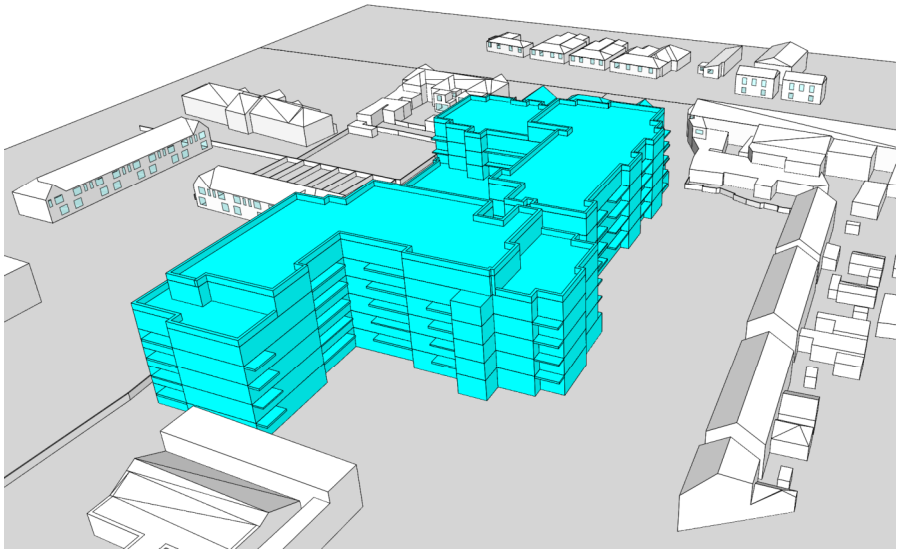
Proposed Residential Development, Glebe House, Dublin

Daylight, Sunlight and Overshadowing Study



Report For: Seabren Developments Ltd and Circle VHA CLG

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1 Executive Summary

This report summarises the analyses undertaken to quantify the Sunlight and Daylight performance of the proposed residential development located at the site of Glebe House including lands to the rear and the Coruba lands, Crumlin, Dublin 12. The report focuses on quantifying the daylight and sunlight impact to the surrounding dwellings as well as the daylight and sunlight performance within the proposed development.

1.1 Planning Authority Guidelines

Currently there are a number of different standards and guidelines which in the writing of this report appropriate and reasonable regard has been taken to address. It should be noted at this point that the *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'* has been included within this report even though it has now been withdrawn because the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) and the BS 8206-2: 2008 directly refer to each other as noted within the BRE guide itself as below.

"This guide gives advice on site layout planning to achieve good sunlight and daylight both within buildings and int the open spaces between them. It is intended to be used in conjunction with the interior daylight recommendations in the British Standard Code of practice for daylighting, *BS 8206-2: 2008."*

In addition to this, The Sustainable Urban Housing: Design Standards for New Apartments December 2020 states the following in Section 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."

However, there is a new standard for the assessment of daylight access within buildings titled "*EN 17037:2018: Daylight in Buildings*" which has been adopted in Ireland as IS EN 17037:2018. This new standard is not directly referred to within the latest Planning Authority Guidelines whereas the BRE Guide and BS 8206-2:2008 are referred to.

Furthermore, the EN 17037:2018 standard has already been adopted in the UK to inform the BS EN 17037:2018 standard which supersedes BS 8206-2:2008 which is now withdrawn. It is important to note that BS EN 17037:2018 includes a National Annex which specifically addresses daylight provision in residential dwellings in the UK. A similar annex is not included in the IS EN 17037:2018 standard.

Therefore, with regards to interior daylighting and external sunlight exposure in particular, where different methodologies are found in each of the different standards, all methodologies have been employed for completeness to ensure appropriate and reasonable regard has been taken to address all assessments under all of the different standards. For clarity are listed below and the following section 1.2 denotes which standard is applicable for each assessment type:

- BRE Guide – 2nd Edition of BR 209 BRE Site Layout Planning for Daylight and Sunlight
- BS 8206-2:2008 – Lighting for Buildings – Part 2: Code of Practice for Daylighting
- IS EN 17037:2018 – Daylight in Buildings
    - This is the Irish implementation of the European EN 17037:2018 standard
- BS EN 17037:2018 – Daylight in Buildings
    - This is the UK implementation of the European EN 17037:2018 standard. It supersedes BS 8206-2:2008 which is withdrawn in the UK. The BS EN standard includes a National Annex which addresses daylight requirements specific to dwellings which is notable as Ireland's climate matches closely with the UK.

1.2 Reference Standards & Summary of Assessments Undertaken

The various daylight and sunlight assessments that were undertaken using the IES VE software are based on a number of different standards which are referenced in the individual sections of this report. For clarity, the assessments that were undertaken are summarised below as well as the reference standards that were used for each (where applicable):

- **Shadow Analysis**
    - Assessed using shadow images cast at key times throughout the year, i.e. March 21st, June 21st and December 21st to determine if any overshadowing impact occurs and to what extent to any existing neighbouring dwellings in accordance with the BRE Guide.
- **Sunlight to Amenity Spaces**
    - Assessed using annual Solar Exposure calculations to determine any impact to existing amenities and the sunlight received and also to assess the proposed developments amenity spaces to derive how much sunlight they can expect to receive in accordance with the BRE Guide.
- **Sunlight to Existing Buildings**
    - Assessed using the Annual Probable Sunlight Hours (APSH) method in accordance with the BRE Guide / BS 8206-2:2008 - to determine any impact to sunlight received to the existing neighbouring building main living areas.
- **Sunlight to Proposed Buildings**
    - Assessed using the Annual Probable Sunlight Hours (APSH) method in accordance with the BRE Guide / BS 8206-2:2008
    - Assessed using Solar Exposure calculations in accordance with IS EN 17037:2018

- In both assessments above the aim is to derive how much sunlight proposed development can expect to receive.

- **Daylight to Existing Buildings**
  - Assessed using the Vertical Sky Component (VSC) method in accordance with the BRE Guide / BS 8206-2:2008 - to determine any impact to existing daylight received to the existing building neighbouring the site.

- **Daylight to Proposed Development**
  - Assessed using the Average Daylight Factor (ADF) method in accordance with the BRE Guide / BS 8206-2:2008
  - Assessed in accordance with IS EN 17037:2018 Method 2
  - Assessed in accordance with BS EN 17037:2018 National Annex Method 2
  - In all assessments above the aim is to derive how much daylight will be received within each of the apartments within the proposed development.
- **View Out**
  - Assessed in accordance with IS EN 17037:2018
- **Glare**
  - Assessed in accordance with IS EN 17037:2018

1.3 Shadow Analysis

The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation and the Proposed Scheme. The results from the study are summarised as follows:

Somerville Green

Additional shading observed from the proposed development on these existing residential properties during the months of March (0800) and December* (0800-1400). No additional shading is noted at any other point through the year.

St Agnes Road

Minor additional shading observed from the proposed development on these existing residential properties during the month of December* (1400). No additional shading is noted at any other point through the year.

St Agnes Terrace

Additional shading observed from the proposed development on these existing residential properties during the months of March (0800 -1000) and December* (0800-1400). No additional shading is noted at any other point through the year.

Somerville Drive

Minor additional shading observed from the proposed development on these existing residential properties during the month of June (1800-2000). No additional shading is noted at any other point through the year.

***** Overshadowing can be expected in December when the sun is lower in the sky and shadows cast are much longer. Although this is the case, overshadowing is least noticeable during the winter months as there is a lot less sunlight available at this time of year and so the overall impact is vastly reduced.

The potential shading impact is quantified via the "Sunlight to Amenity Spaces" and "Daylight to Existing Buildings" section of this report.

1.4 Sunlight to Amenity Spaces

The BRE Guide states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation with the proposed development in place.

Existing Amenity Spaces

The existing communal and private amenity spaces in the adjacent properties have been analysed and the results demonstrate they continue to receive the same level of sunlight even with the proposed development in place on March 21st, thus complying with the recommendations in the BRE Guide as outlined above.

Proposed Amenity Spaces

On March 21st 88% of the combined proposed public amenity spaces and 60% of the combined proposed communal amenity spaces provided within the development will receive at least 2 hours of sunlight over the total area provided, thus exceeding the 50% recommendation noted in the BRE Guide. In addition, all individual spaces meet the BRE recommendations confirming the amenity areas provided will be a quality spaces in terms of sunlight.

1.5 Sunlight to Existing Buildings

This study considers the proposed scheme and tests if the Annual Probable Sunlight Hours (APSH) results for the living room windows are greater than 25% annual and 5% winter sunlight or are greater than 0.8 times their former value with the proposed development in place.

When compared to the Existing Situation, of the 13 no. points tested on St Agnes Road, 100% (13 no. points) meet the annual and winter recommendations outlined in the BRE Guide. Therefore, the Proposed Scheme has a negligible impact when compared to the Existing Situation.

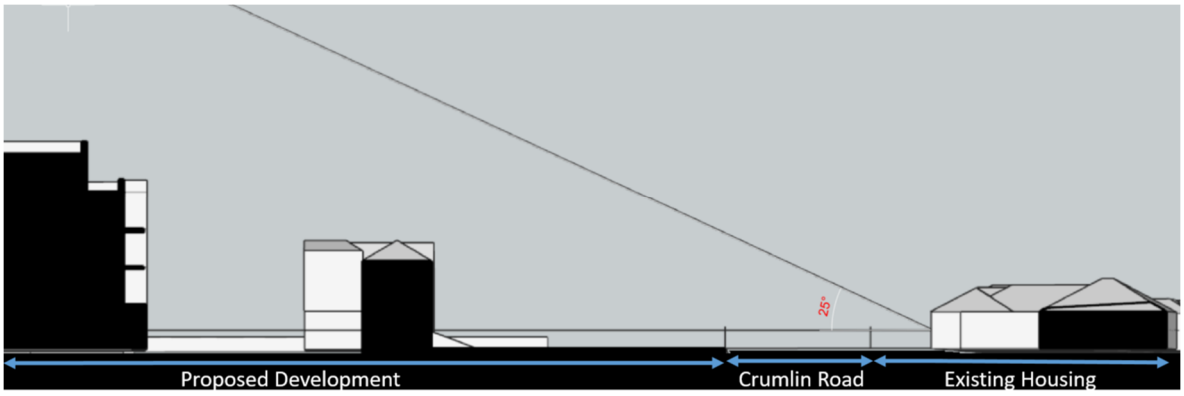
Based on the criteria outlined in Section 3.2.7 of the BRE guidance, only 13 windows of the existing neighbouring dwellings are included within the APSH assessment as the rest did not meet the criterion as laid out within the BRE guide.

"It is not always necessary to do a full calculation to check sunlight potential. The guideline above is net provided either the following is true:

- If the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window."
- The existing building has living room with a main window which faces within 90 degrees of due south and the 25° rule is applied.

Given the statement above the 25-degree check was carried out for the existing dwellings adjacent to the proposed development across St Agnes Road. The proposed development passed as can be seen from the image below and as such these properties were excluded on the basis, as noted in section 3.2.7 of the BRE guidance, that these windows need not be analysed as sunlight impact will be unnoticeable to the existing occupants.

In addition, the properties on Summerville Drive were excluded from the assessment as they did not have a main living room window that sat within 90 degrees of due south.



Site Section – Qualification of Distance/Height Rule & 25° Rule

1.6 Sunlight to Proposed Development

For the sunlight to proposed development assessment, two standards have been analysed: BRE Guide / BS 8206-2:2008 and IS EN 17037:2018. All main living room windows within the

proposed development have been assessed and the results are summarised below under each standard.

BRE Guide / BS 8206-2:2008

Within the BS 8206-2:2008 standard, when discussing annual probable sunlight hours regarding proposed developments, it is noted that:

"The degree of satisfaction is related to the expectation of sunlight. If a room is necessarily North facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".

This is also reflected in the BRE Guide which states:

"The BS 8206-2 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met."

Of the 165 no. points tested, 127 no. points (77%) meet the BRE recommended values over the annual period. The compliance rate increases to 80% (132 no. points) during the winter period when sunlight is most valuable.

It should be noted that in the development of any apartment type building achieving in the region of 75% to 80% for this assessment would be considered very high and factors such site constraints and ultimately orientation play a huge part to the outcome of this assessment. As such, the sunlight provision results to the proposed development in accordance with BRE Guide/BS 8206-2:2008 are considered to be excellent in the context of this urban environment, due to the fact that not all living rooms can face south and the inclusion of balconies within the design scheme (as a requirement).

IS EN 17037:2018

As the sunlight exposure assessment in accordance with IS EN 17037:2018 considers the orientation of the rooms similar to the BRE Guide / BS 8206-2:2008 assessment above, it can also be concluded that the criteria for rooms facing significantly north of due east or west is unlikely to be met.

Of the 165 no. points tested, 152 no. points (92%) meet the IS EN 17037:2018 sunlight exposure recommendations of greater than 1.5 hours on March 21st. Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.

Overall, the sunlight provision results to the proposed development in accordance with IS EN 17037:23018 are considered excellent in the context of an urban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

Note, the sunlight exposure results are visually represented in Appendix B.

1.7 Daylight to Existing Buildings

This study considers the Proposed Scheme and tests if the VSC results are greater than 27% or not less than 0.8 times the value of the Existing Situation.

When compared to the Existing Situation, of the 111 no. points tested, 95% (105 points) have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing Situation. The remaining 6 points have VSC values of 26.34% and 26.94% which is just below the 27% recommendations. Therefore, the Proposed Scheme has a negligible impact when compared to the Existing Situation and complies with the BRE guidance.

1.8 Daylight to Proposed Development

For the daylight to proposed development assessment, three standards have been analysed: BRE Guide / BS 8206-2:2008, IS EN 17037:2018 and BS EN 17037:2018 National Annex. The results under each standard are summarised below.

BRE Guide / BS 8206-2:2008

Across the proposed development, 95% of the tested rooms are achieving Average Daylight Factors (ADF) in accordance with the BRE Guide / BS 8206-2:2008 when Living/Kitchen/Dining spaces are assessed as whole rooms against a 2% ADF target and Bedrooms against a 1% ADF target. The majority of rooms that are failing are located on the lower floors. However, overall the quality of daylight provision across the development can be considered high.

Compensatory Measures

With regards to internal daylighting, Section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments December 2020, states the following:

"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 (sic). This may arise due to 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."

Furthermore, Section 3.2 of the Urban Development and Building Heights: Guidelines for Planning Authorities December 2018, states the following:

Where a proposal may not be able to fully meet all 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, in respect of which the planning authority or An Bord Pleanála

should apply their discretion, having regard to local factors including specific site constraints 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.

Having regard to the statements above, it should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme. Initial testing was producing daylight results of 89% for the 2% target. Optimisation solutions were tested which included the following:

- Increased window sizes to improve daylight provision to the apartments.

The introduction of the above design solutions improved the daylight to the scheme as a whole as anticipated producing final daylight results of 95% for the 2% target and.

In addition to this, design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against. These design features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:

- 69% of the apartment units (104 no. of 150 no.) have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (Dec 2020). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.
- 59% of the apartment units are dual aspect which is above the 50% minimum requirement as required by the Design Standards (Dec 2020). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.
- An additional 3% of public open space (905 sq m) above the minimum requirements (10% = 878 sq m) required by the Dublin City Development Plan 2016-2022 is proposed across the development which provides additional residential amenity.
- Furthermore, an additional 94% of communal open space above the minimum requirements (838 sq m) required by the Design Standards (Dec 2020) is proposed across the development.

IS EN 17037:2018

It is important to note that IS EN 17037:2018 does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 of IS EN 17037:2018 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3 (refer to Section 10.1.2 of this report). The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1 (refer to Section 10.1.2 of this report). The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

As outlined in Section 5.1.4 of the standard, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *"a representative model of the space is required together with the key parameters (such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building. This can be determined using either Method 1 or Method 2."*

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037:2018.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

Across the proposed development, 90% of the tested rooms are achieving the daylight provision targets in accordance with Table A.1 of IS EN 17037:2018 using Method 2.

BS EN 17037:2018 National Annex

In the UK, EN17037:2018 was adopted to form "BS EN 17037:2018". However, a National Annex was included which states:

"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."

Whereas IS EN 17037:2018 does not provide different illuminance targets for different space types, the BS EN 17037:2018 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 (refer to Section 10.1.3 of this report). It is also important to note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.
The BS National Annex also states:

"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."

Therefore, combined LKDs were assessed using a 200 lux target illuminance (E_T).

Across the proposed development, 99% of the tested rooms are achieving the daylight provision targets in accordance with Table NA.1 of BS EN 17037:2018 using Method 2.

1.9 View Out

The View Out assessment is related to buildings such as offices or schools where seating layouts are typically fixed compared to domestic settings where an occupant can move around the space freely. In their own home occupants can choose to sit near to or even at a window which will inevitably provide the varying layers of a 'View Out' such as the ground, landscape or sky. This ability to choose their position within a domestic setting means they would always have access to a position in the apartment with the minimum requirements of 'View Out'. Therefore, all the properties would meet the minimum requirement as outlined in IS EN 17037:2018/ BS EN 17037:2018 National Annex.

1.10 Glare

As outlined in IS EN 17037:2018/ BS EN 17037:2018 National Annex, a Glare assessment is suggested in spaces where the *"expected activities are comparable to reading, writing or using display devices and the user is not able to choose freely their position and viewing direction".* Given that occupants within a domestic setting are free to move around, on this basis a glare assessment for the proposed development has not been carried out.

1.11 Observations

It is important to note that the recommendations within the BRE Guide itself states "*although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of many factors in site layout design"*, Although this is true appropriate and reasonable regard has still been taken to the BRE guide.

Whilst the results shown relate to the criteria as laid out in the BRE Guide, it is important to note that the BRE targets are guidance only and should therefore be used with flexibility and caution when dealing with different types of sites.

In addition, the foreword of BS 8206-2:2008 also states "*The aim of the standard is to give guidance to architects, builders and others who carry out lighting design. It is recognised that lighting is only one of many matters that influence fenestration. These include other aspects of environmental performance (such as noise, thermal equilibrium and the control of energy use), fire hazards, constructional requirements, the external appearance and the surroundings of the site. The best design for a building does not necessarily incorporate the ideal solution for any individual function. For this reason, careful judgement needs to be exercised when using the criteria given in the standard for other purposes, particularly town planning control.*"

Taking all of the above information into account and based on the results from each of the assessments undertaken, the proposed development performs well when compared to the recommendations in the BRE Guide / BS 8206-2:2008, IS EN 17037:2018 and BS EN 17037:2018 National Annex. With regards to the existing properties there is a negligible impact when considering sunlight and daylight as a result of the proposed development and the proposed development itself performs well with the same regard.

2 Introduction

This report summarises the analyses undertaken to quantify the Sunlight and Daylight performance of the proposed residential development located at the site of Glebe House including lands to the rear and the Coruba lands, Crumlin, Dublin 12. The report focuses on quantifying the daylight and sunlight impact to the surrounding dwellings as well as the daylight and sunlight performance within the proposed development.

2.1 Development Description

Seabren Developments Ltd and Circle VHA CLG intend to apply to An Bord Pleanála for planning permission for a strategic housing development at this site located at Glebe House (Protected Structure, RPS Ref. 7560), including the vacant Glebe light industrial lands, and the vacant site of the former Coruba House, Saint Agnes Road, Crumlin, Dublin 12 all on a site of 0.88 Hectares. The site bounds Somerville Drive and Somerville Green to the southeast and southwest, respectively, and includes the grass margin between the Coruba site boundary and Somerville Drive. The Glebe House lies within the Crumlin Architectural Conservation Area.

A residential development of 150 no. apartments consisting of 74 one beds, 72 two beds and 4 three bed residential units, a creche and café. The proposed scheme has an overall Gross Floor Area of 15,767 sq.m.

Two apartment buildings are proposed ranging in height from 4 – 6 storeys and linked by a carpark at ground floor and a podium at first floor level comprising the following:

- Block A is 5-6 storeys and consists of 79 apartments and includes 35 no. one beds and 44 no. two beds units, ESB substation/switch room/metering room of 85sqm, 42 no. secure bicycle storage and bin storage of 44sqm

- Block B is 4-5 storeys and consists of 66 apartments and includes 38 no. one beds, 25no. two beds and 3 no. three beds, a Creche of 147 sqm at ground floor level with associated outdoor area, ground floor plant rooms of 74sqm, ESB substations/switch room/metering room/telecoms of 89sqm, 188 no. secure bicycle storage spaces in two locations, 6 no. motorbike spaces and bin storage of 75sqm.

Two no. three storey pavilion buildings either side of Glebe House to accommodate:

- One number two storey duplex 2 bed apartment above one number 1 bed apartment at ground floor in the north west pavilion and,
- One number two storey duplex 2 bed apartment above a 55 sqm ground floor café, in the south east pavilion.

The repair of fire damaged elements (following a fire 21st April 2022) and the refurbishment of Glebe House, a protected structure, into two apartments, one number 2 bed unit at lower ground floor and one number 3 bed unit at upper ground and first floor;

- Repair of fire damaged elements including the replacement of all roof coverings and structure, replacement of all first floor timber stud walls, replacement of first floor rear return joists, replacement/repair of floor joists at first floor level, replacement of internal render to kitchen/dining area in rear return building and replacement/repair of stair from upper ground to first floor level,
    - the refurbishment of Glebe House including the removal of extensions to the rear and sides of the building, restoration of the façade, replacement of pvc windows with sliding sash windows and associated works to the interior and to the curtilage of Glebe House.
    - Lowering the front boundary wall and return boundary wall to the front of Glebe House.

Demolition of all workshops, offices and sheds to the rear and sides of Glebe House Demolition of boundary walls around the Coruba land on Somerville Drive, the front entrance and between Coruba and the Glebe lands. Demolition of non-original brick column's at St Agnes Road entrance to Glebe House (1,636 sqm).

75 car parking spaces are proposed:
66 no. car parking spaces (includes 2 Go Car spaces) in ground floor car park below podium and partly in Block A and 4 No. visitor car parking spaces in front of Glebe House all with vehicular access from St Agnes's Road

- 5 No. assigned car parking spaces on the eastern side of Block B with vehicular access from Somerville Drive.

The development provides 905 sqm of Public Open Space to the front and side of Glebe House, and within the southeast public plaza. with a pedestrian route to the side of the Café at Pavilion B and 1,632 sqm of Communal Open Space located at podium level and to the rear of Block A.

- 76 no. visitor bicycle parking spaces are provided in the public accessible areas of the site.

The application also includes the provision of a new footpath along the south-eastern boundary at Somerville Drive, a new controlled gate between Somerville Drive and St Agnes Road allowing public access through the site within daylight hours and a new pedestrian access from the public open space onto St. Agnes Road, boundary treatment, landscaping, Solar Panels on the roof of Blocks A and B, provision of 4 no. Microwave link dishes to be mounted on 2 No. steel support posts affixed to the lift shaft overrun on Block A, lighting, services and connections, waste management and other ancillary site development works to facilitate the proposed development.

3 BRE – Site Layout Planning for Daylight and Sunlight (2nd Edition)

Access to daylight and sunlight is a vital part of a healthy environment. Sensitive design should provide sufficient daylight and sunlight to new residential developments while not obstructing light to existing homes nearby.

The 2nd Edition of the BR 209 BRE Site Layout Planning for Daylight and Sunlight, henceforth referred to as the "BRE Guide", advises on planning developments for good access to daylight and sunlight and is widely used by local authorities to help determine the performance of new developments.

3.1 Impact Classification Discussion

BRE guidance in Appendix I – Environmental Impact Assessment suggests impact classifications as minor, moderate and major adverse. It provides further classifications of these impacts with respect to criteria summarised in the table below.

Where the loss of skylight or sunlight fully meets the guidelines in the BRE guide, the impact is assessed as negligible or minor adverse. Where the loss of skylight or sunlight does not meet the BRE guidelines, the impact is assessed as minor, moderate or major adverse.

Impact	Description
Negligible adverse impact	• *Loss of light well within guidelines, **or*** • *only a small number of windows losing light (within the guidelines) **or** limited area of open space losing light (within the guidelines)*

Minor adverse impact (a)	• *Loss of light only just within guidelines **and***
	  ○ *a larger number of windows are affected **or***
	  ○ *larger area of open space is affected (within the guidelines)*

Minor adverse impact (b)	• *only a small number of windows or limited open space areas are affected* • *the loss of light is only marginally outside the guidelines* • *an affected room has other sources of skylight or sunlight* • *the affected building or open space only has a low-level requirement for skylight or sunlight* • *there are particular reasons why an alternative, less stringent, guideline should be applied*
Major adverse impact	• *large number of windows or large open space areas are affected* • *the loss of light is substantially outside the guidelines* • *all the windows in a particular property are affected* • *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight (living rooms / playground)*

4 Methodology

4.1 Planning Authority Guidelines and Standards for Daylight

Currently there are a number of different standards and guidelines which in the writing of this report appropriate and reasonable regard has been taken to address. It should be noted at this point that the *BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' has been included within this report even although it has* now *been* withdrawn because the *BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) and the BS 8206-2: 2008 directly refer to each other as noted within the BRE guide itself as below.*

"This guide gives advice on site layout planning to achieve good sunlight and daylight both within buildings and int the open spaces between them. It is intended to be used in conjunction with the interior daylight recommendations in the British Standard Code of practice for daylighting, *BS 8206-2: 2008."*

In addition to this, The Sustainable Urban Housing: Design Standards for New Apartments December 2020 states the following in Section 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."

However, there is a new standard for the assessment of daylight access within buildings titled "*EN 17037:2018: Daylight in Buildings*" which has been adopted in Ireland as IS EN 17037:2018. This new standard is not directly referred to within the latest Planning Authority Guidelines whereas the BRE Guide and BS 8206-2:2008 are referred to.

Furthermore, the EN 17037:2018 standard has already been adopted in the UK to inform the BS EN 17037:2018 standard which supersedes BS 8206-2:2008 which is now withdrawn. It is important to note that BS EN 17037:2018 includes a National Annex which specifically addresses daylight provision in residential dwellings in the UK. A similar annex is not included in the IS EN 17037:2018 standard.

Therefore, with regards to interior daylighting and external sunlight exposure in particular, where different methodologies are found in each of the different standards, all have been carried out for completeness to ensure appropriate and reasonable regard has been taken to address all assessments under all of the different standards.

The diagram above illustrates the relationship between the standards and guidance documents which are listed out below.

- (1) Urban Development and Building Heights
- (2) The Sustainable Urban Housing: Design Standards for New Apartments
- (3) BRE Guide – 2nd Edition of BR 209 BRE Site Layout Planning for Daylight and Sunlight
- (4) BS 8206-2:2008 – Lighting for Buildings – Part 2: Code of Practice for Daylighting
- (5) BS EN 17037:2018 – Daylight in Buildings
    - This is the UK implementation of the European EN 17037:2018 standard. It supersedes BS 8206-2:2008 which is withdrawn in the UK. The BS EN standard includes a National Annex which addresses daylight requirements specific to dwellings which is notable as Ireland's climate matches closely with the UK.
- (6) IS EN 17037:2018 – Daylight in Buildings
    - This is the Irish implementation of the European EN 17037:2018 standard

4.2 Reference Standards & Summary of Assessments Undertaken

The various daylight and sunlight assessments that were undertaken using the IES VE software are based on a number of different standards which are referenced in the individual sections of this report. For clarity, the assessments that were undertaken are summarised below as well as the reference standards that were used for each (where applicable):

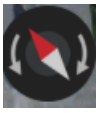
- **Shadow Analysis**
    - Assessed using shadow images cast at key times throughout the year, i.e. March 21st, June 21st and December 21st
- **Sunlight to Amenity Spaces**

- Assessed using annual Solar Exposure calculations - BRE Guide

- **Sunlight to Existing Buildings**
  - Assessed using the Annual Probable Sunlight Hours (APSH) method in accordance with the BRE Guide / BS 8206-2:2008
- **Sunlight to Proposed Buildings**
  - Assessed using the Annual Probable Sunlight Hours (APSH) method in accordance with the BRE Guide / BS 8206-2:2008
  - Assessed using Solar Exposure calculations in accordance with IS EN 17037:2018
- **Daylight to Existing Buildings**
  - Assessed using the Vertical Sky Component (VSC) method in accordance with the BRE Guide / BS 8206-2:2008
- **Daylight to Proposed Development**
  - Assessed using the Average Daylight Factor (ADF) method in accordance with the BRE Guide / BS 8206-2:2008
  - Assessed in accordance with IS EN 17037:2018 Method 2
  - Assessed in accordance with BS EN 17037:2018 National Annex Method 2
- **View Out**
  - Assessed in accordance with IS EN 17037:2018
- **Glare**
  - Assessed in accordance with IS EN 17037:2018

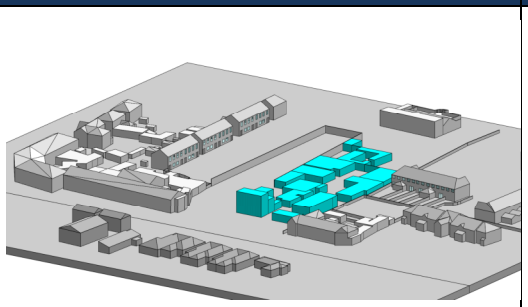
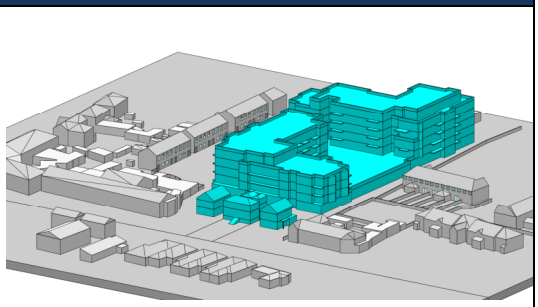
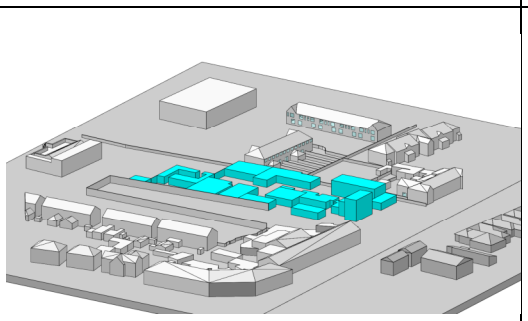
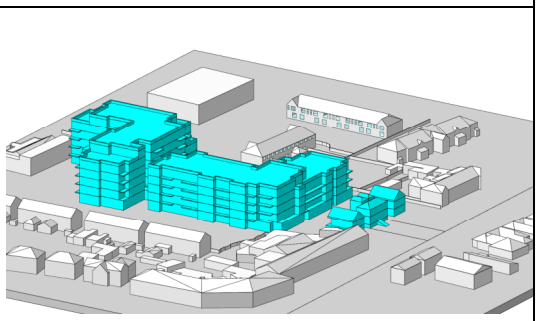
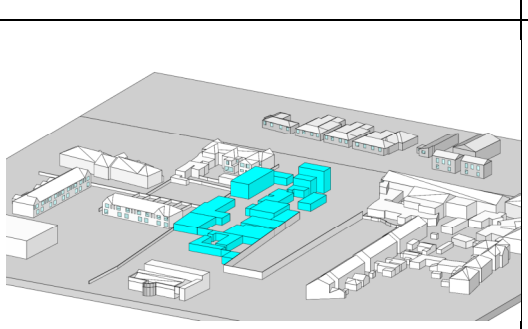
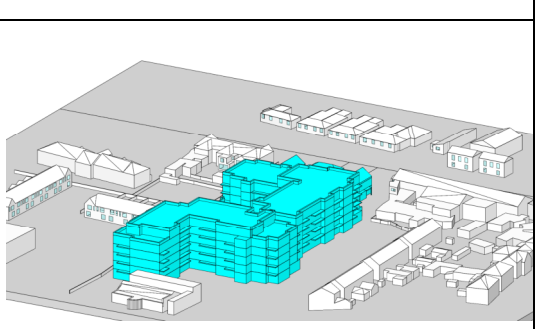
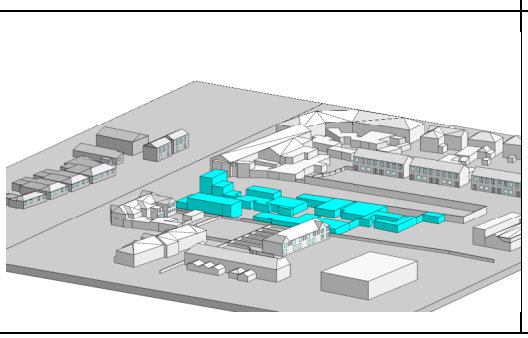
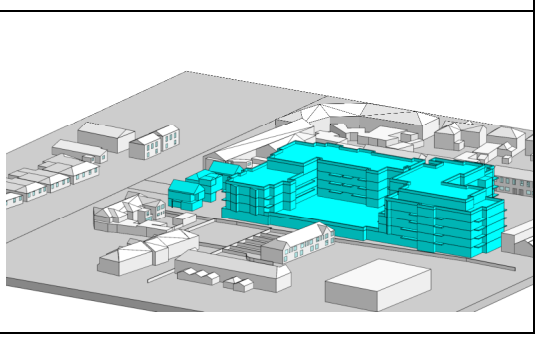
4.3 Orientation

The model orientation has been taken from drawings provided by the Architect with the resulting angle shown below used in the analysis.

Orientation	
	
	

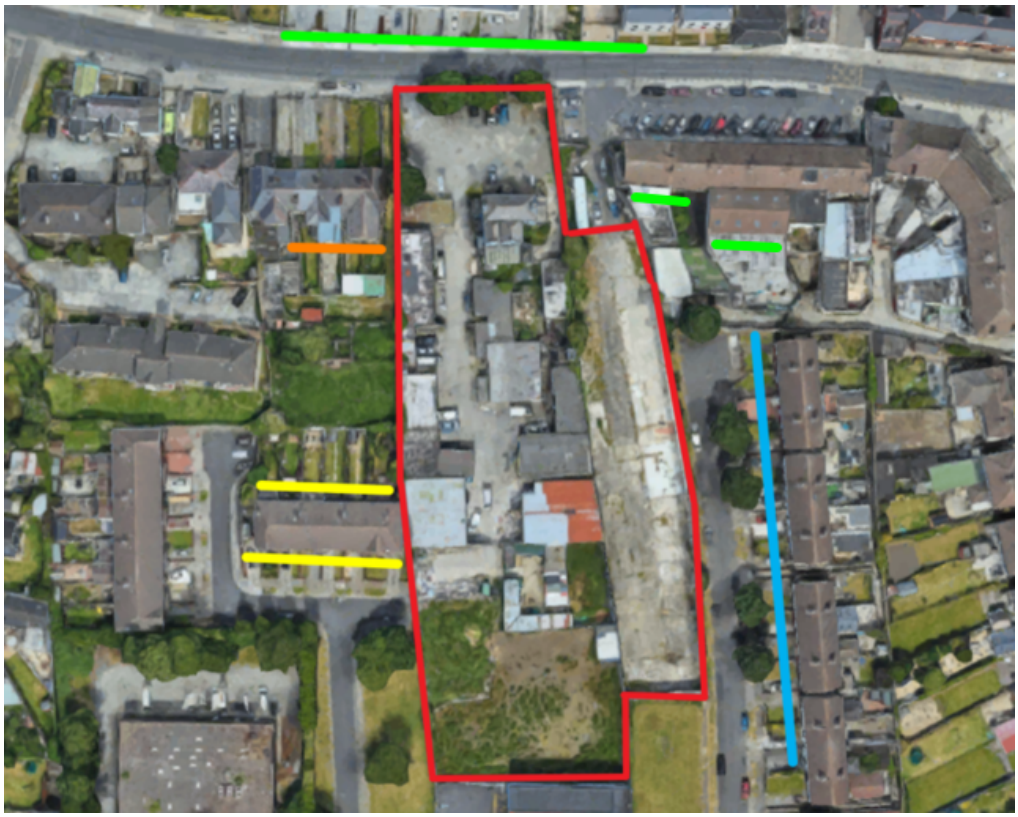
4.4 Proposed Model

The following images illustrate the models created from the architectural information provided and the use of Google/Bing maps where information was absent.

	Existing Situation	Proposed Scheme
View looking from North of Site		
View looking from East of Site		
View looking from South of Site		
View looking from West of Site		

4.5 Potential Sensitive Receptors

To help understand the potential impact to surrounding buildings, potential sensitive receptors were identified as illustrated below.



	Proposed Site
	Somerville Green
	St Agnes Terrace
	Somerville Drive
	St Agnes Road

5 Shadow Analysis

The statistics of Met Eireann, the Irish Meteorological Service, show that the sunniest months in Ireland are May and June, based on 1981-2010 averages or latest: https://www.met.ie/climate/30-year-averages.

The following can also be shown:

- During December a mean daily duration of 1.7 hours of sunlight out of a potential 7.3 hours sunlight each day is received (i.e. only 23% of potential sunlight hours).
- During June a mean daily duration of 5.8 hours of sunlight out of a potential 15.9 hours sunlight each day is received (i.e. only 36% of potential sunlight hours).

Therefore, the impacts caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months.

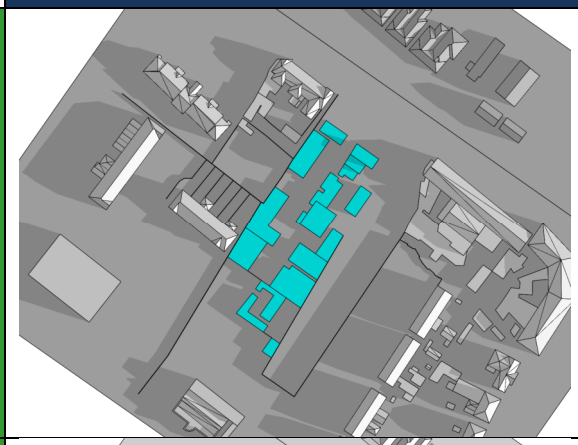
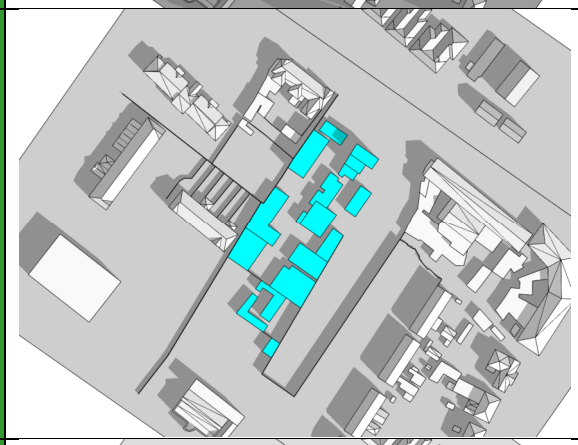
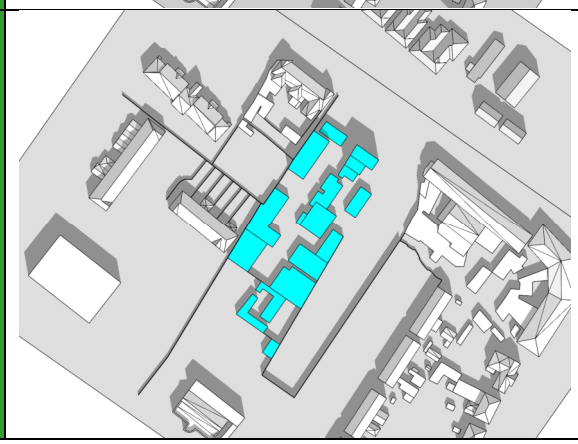
This section will consider the shadows cast by the proposed development on the following dates:

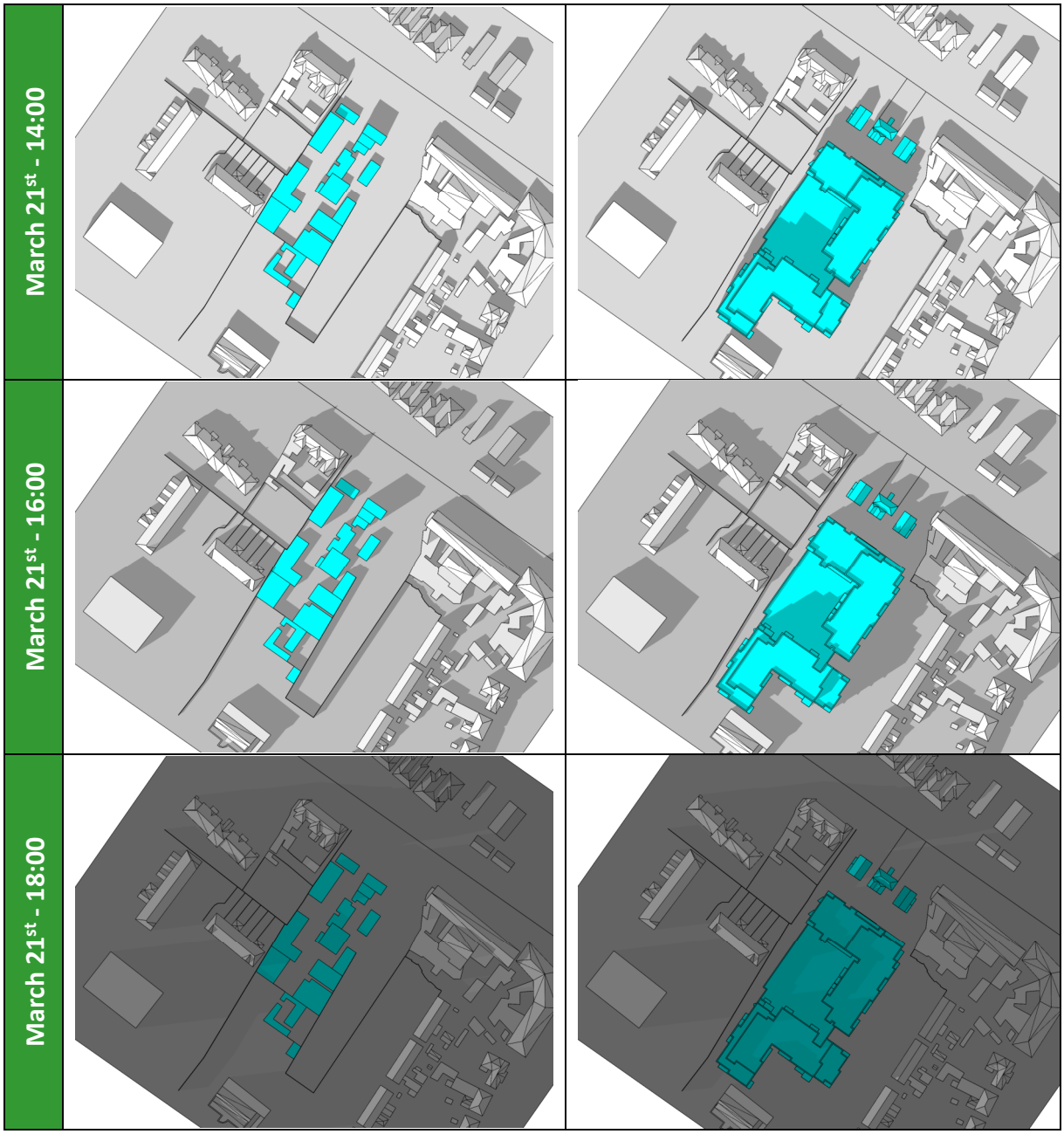
- March 21st / September 21st (Equinox)
- June 21st (Summer Solstice)
- December 21st (Winter Solstice)

These images illustrate shadows cast for 'perfect sunny' conditions with no clouds and assumed that the sun is shining for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

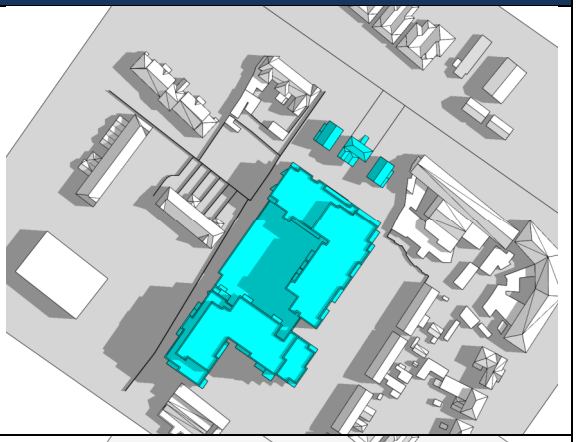
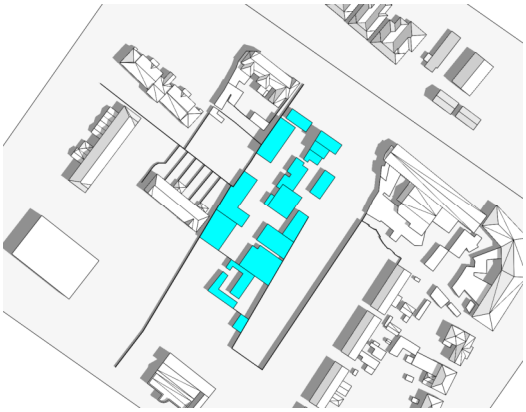
5.1 Plan View

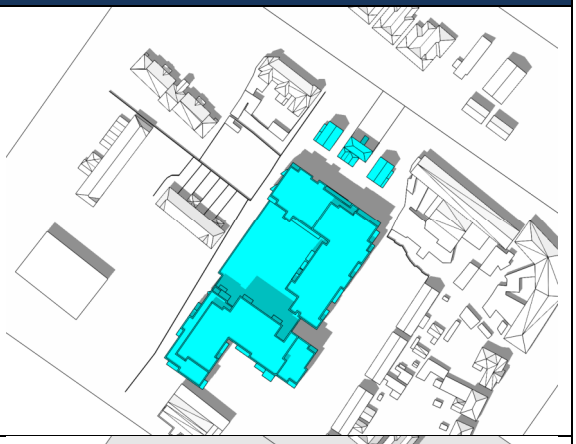
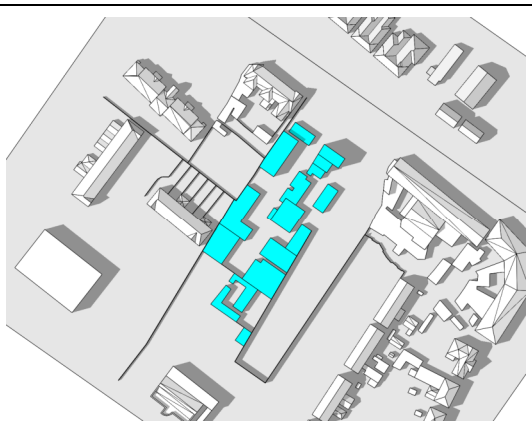
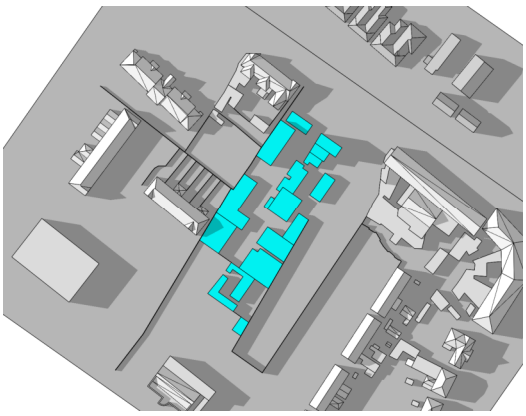
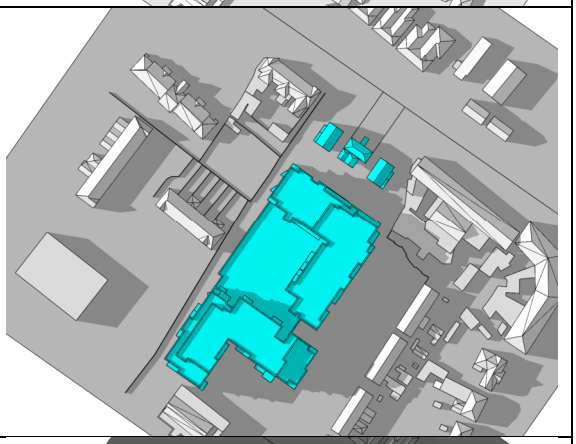
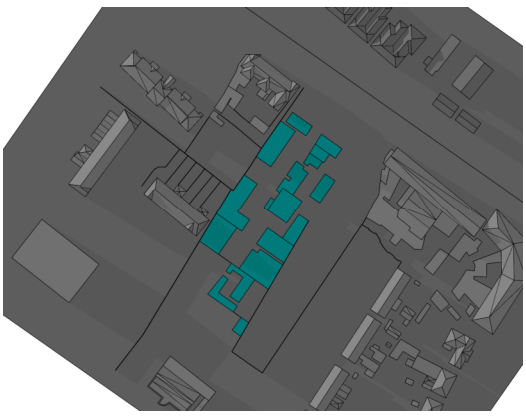
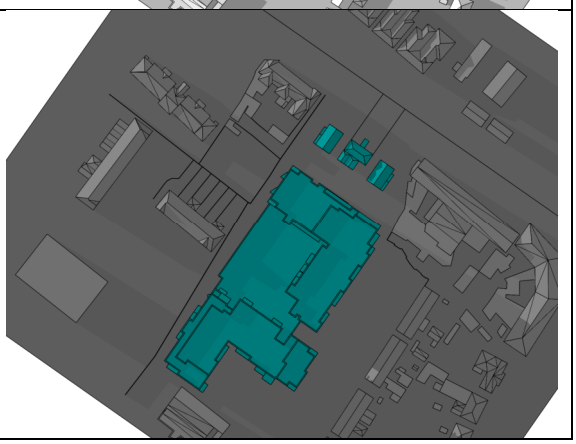
5.1.1 March 21st

	Existing	Proposed
March 21st - 8:00		
March 21st - 10:00		
March 21st - 12:00		

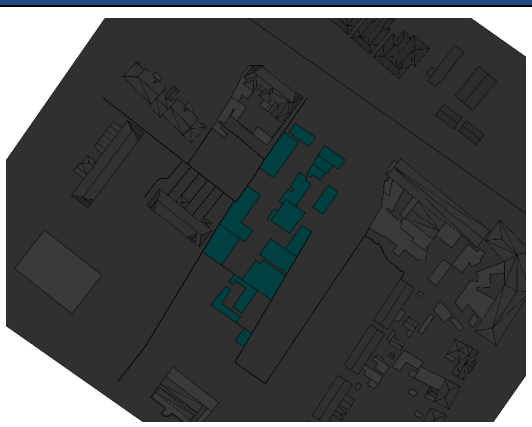
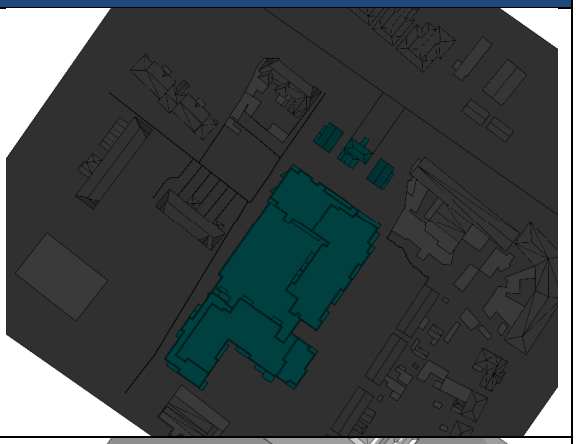
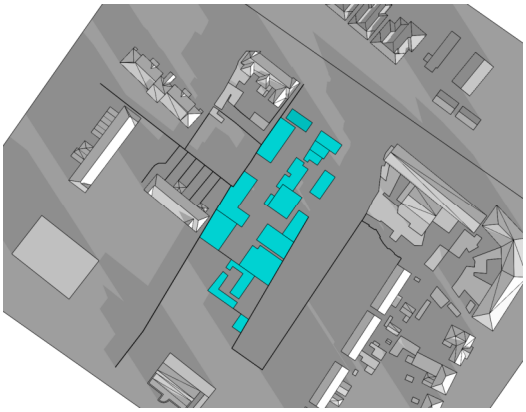
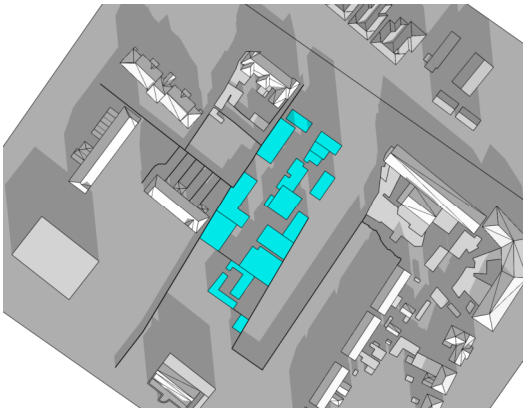
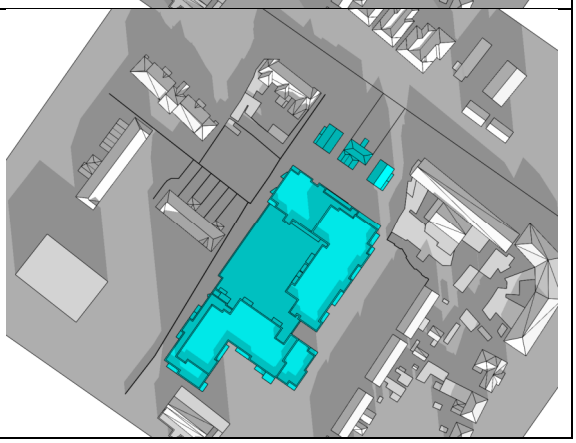

March 21st - 14:00
March 21st - 16:00
March 21st - 18:00

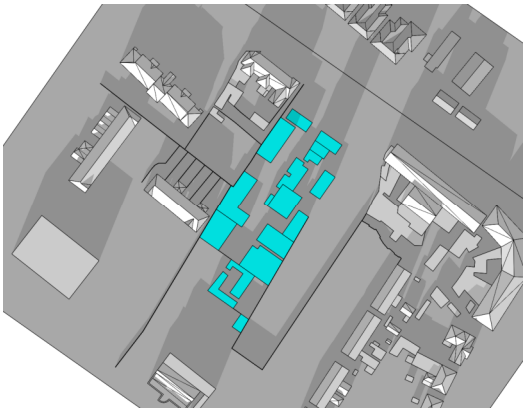
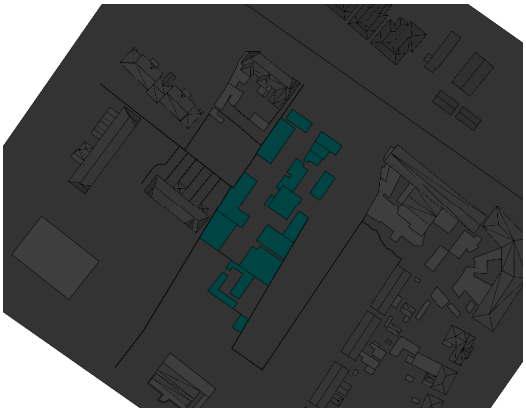
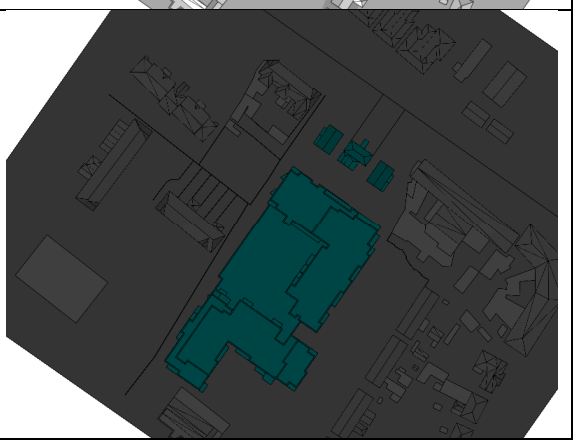
5.1.2 June 21st

	Existing	Proposed
June 21st - 8:00		
June 21st - 10:00		
June 21st - 12:00		

	Existing	Proposed
June 21st - 14:00		
June 21st - 16:00		
June 21st - 18:00		
June 21st - 20:00		

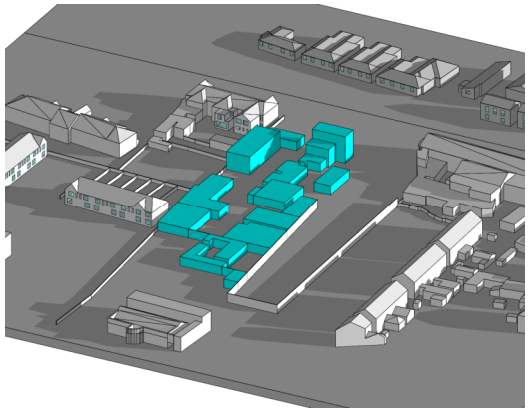
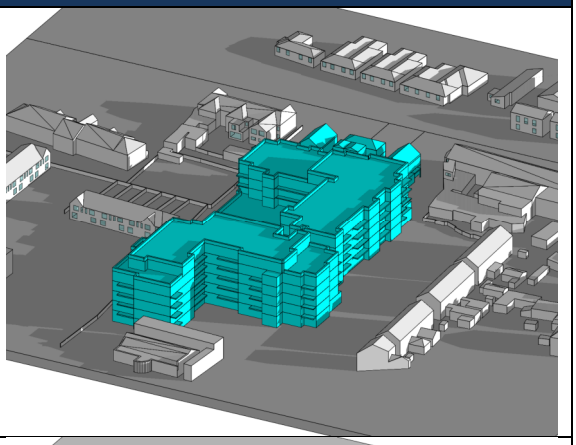
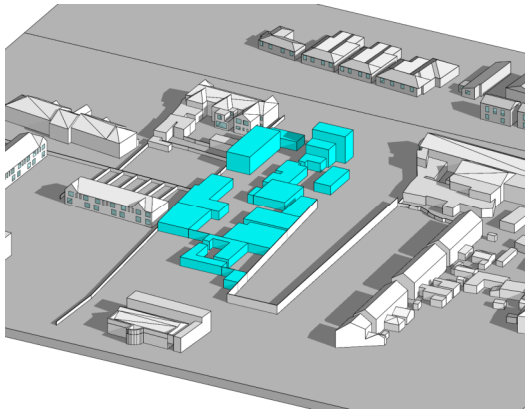
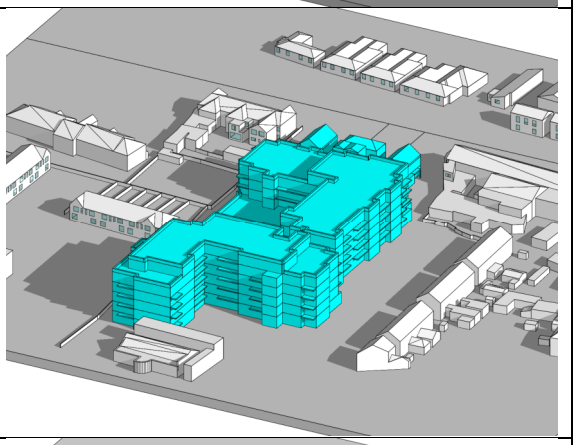
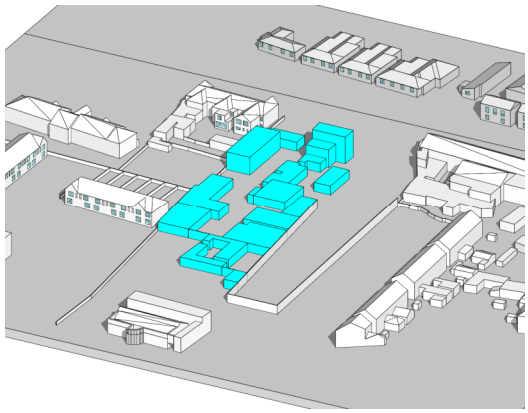
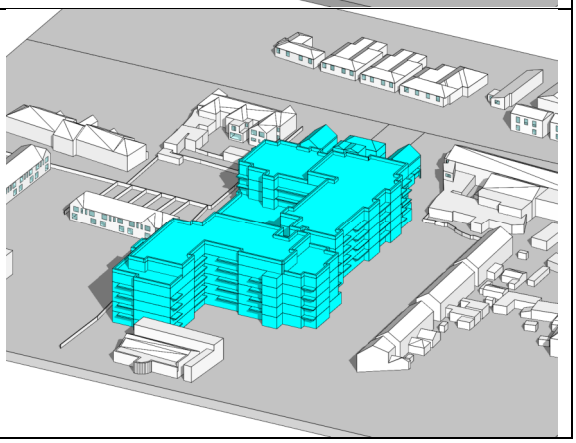
5.1.3 December 21st

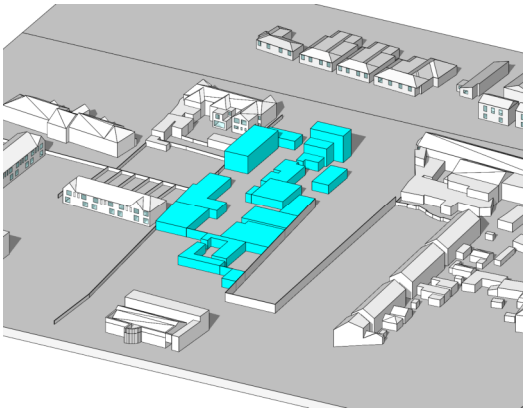
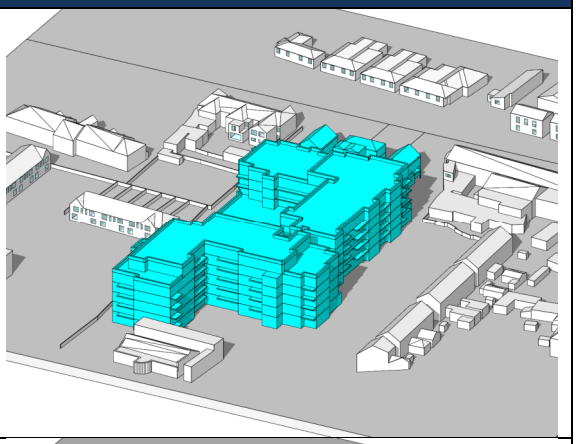
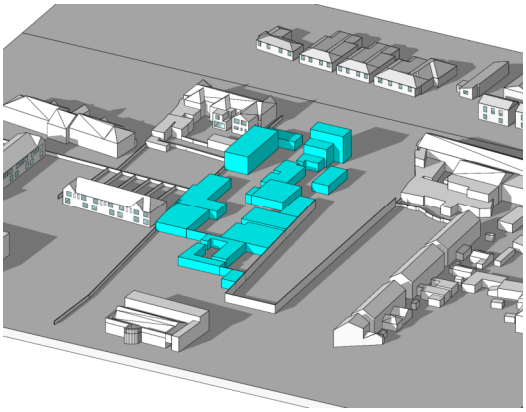
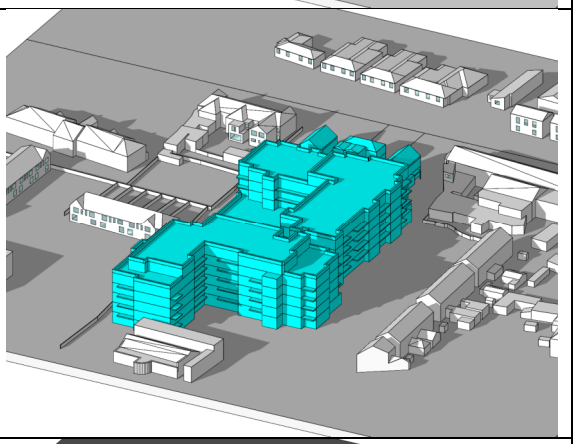
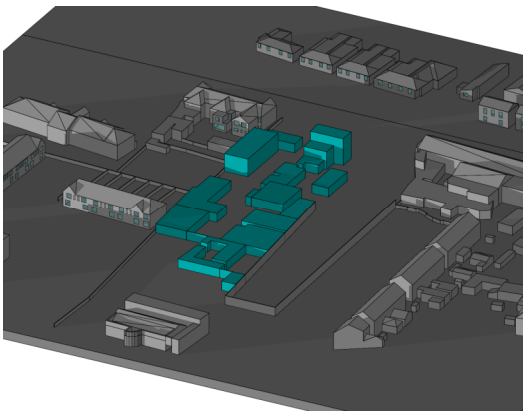
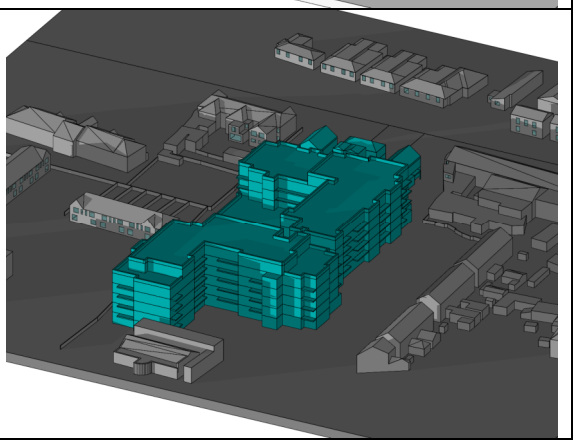
	Existing	Proposed
December 21st - 8:00		
December 21st - 10:00		
December 21st - 12:00		

December 21st - 14:00		
December 21st - 16:00		

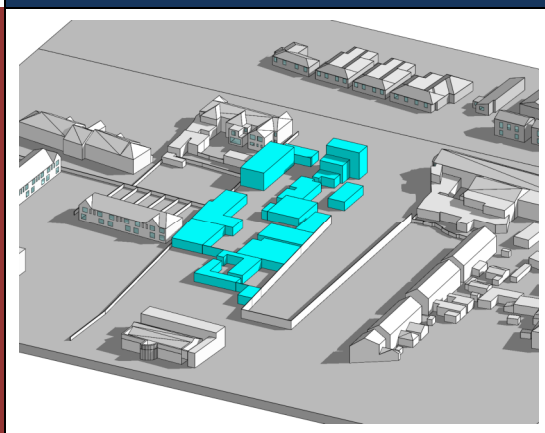
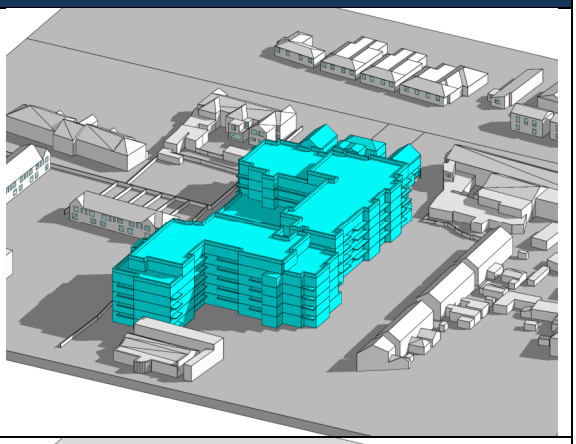
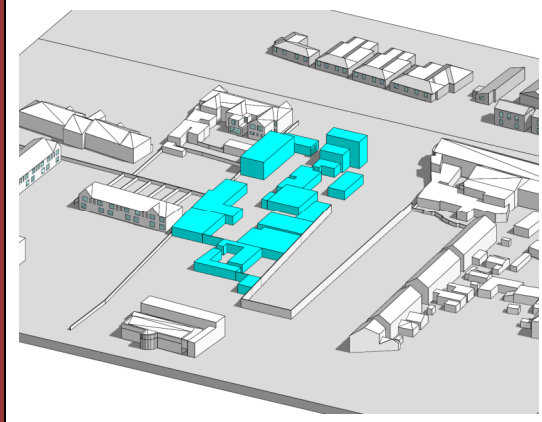
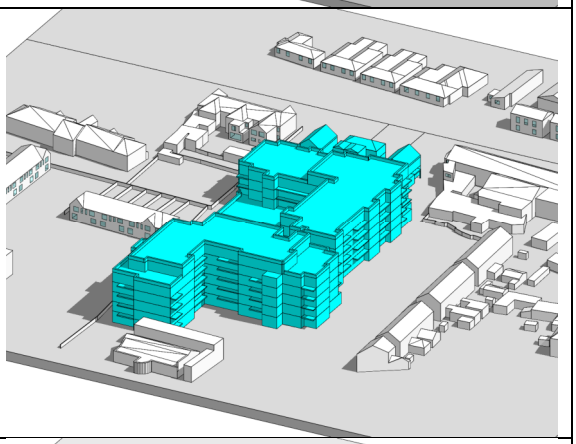
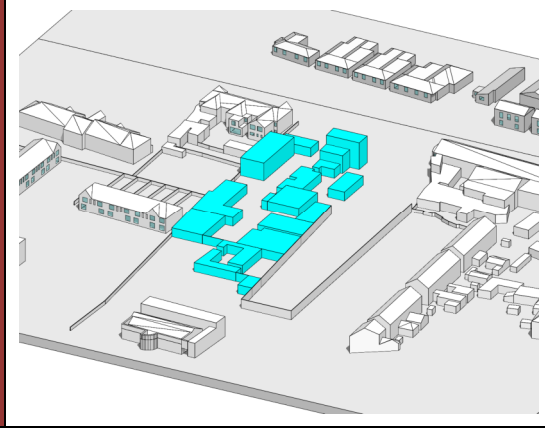
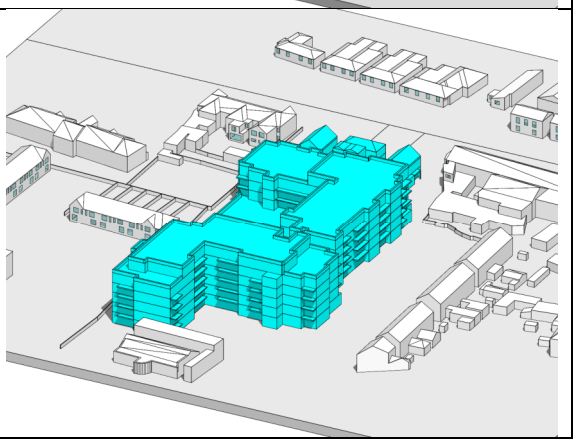
5.2 3D View

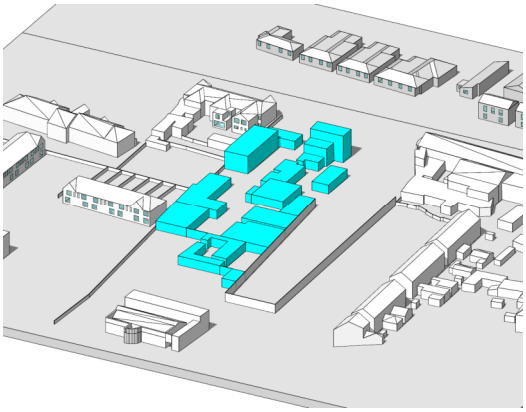
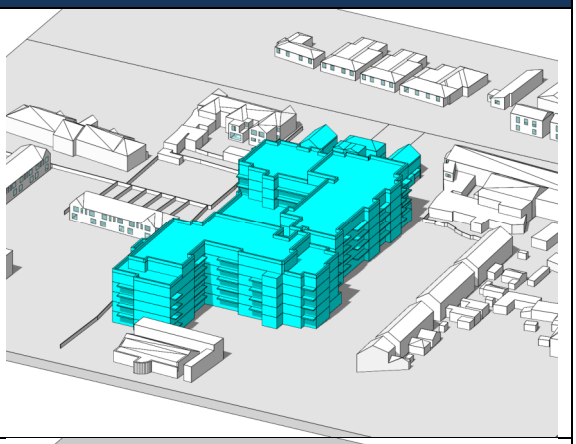
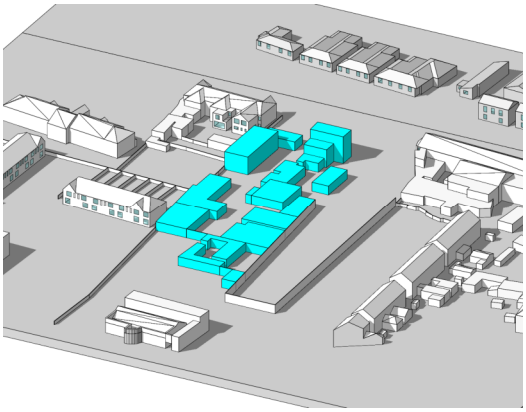
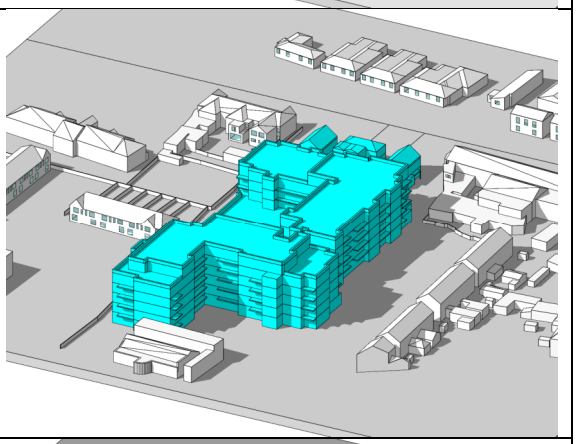
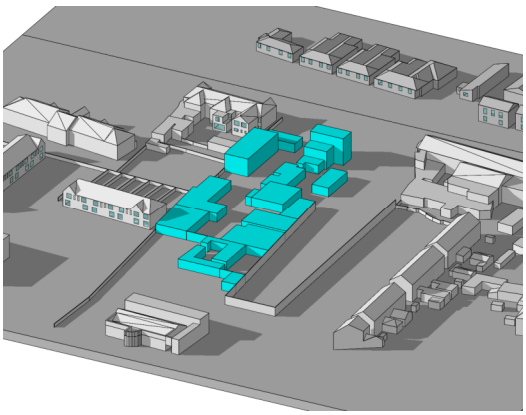
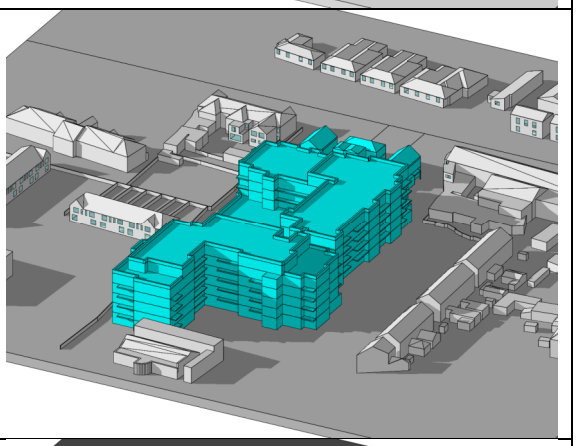
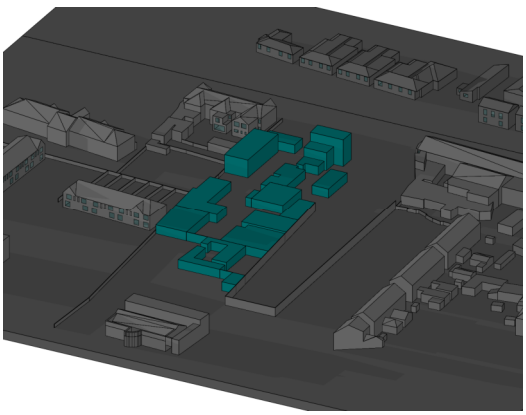
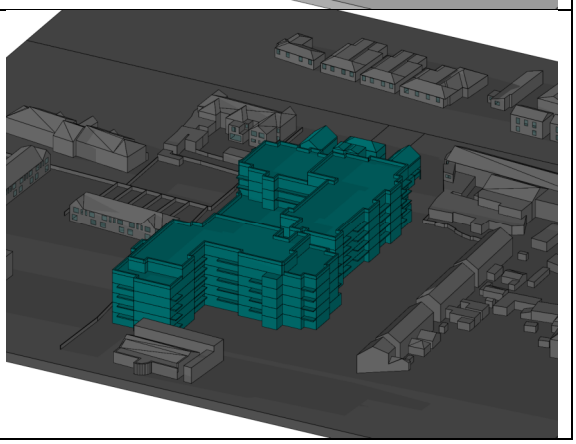
5.2.1 March 21st

	Existing	Proposed
March 21st - 8:00		
March 21st - 10:00		
March 21st - 12:00		

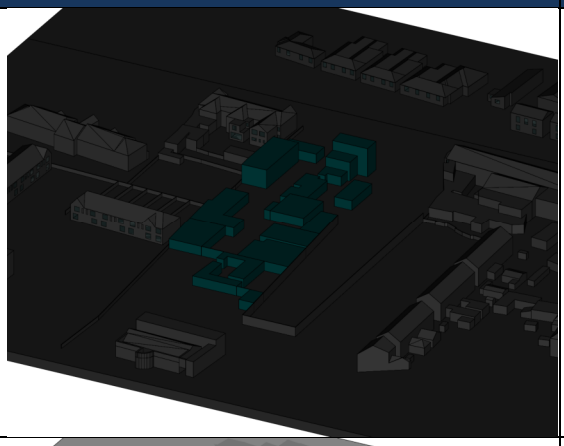
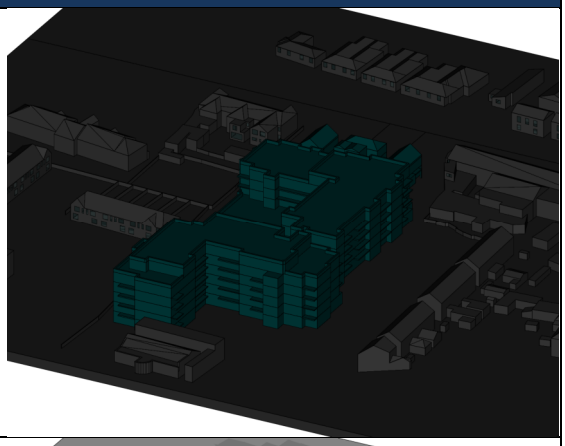
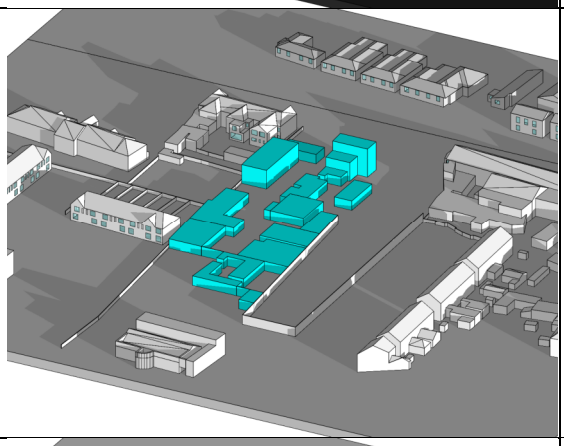
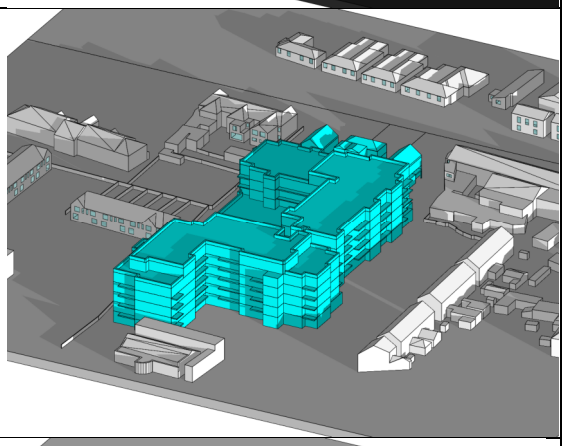
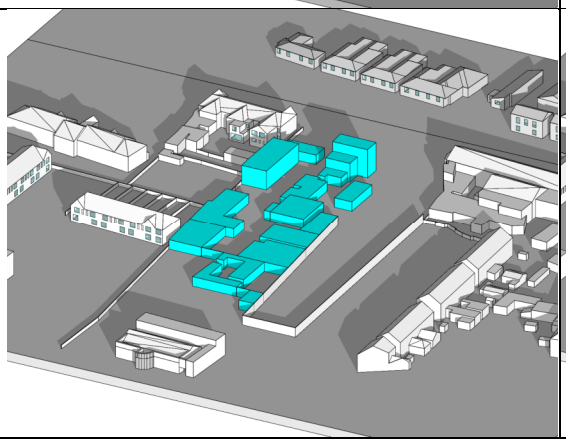
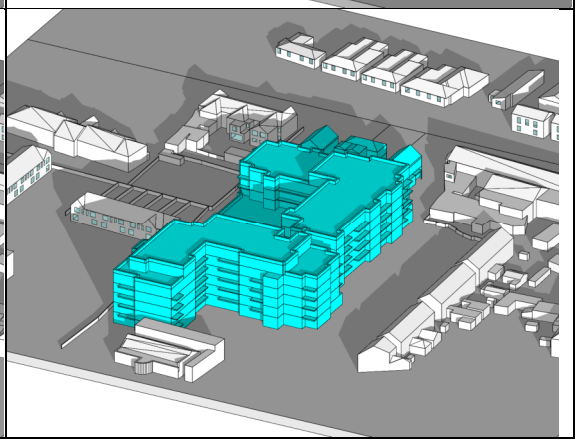
	Existing	Proposed
March 21st - 14:00		
March 21st - 16:00		
March 21st - 18:00		

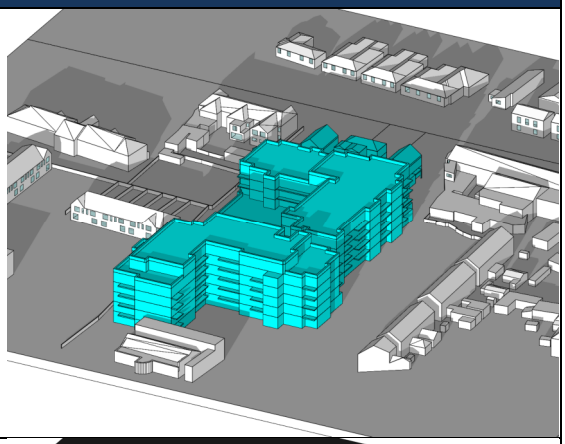
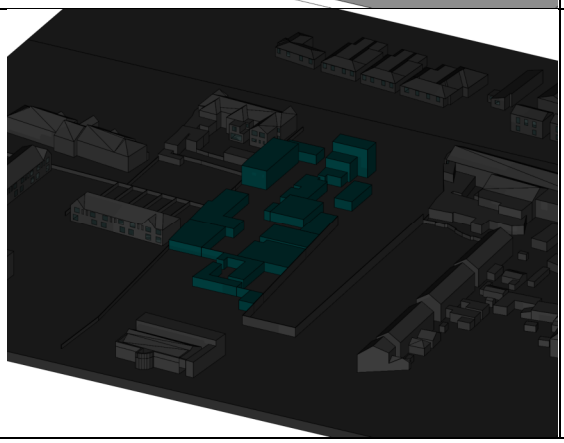
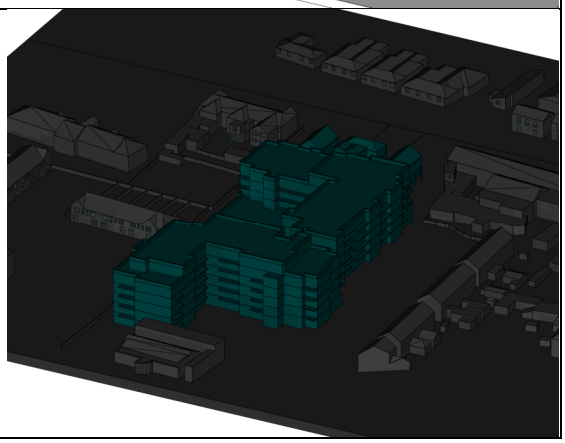
5.2.2 June 21st

	Existing	Proposed
June 21st - 8:00		
June 21st - 10:00		
June 21st - 12:00		

	Existing	Proposed
June 21st - 14:00		
June 21st - 16:00		
June 21st - 18:00		
June 21st - 20:00		

5.2.3 December 21st

	Existing	Proposed
December 21st - 8:00		
December 21st - 10:00		
December 21st - 12:00		

	Existing	Proposed
December 21st - 14:00		
December 21st - 16:00		

5.3 Discussion

The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation and the Proposed Scheme. The results from the study are summarised as follows:

Somerville Green

Additional shading observed from the proposed development on these existing residential properties during the months of March (0800) and December* (0800-1400). No additional shading is noted at any other point through the year.

St Agnes Road

Minor additional shading observed from the proposed development on these existing residential properties during the month of December* (1400). No additional shading is noted at any other point through the year.

St Agnes Terrace

Additional shading observed from the proposed development on these existing residential properties during the months of March (0800 -1000) and December* (0800-1400). No additional shading is noted at any other point through the year.

Somerville Drive

Minor additional shading observed from the proposed development on these existing residential properties during the month of June (1800-2000). No additional shading is noted at any other point through the year.

***** Overshadowing can be expected in December when the sun is lower in the sky and shadows cast are much longer. Although this is the case, overshadowing is least noticeable during the winter months as there is a lot less sunlight available at this time of year and so the overall impact is vastly reduced.

The potential shading impact is quantified via the “Sunlight to Amenity Spaces” and “Daylight to Existing Buildings” section of this report.

6 Sunlight to Amenity Spaces

6.1 Guidance Requirements

The impact of the proposed development on the sunlight availability to the amenity spaces will be considered to determine how the amenity spaces perform when assessed against the BRE Guide which states the following in Section 3.3.17:

> **Summary**
>
> 3.3.17 It is recommended 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 21 March. 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 BRE Guide states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation with the proposed development in place.

6.2 Existing and Proposed Amenity Spaces

As stated previously, for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least 2 hours of sunlight on March 21st. This analysis will be performed on the amenity spaces illustrated in the image below.

Amenity Spaces	
Existing Private Amenity space Existing Public Amenity Spaces Potential Future Development Site Proposed Public Proposed Communal	

The following images illustrate the predicted results with respect to this space receiving at least 2 hours of sunlight on March 21st. Any areas that receive less than 2 hours of sunlight are colour-coded in grey.

6.2.1 Existing Amenity Spaces

The BRE Guide states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation with the proposed development in place.

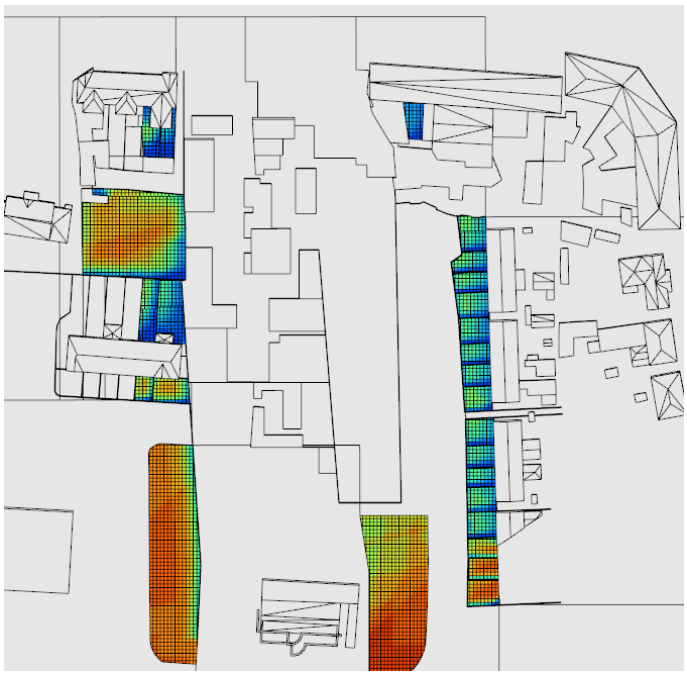
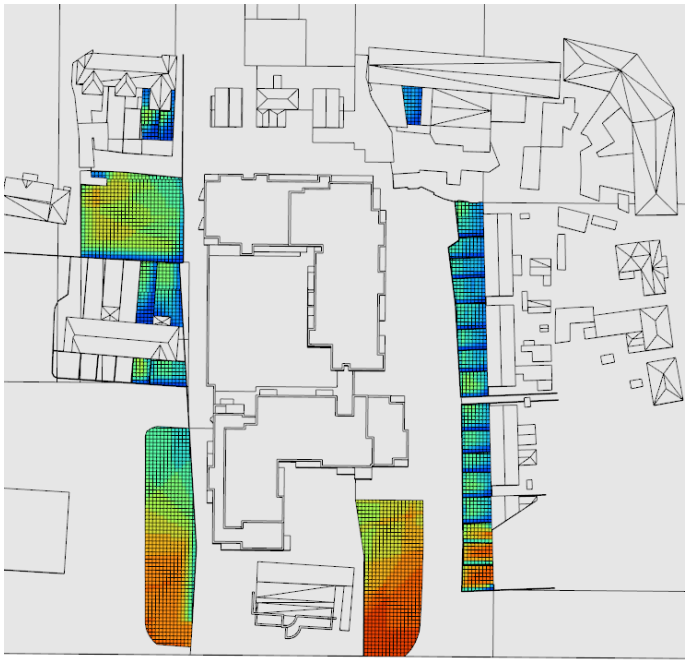
Amenity Spaces

Existing Private Amenity space

Existing Public Amenity Spaces

Potential Future Development Site

6.2.1.1 Existing Private Amenity Space Results

Existing Situation: Absolute Scale Showing all Hours of Sunlight Received	
21/Mar - 00:00 to 21/Mar - 23:00 Hours 12.00 10.80 9.60 8.40 7.20 6.00 4.80 3.60 2.40 1.20 0.00	
Proposed Situation: Absolute Scale Showing all Hours of Sunlight Received	
21/Mar - 00:00 to 21/Mar - 23:00 Hours 12.00 10.80 9.60 8.40 7.20 6.00 4.80 3.60 2.40 1.20 0.00	

Existing Situation: Hours of Sunlight > 2 Illustrated in Red	
Receives more than 2 hours of sunlight Receives less than 2 hours of sunlight	
Proposed Situation: Hours of Sunlight > 2 Illustrated in Red	
Receives more than 2 hours of sunlight Receives less than 2 hours of sunlight	

6.2.1.2 Existing Amenity Results

Existing Private Amenity Results

Ref	Area (m^2)	Existing Area >2 hrs		Existing Area with Proposed Development in Place >2 hrs		Proposed vs Existing (%)	Comment
		(m^2)	(%)	(m^2)	(%)		
1	52	28	54%	30	58%	107%	✓
2	38	14	36%	17	44%	123%	✓
3	643	603	94%	593	92%	98%	✓
4	78	43	55%	42	54%	98%	✓
5	111	59	53%	84	76%	142%	✓
6	32	30	95%	26	82%	86%	✓
7	65	64	98%	53	82%	83%	✓
7a	48	30	62%	26	54%	87%	✓
8	67	58	86%	54	80%	93%	✓
9	48	38	78%	38	78%	100%	✓

10	48	40	83%	40	83%	100%	✓
11	57	48	84%	48	84%	100%	✓
12	56	42	75%	42	75%	100%	✓
13	44	35	81%	30	70%	86%	✓
14	44	36	82%	36	82%	100%	✓
15	50	43	86%	43	86%	100%	✓
16	54	44	80%	44	80%	100%	✓
17	44	37	84%	35	79%	94%	✓
18	40	30	75%	30	75%	100%	✓
19	51	44	85%	44	85%	100%	✓
20	54	45	84%	45	84%	100%	✓
21	42	42	100%	43	102%	100%	✓
22	47	46	98%	51	109%	100%	✓
23	59	58	98%	60	102%	100%	✓
24	690	680	99%	680	99%	100%	✓
25	782	769	98%	769	98%	100%	✓

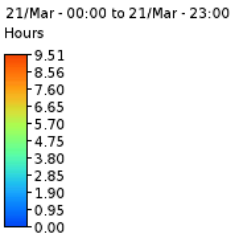
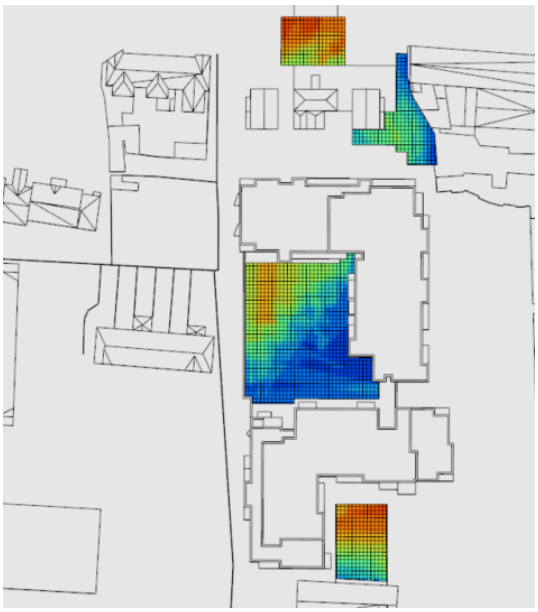
The BRE Guide states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation with the proposed development in place.

Based on the results in the table above, on March 21st the existing private amenity spaces will continue to receive the same level of sunlight even with the proposed development in place, thus exceeding the recommendations in the BRE Guide.

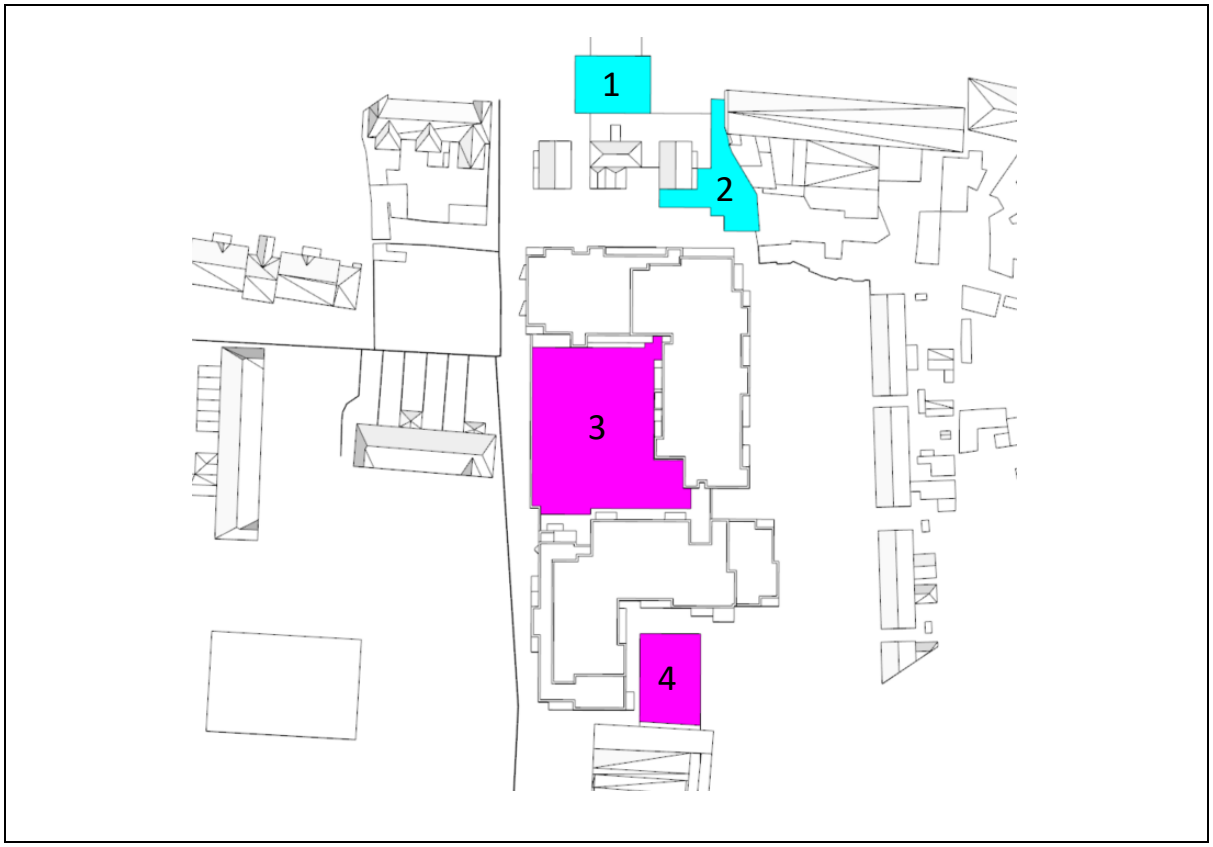
6.2.2 Proposed Amenity Spaces

Amenity Spaces	
Public Communal	

6.2.2.1 Proposed Amenity

Absolute Scale Showing All Hours of Sunlight Received	
	
Area Showing >2 Hours	
Receives more than 2 hours of sunlight Receives less than 2 hours of sunlight	

6.2.2.2 Proposed Amenity Results



Proposed Public	Total Area (m²)	Area Receiving >2h (m²)	Percent Receiving >2h	Comment
1	216	216	100%	✓
2	247	190	77%	✓
Total	**463**	**406**	**88%**	✓

Proposed Communal	Total Area (m²)	Area Receiving >2h (m²)	Percent Receiving >2h	Comment
3	1,098	551	50%	✓
4	271	271	100%	✓
Total	**1,369**	**822**	**60%**	✓

6.3 Discussion

The BRE Guide states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation with the proposed development in place.

Existing Amenity Spaces

The existing communal and private amenity spaces in the adjacent properties have been analysed and the results demonstrate they continue to receive the same level of sunlight even with the proposed development in place on March 21st, thus complying with the recommendations in the BRE Guide as outlined above.

Proposed Amenity Spaces

On March 21st 88% of the combined proposed public amenity spaces and 60% of the combined proposed communal amenity spaces provided within the development will receive at least 2 hours of sunlight over the total area provided, thus exceeding the 50% recommendation noted in the BRE Guide. In addition, all individual spaces meet the BRE recommendations confirming the amenity areas provided will be a quality spaces in terms of sunlight.

7 Sunlight to Existing Buildings

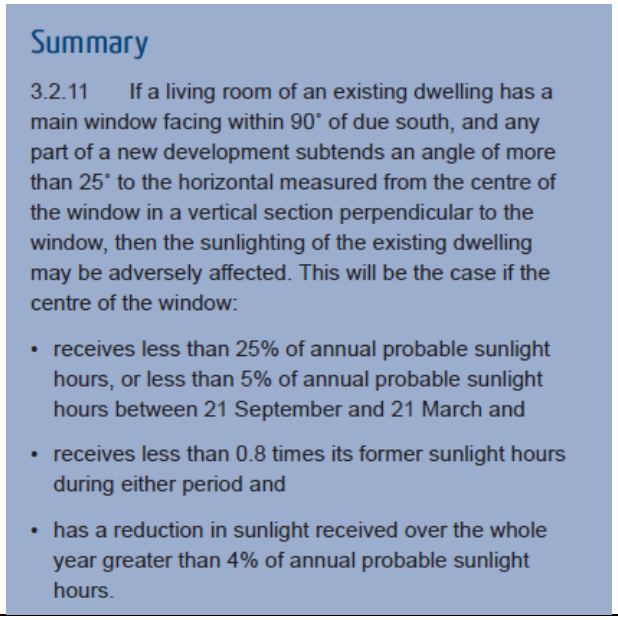
7.1 Guidance – BRE Guide / BS 8206-2:2008

The British Standard BS 8206-2:2008 recommends that interiors where the occupants expect sunlight should receive at least one quarter (25%) of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months, between 21st September and 21st March.

Here 'probable sunlight hours' means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.

If a window reference point can receive more than 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21st September and 21st March, then the room should still receive enough sunlight. Any reduction in sunlight access below this level should be kept to a minimum.

If the available sunlight hours are both less than the amount given and less than 0.8 times their former value, either over the whole year or just during the winter months (21st September to 21st March) and reduction in sunlight across the year has a greater reduction than 4%, then the occupants of the existing building will notice the loss of sunlight.



Summary

3.2.11 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.

Extract from the BRE Guide

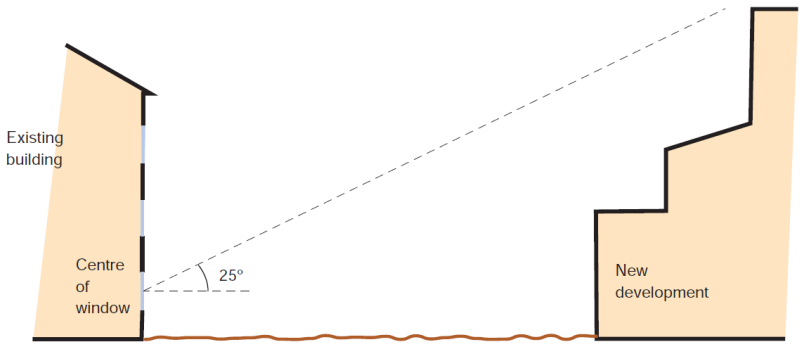
As such this study will compare the Existing Scheme and Proposed Schemes and consider if the values on the existing buildings meet the requirements outlined above when compared to their former value (that of the Existing scheme).

7.2 APSH Exclusions

The BRE recommendations note that if a new development sits within 90° of due south of any main living room window of an existing dwelling, then these should be assessed for APSH. However, there are several exceptional cases in which APSH is not required to be calculated, as indicated below:

3.2.7 It is not always necessary to do a full calculation to check sunlight potential. The guideline above is met provided either of the following is true:

- If the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window (NB obstructions within 90° of due north of the existing window need not count here).
- The window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal (Figure 14 in Section 2.2). Again, obstructions within 90° of due north of the existing window need not be counted.
- The window wall faces within 20° of due south and the reference point has a VSC (section 2.1) of 27% or more.



Extract from the BRE Guide

Consequently, APSH will only be calculated for adjacent windows which meet the following conditions:

1. The height distance rule is not met.
2. The existing building has living room with a main window which faces within 90 degrees of due south and the 25° rule is applied.
3. Existing building is located to the North, East, or West of the Proposed Development.
4. The VSC of the existing window is less than 27%.

7.3 APSH Assessment & Discussion

Based on the above criteria, the locations in the following sections have been modelled and analysed with the results also included.

Please note, the "Comment" symbol in each of the tables represents the following:

✓/✓ For these locations, both the Proposed Scheme annual and winter APSH results are greater than 25% and 5% respectively, or are greater than 0.8 times their former value with the proposed development in place.

✓/ x For these locations, the annual APSH results are greater than 25% or are greater than 0.8 times their former value with the proposed development in place, however, the winter results are below the guidelines.

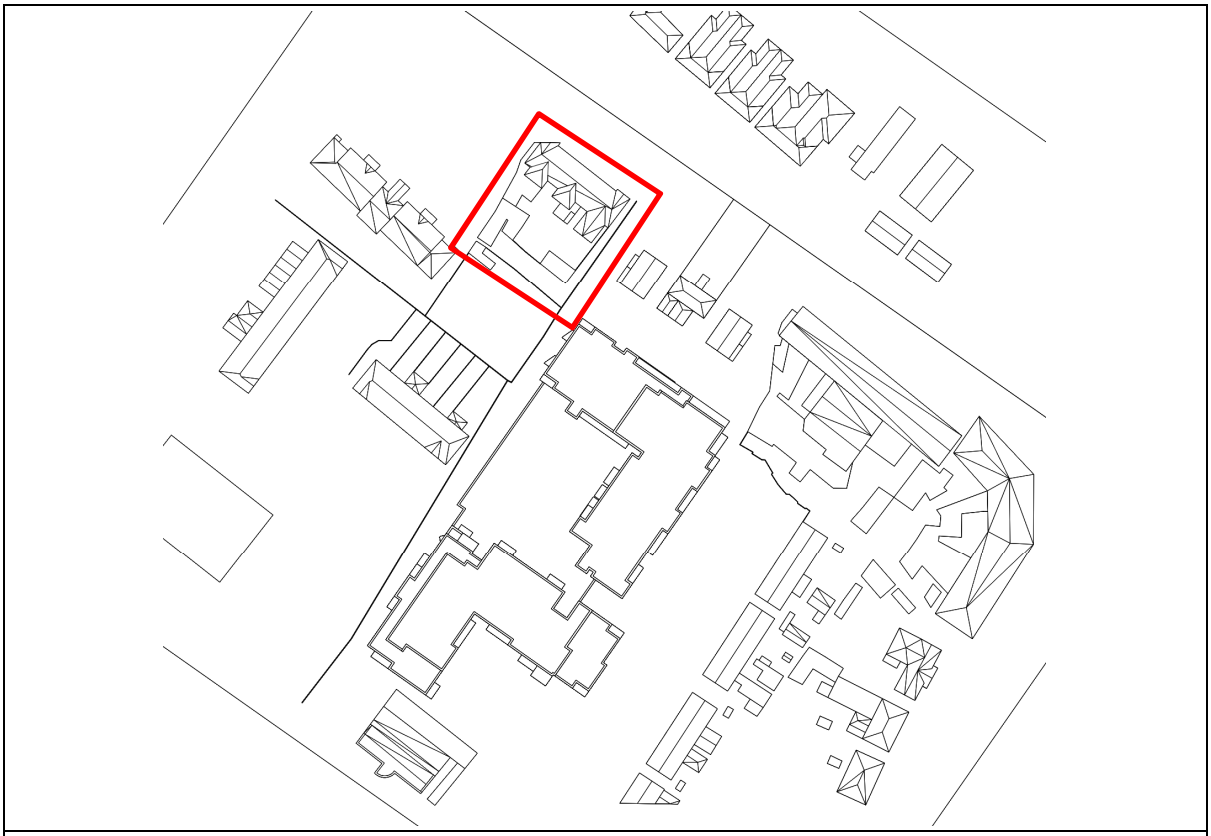
x /✓ For these locations, the annual APSH results are less than the recommended values, however, the winter APSH results are greater than 5% or greater than 0.8 times their former value with the proposed development in place.

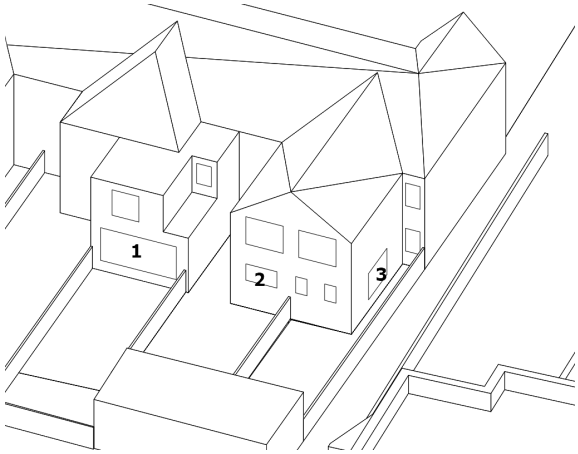
x / x For these locations, both the annual and winter APSH results are less than 25% and 5% respectively, and less than 0.8 times their former value with the proposed development in place.

7.3.1 View 1: Somerville Green St Agnes Terrace

Ref.	Existing Situation APSH		Proposed Scheme APSH		Proposed APSH as a % of Existing Situation		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	68.82	29.09	52.98	15.22	77%	52%	✓/✓
2	68.21	30.45	50.94	13.56	75%	45%	✓/✓

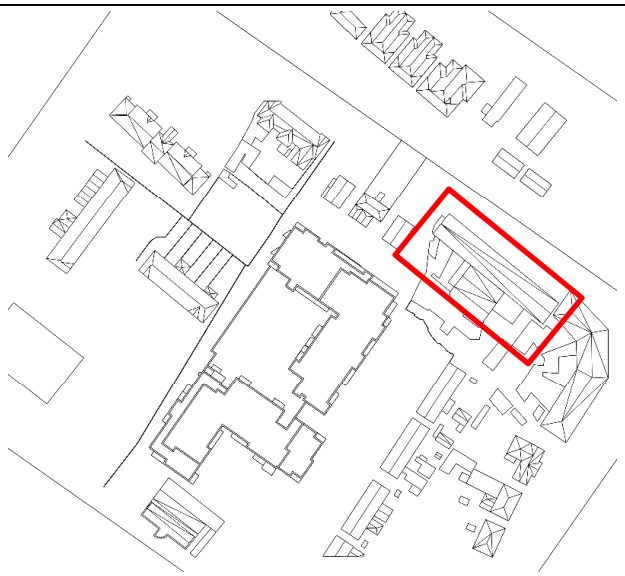
7.3.2 View 2: St Agnes Terrace

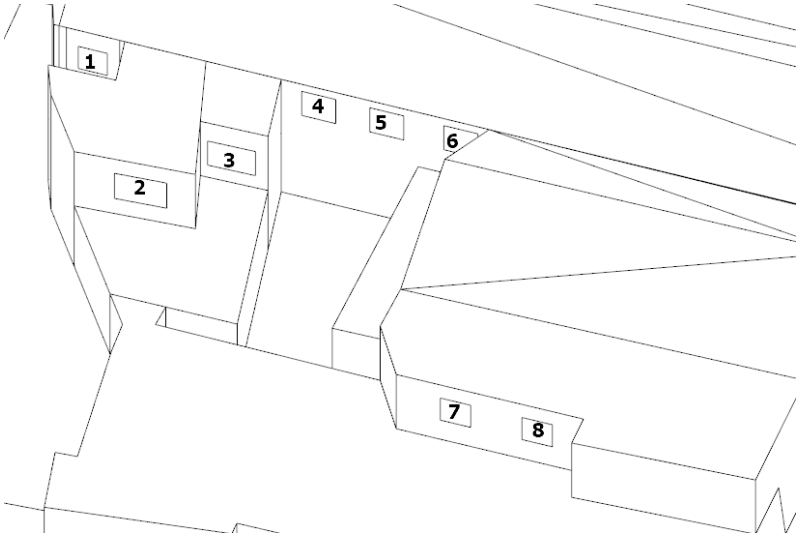




Ref.	Existing Situation APSH		Proposed Scheme APSH		Proposed APSH as a % of Existing Situation		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	59.83	23.33	57.46	20.97	96%	90%	✓/✓
2	60.21	20.77	58.47	19.03	97%	92%	✓/✓
3	44.70	9.97	43.60	9.62	98%	96%	✓/✓

7.3.3 View 3: Flats St Agnes Road





Ref.	Existing Situation APSH		Proposed Scheme APSH		Proposed APSH as a % of Existing Situation		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	40.60	6.24	32.52	5.03	80%	49%	✓/✓
2	71.61	31.78	54.75	22.09	76%	70%	✓/✓
3	44.64	21.20	42.33	18.94	95%	89%	✓/✓
4	51.28	22.63	47.18	18.78	92%	83%	✓/✓
5	57.11	21.56	48.74	14.95	85%	69%	✓/✓
6	45.62	12.05	37.75	6.40	83%	53%	✓/✓
7	72.38	31.49	57.74	25.80	80%	82%	✓/✓
8	64.22	24.17	50.47	19.14	80%	49%	✓/✓

7.4 Discussion

This study considers the proposed scheme and tests if the Annual Probable Sunlight Hours (APSH) results for the living room windows are greater than 25% annual and 5% winter sunlight or are greater than 0.8 times their former value with the proposed development in place.

When compared to the Existing Situation, of the 13 no. points tested on St Agnes Road, 100% (13 no. points) meet the annual and winter recommendations outlined in the BRE Guide. Therefore, the Proposed Scheme has a negligible impact when compared to the Existing Situation.

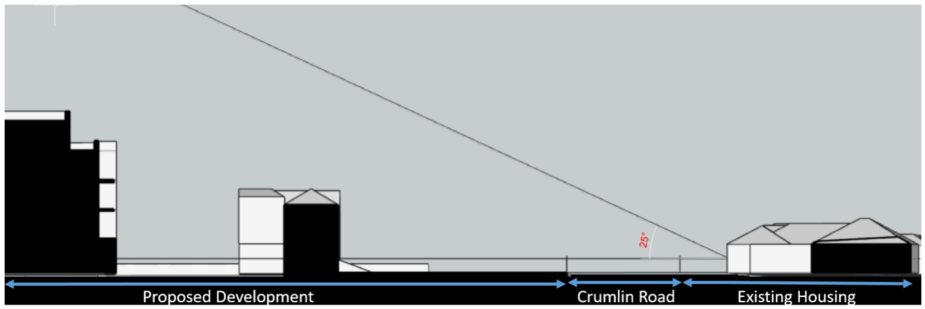
Based on the criteria outlined in Section 3.2.7 of the BRE guidance, only 13 windows of the existing neighbouring dwellings are included within the APSH assessment as the rest did not meet the criterion as laid out within the BRE guide.

“It is not always necessary to do a full calculation to check sunlight potential. The guideline above is net provided either the following is true:

- If the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window.”
- The existing building has living room with a main window which faces within 90 degrees of due south and the 25° rule is applied.

Given the statement above the 25-degree check was carried out for the existing dwellings adjacent to the proposed development across St Agnes Road. The proposed development passed as can be seen from the image below and as such these properties were excluded on the basis, as noted in section 3.2.7 of the BRE guidance, that these windows need not be analysed as sunlight impact will be unnoticeable to the existing occupants.

In addition, the properties on Summerville Drive were excluded from the assessment as they did not have a main living room window that sat within 90 degrees of due south.



Site Section – Qualification of Distance/Height Rule & 25° Rule

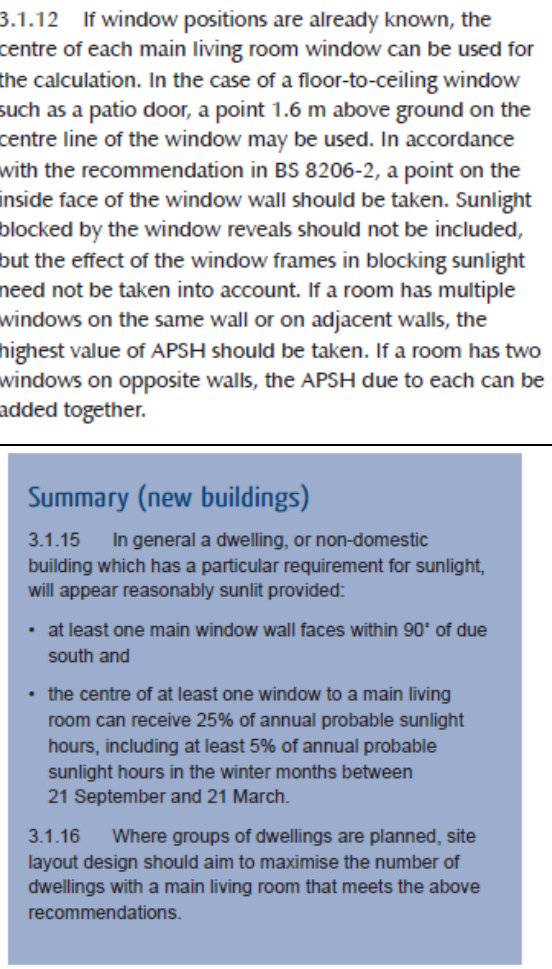
8 Sunlight to Proposed Development

8.1 Guidance – BRE Guide / BS8206-2:2008

The British Standard BS 8206-2:2008 recommends that interiors where the occupants expect sunlight should receive at least one quarter (25%) of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months, between 21st September and 21st March. Here 'probable sunlight hours' means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.

If a window reference point can receive more than one quarter of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21st September and 21st March, then the room should still receive enough sunlight. Any reduction in sunlight access below this level should be kept to a minimum.

As stated in Section 3.1.12 of the BRE Guide, "If window positions are already known, the centre of each main living room window can be used for the calculation".



3.1.12 If window positions are already known, the centre of each main living room window can be used for the calculation. In the case of a floor-to-ceiling window such as a patio door, a point 1.6 m above ground on the centre line of the window may be used. In accordance with the recommendation in BS 8206-2, a point on the inside face of the window wall should be taken. Sunlight blocked by the window reveals should not be included, but the effect of the window frames in blocking sunlight need not be taken into account. If a room has multiple windows on the same wall or on adjacent walls, the highest value of APSH should be taken. If a room has two windows on opposite walls, the APSH due to each can be added together.

Summary (new buildings)

3.1.15 In general a dwelling, or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided:

- at least one main window wall faces within 90° of due south and
- the centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March.

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.

Extract from the BRE Guide

8.2 Guidance – IS EN 17037:2018

Section 5.3.1 of IS EN 17037:2018 states that *"exposure to sunlight is an important quality criterion of an interior space and can contribute to human well-being."* Table A.6 from IS EN 17037:2018 summarises the recommendation for daily sunlight exposure.

Table A.6 — Recommendation for daily sunlight exposure

Level of recommendation for exposure to sunlight	Sunlight exposure
Minimum	1,5 h
Medium	3,0 h
High	4,0 h

Within the context of a domestic property, IS EN 17037:2018 states that at least one habitable space within a dwelling should receive the recommended minimum value of 1.5 hours of sunlight on the 21st of March. The test is carried out on a clear, cloud free day.

8.3 APSH & Sunlight Exposure Assessment

Based on the above criteria for both the BRE Guide/BS8206-2:2008 and IS EN 17037:2018, all main living room windows within the proposed development have been assessed with the results included in the following sections.

Please note, the "Comment" symbol in each of the tables represents the following:

BRE Guide / BS 8206-2:2008

✓/✓ For these locations, both the annual and winter APSH results are greater than 25% and 5% respectively.

x /✓ For these locations, the annual APSH results are less than the recommended values, however, the winter APSH results are greater than 5%.

✓ / x For these locations, the winter APSH results are less than the recommended values, however, the annual APSH results are greater than 25%.

x / x For these locations, both the annual and winter APSH results are less than the recommended values.

IS EN 17037:2018

✓ These rooms achieve the minimum 1.5 hours of recommended sunlight exposure on March 21st.

x These rooms do not achieve the minimum 1.5 hours of recommended sunlight exposure on March 21st.

8.3.1 Block A View 1

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	73.45	32.71	✓/ ✓	✓
2	58.25	26.36	✓/ ✓	✓
3	70.74	34.24	✓/ ✓	✓
4	73.92	34.97	✓/ ✓	✓
5	67.02	26.84	✓/ ✓	✓
6	76.92	34.97	✓/ ✓	✓
7	27.87	20.25	✓/ ✓	✓
8	61.25	29.13	✓/ ✓	✓
9	71.21	34.97	✓/ ✓	✓
10	65.55	34.74	✓/ ✓	✓
11	42.18	23.10	✓/ ✓	✓
12	76.92	34.97	✓/ ✓	✓
13	25.47	19.76	✓/ ✓	✓
14	51.74	24.82	✓/ ✓	✓

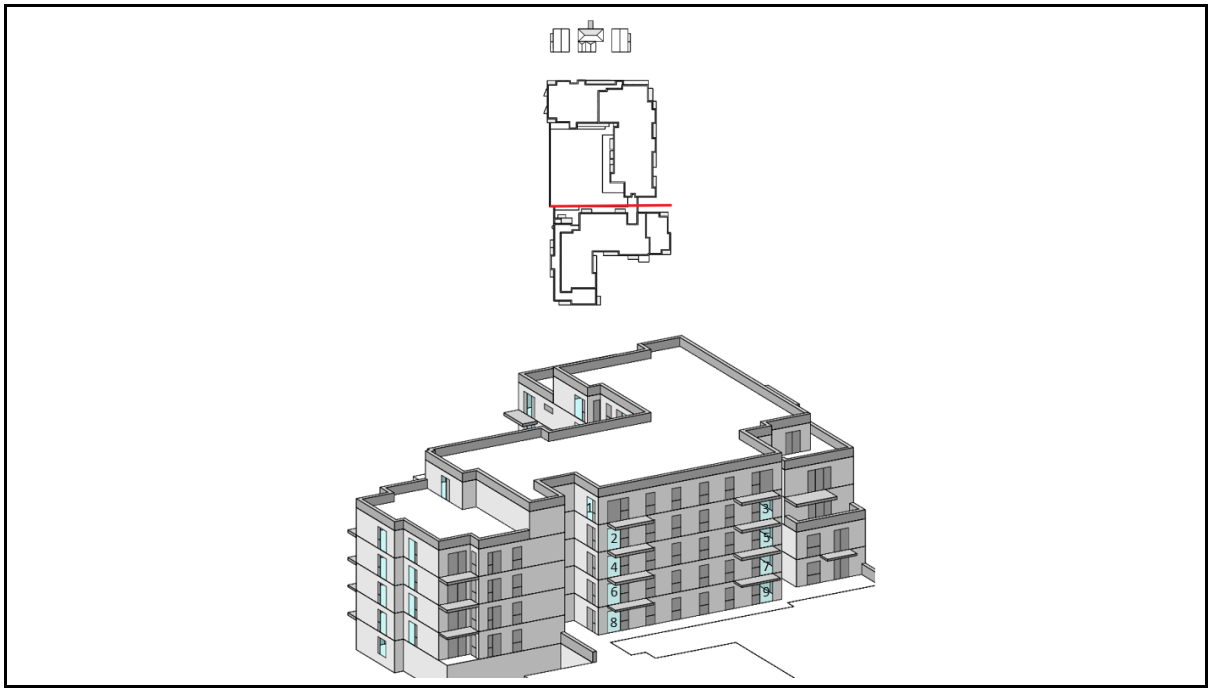
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
15	69.51	34.91	✓/ ✓	✓
16	42.47	31.03	✓/ ✓	✓
17	42.18	23.10	✓/ ✓	✓
18	76.92	34.97	✓/ ✓	✓
19	24.16	19.55	x /✓	✓
20	46.91	24.81	✓/ ✓	✓
21	67.32	34.83	✓/ ✓	✓
22	42.15	30.75	✓/ ✓	✓
23	42.54	23.12	✓/ ✓	✓
24	57.54	18.04	✓/ ✓	✓
25	24.36	19.98	x /✓	✓
26	44.77	23.56	✓/ ✓	✓
27	63.36	30.99	✓/ ✓	✓
28	41.34	28.86	✓/ ✓	✓
29	41.55	19.51	✓/ ✓	✓
30	26.71	5.09	✓/ ✓	✓
31	25.93	19.06	✓/ ✓	✓
32	39.21	19.65	✓/ ✓	✓
33	60.01	28.08	✓/ ✓	✓
34	42.93	26.43	✓/ ✓	✓

8.3.3 Block A View 2

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	60.57	27.97	✓/ ✓	✓
2	50.23	22.30	✓/ ✓	✓
3	64.30	27.32	✓/ ✓	✓
4	56.34	27.97	✓/ ✓	✓
5	24.77	17.45	x /✓	✓
6	65.73	28.67	✓/ ✓	✓
7	52.29	19.98	✓/ ✓	✓
8	54.40	27.16	✓/ ✓	✓
9	23.72	17.10	x /✓	✓
10	65.73	28.67	✓/ ✓	✓
11	50.70	19.98	✓/ ✓	✓
12	50.98	26.16	✓/ ✓	✓
13	21.56	16.42	x /✓	✓
14	65.08	28.02	✓/ ✓	✓
15	49.97	19.26	✓/ ✓	✓
16	47.78	25.39	✓/ ✓	✓
17	20.43	15.75	x /✓	✓
18	60.70	24.66	✓/ ✓	✓
19	45.75	16.11	✓/ ✓	✓

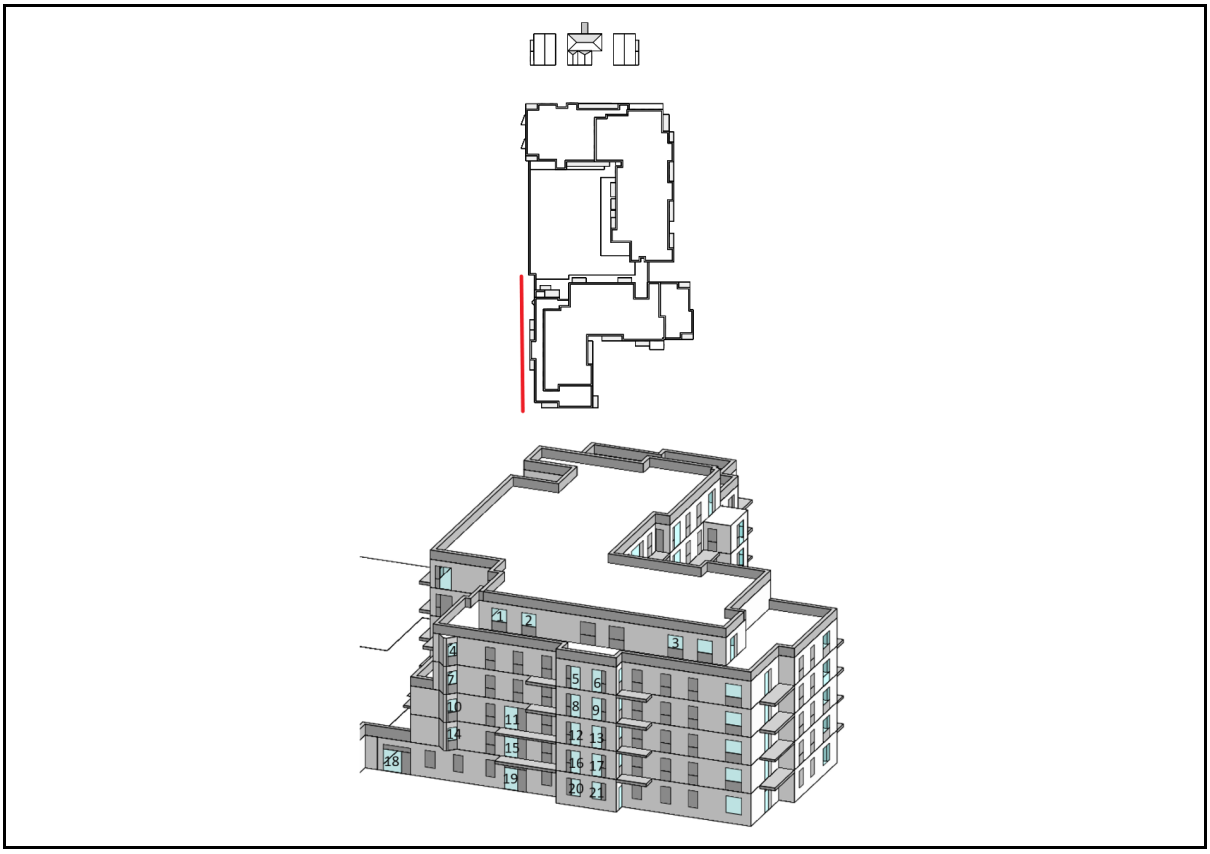
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
20	43.15	21.60	✓/ ✓	✓
21	23.14	16.90	x /✓	✓
22	54.83	21.16	✓/ ✓	✓

8.3.4 Block A View 3



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	32.79	2.32	✓/ x	✓
2	14.52	2.79	x / x	✓
3	10.86	2.36	x / x	x
4	10.50	2.79	x / x	✓
5	5.75	1.38	x / x	x
6	8.69	2.56	x / x	✓
7	2.31	1.23	x / x	x
8	7.74	1.98	x / x	✓
9	1.43	0.74	x / x	x

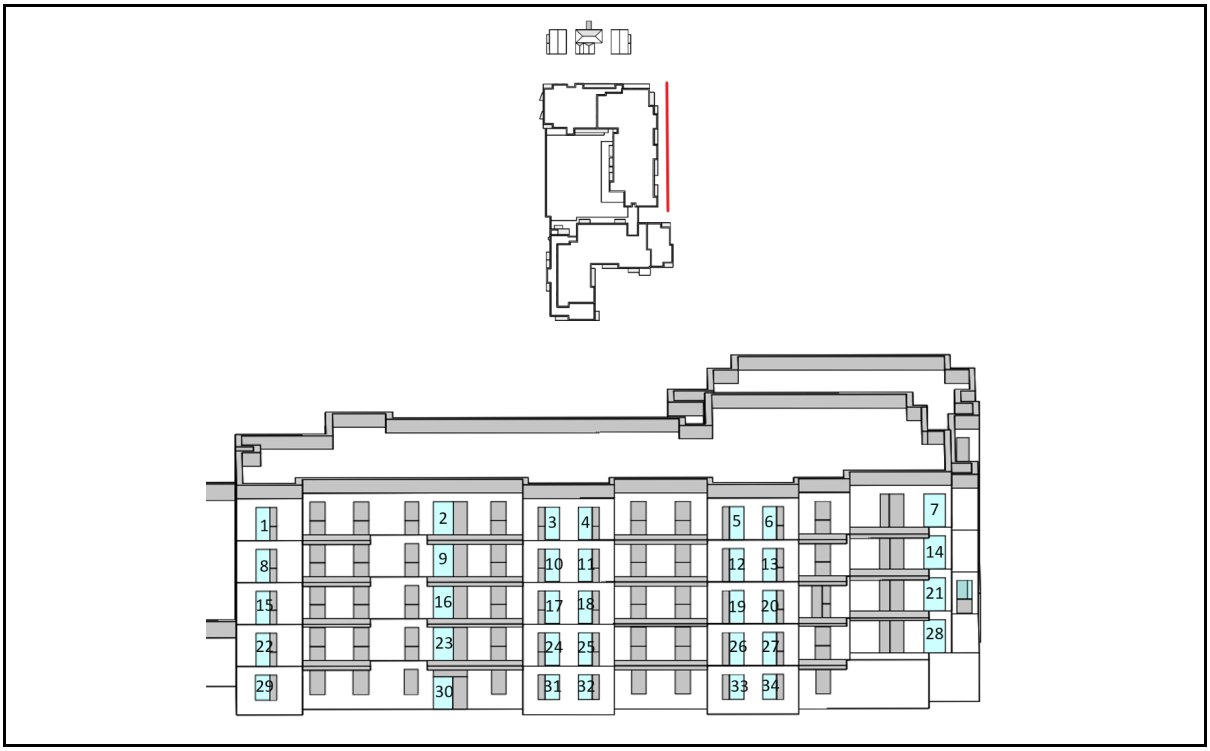
8.3.5 Block A View 4



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	34.27	9.79	✓/ ✓	✓
2	34.27	9.79	✓/ ✓	✓
3	34.27	9.79	✓/ ✓	✓
4	35.79	9.03	✓/ ✓	✓
5	34.27	9.79	✓/ ✓	✓
6	34.27	9.79	✓/ ✓	✓
7	33.36	7.76	✓/ ✓	✓
8	34.27	9.79	✓/ ✓	✓
9	34.27	9.79	✓/ ✓	✓
10	32.51	7.36	✓/ ✓	✓
11	22.88	4.49	x / x	✓
12	34.27	9.79	✓/ ✓	✓
13	34.27	9.79	✓/ ✓	✓
14	31.48	7.02	✓/ ✓	✓
15	18.48	4.49	x / x	✓
16	32.96	9.79	✓/ ✓	✓

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
17	32.77	9.79	✓/ ✓	✓
18	26.29	6.20	✓/ ✓	✓
19	17.40	4.01	x / x	✓
20	31.54	9.79	✓/ ✓	✓
21	30.93	9.79	✓/ ✓	✓

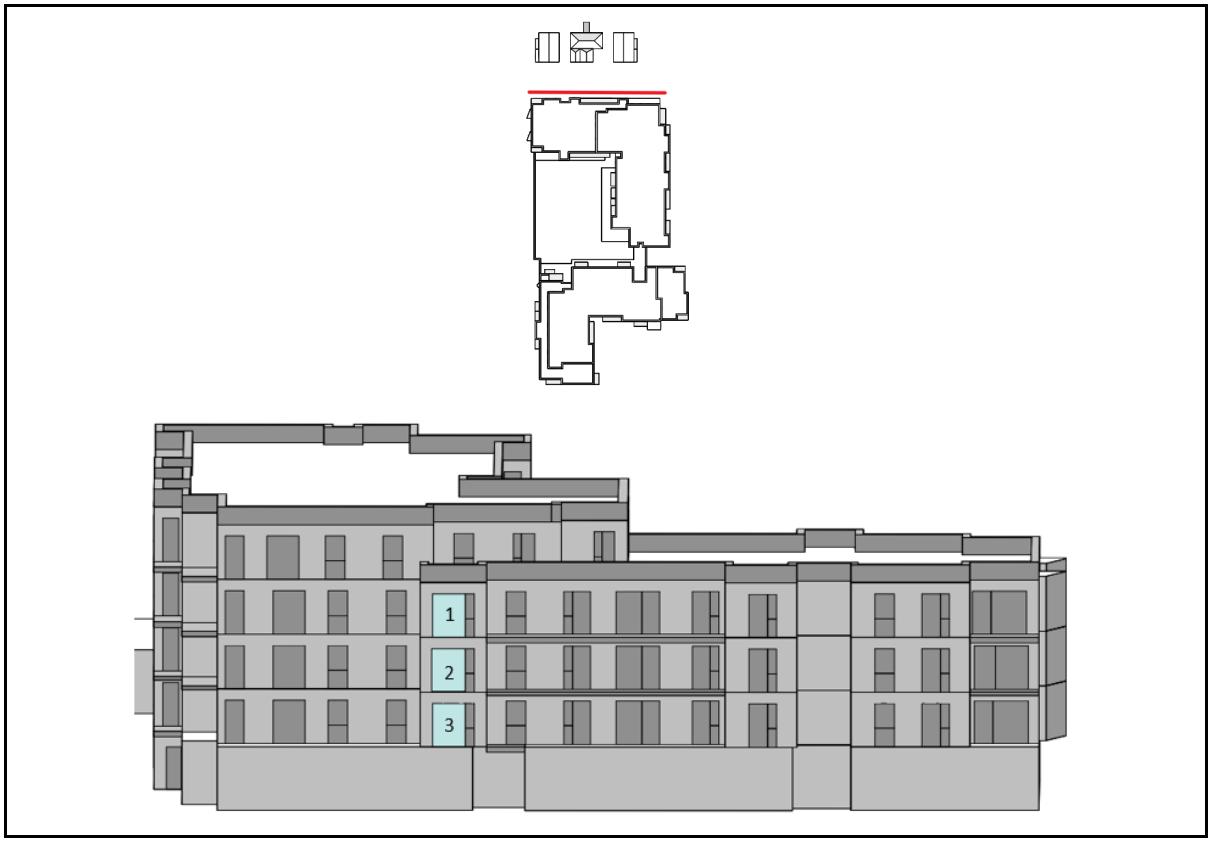
8.3.6 Block B View 1



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	62.72	25.66	✓/ ✓	✓
2	64.60	27.53	✓/ ✓	✓
3	65.73	28.67	✓/ ✓	✓
4	65.73	28.67	✓/ ✓	✓
5	65.73	28.67	✓/ ✓	✓
6	65.73	28.67	✓/ ✓	✓
7	61.91	24.86	✓/ ✓	✓
8	58.73	21.98	✓/ ✓	✓
9	47.24	23.37	✓/ ✓	✓
10	65.03	27.97	✓/ ✓	✓
11	65.12	28.06	✓/ ✓	✓
12	65.61	28.55	✓/ ✓	✓
13	65.72	28.66	✓/ ✓	✓
14	43.23	18.25	✓/ ✓	✓
15	55.54	20.50	✓/ ✓	✓
16	44.76	22.00	✓/ ✓	✓
17	63.73	26.66	✓/ ✓	✓
18	63.92	26.86	✓/ ✓	✓
19	64.50	27.44	✓/ ✓	✓

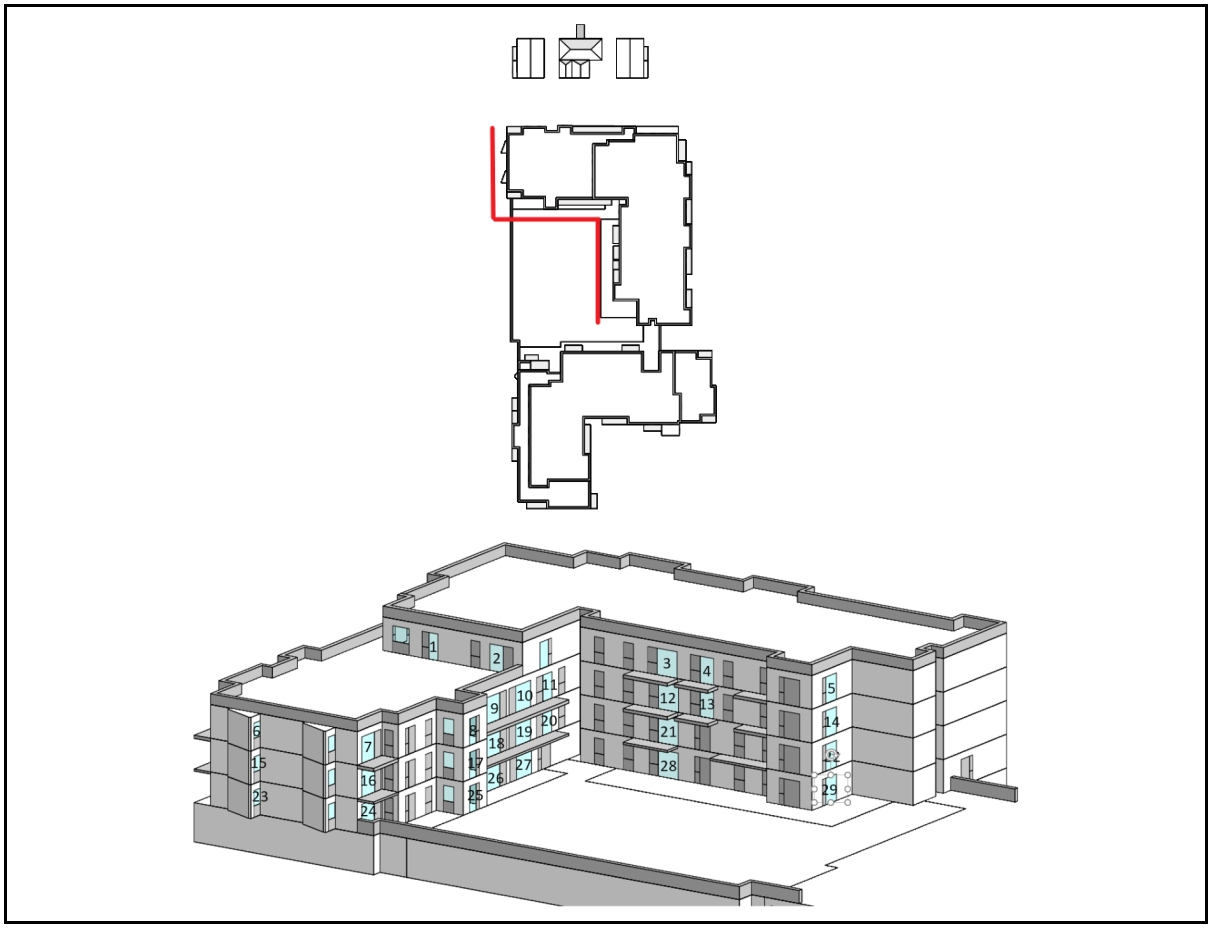
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
20	64.54	27.48	✓/ ✓	✓
21	42.13	17.96	✓/ ✓	✓
22	51.13	17.84	✓/ ✓	✓
23	43.24	19.76	✓/ ✓	✓
24	61.00	24.32	✓/ ✓	✓
25	60.99	24.42	✓/ ✓	✓
26	60.72	24.76	✓/ ✓	✓
27	60.51	24.76	✓/ ✓	✓
28	39.39	17.28	✓/ ✓	✓
29	44.36	14.10	✓/ ✓	✓
30	42.44	17.17	✓/ ✓	✓
31	53.81	19.78	✓/ ✓	✓
32	54.41	20.50	✓/ ✓	✓
33	55.65	21.68	✓/ ✓	✓
34	55.26	21.68	✓/ ✓	✓

8.3.7 Block B View 2



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	23.08	3.50	x / x	✓
2	22.75	3.17	x / x	✓
3	19.71	2.10	x / x	✓

8.3.8 Block B View 3



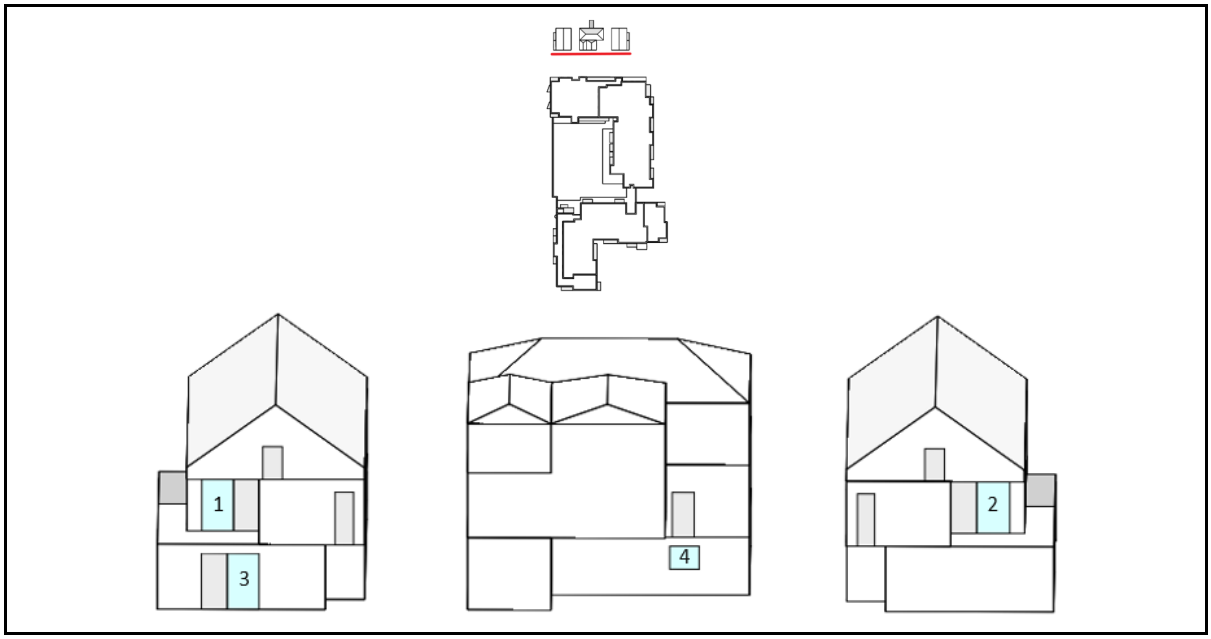
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	31.98	7.67	✓/✓	✓
2	29.76	6.11	✓/✓	✓
3	29.32	4.85	✓/x	✓
4	27.79	3.32	✓/x	✓
5	43.21	5.18	✓/✓	✓
6	36.97	9.18	✓/✓	✓
7	59.72	23.14	✓/✓	✓
8	65.34	23.38	✓/✓	✓
9	52.88	18.08	✓/✓	✓
10	50.52	12.64	✓/✓	✓
11	38.92	7.36	✓/✓	✓
12	17.52	1.81	x/x	✓
13	21.01	1.34	x/x	✓
14	29.18	0.87	✓/x	x
15	32.66	7.27	✓/✓	✓

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
16	37.29	17.77	✓/ ✓	✓
17	59.07	17.11	✓/ ✓	✓
18	23.78	10.10	x /✓	✓
19	23.92	7.49	x /✓	✓
20	21.01	5.02	x /✓	✓
21	15.85	0.87	x / x	x
22	21.31	0.33	x / x	x
23	28.40	5.45	✓/ ✓	✓
24	25.60	10.42	✓/ ✓	✓
25	52.26	12.21	✓/ ✓	✓
26	21.80	7.48	x /✓	✓
27	21.94	5.21	x /✓	✓
28	18.18	0.70	x / x	x
29	15.26	0.00	x / x	x

8.3.9 Block GH View 1

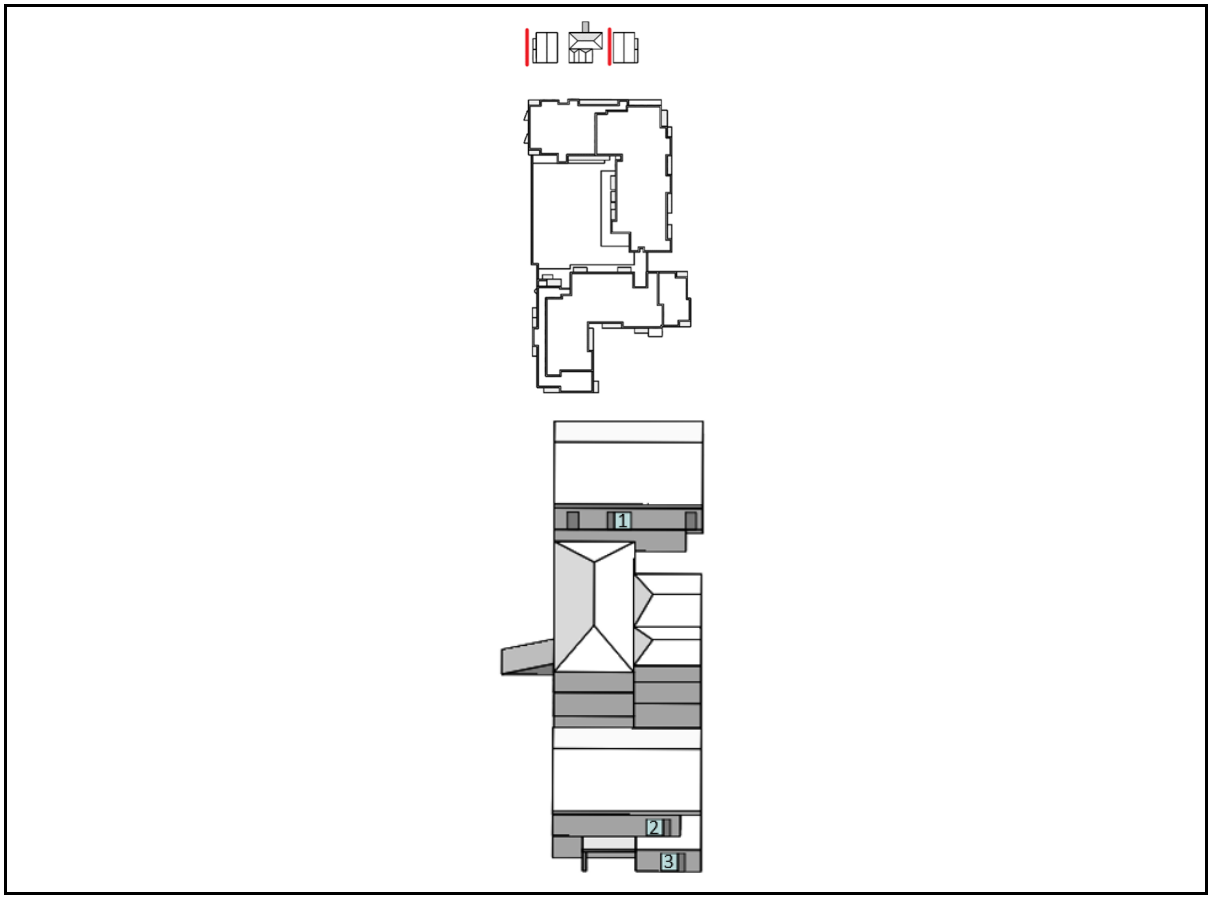
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	13.69	0.43	x / x	x
2	20.52	1.81	x / x	✓
3	16.66	0.78	x / x	x

8.3.10 Block GH View 2



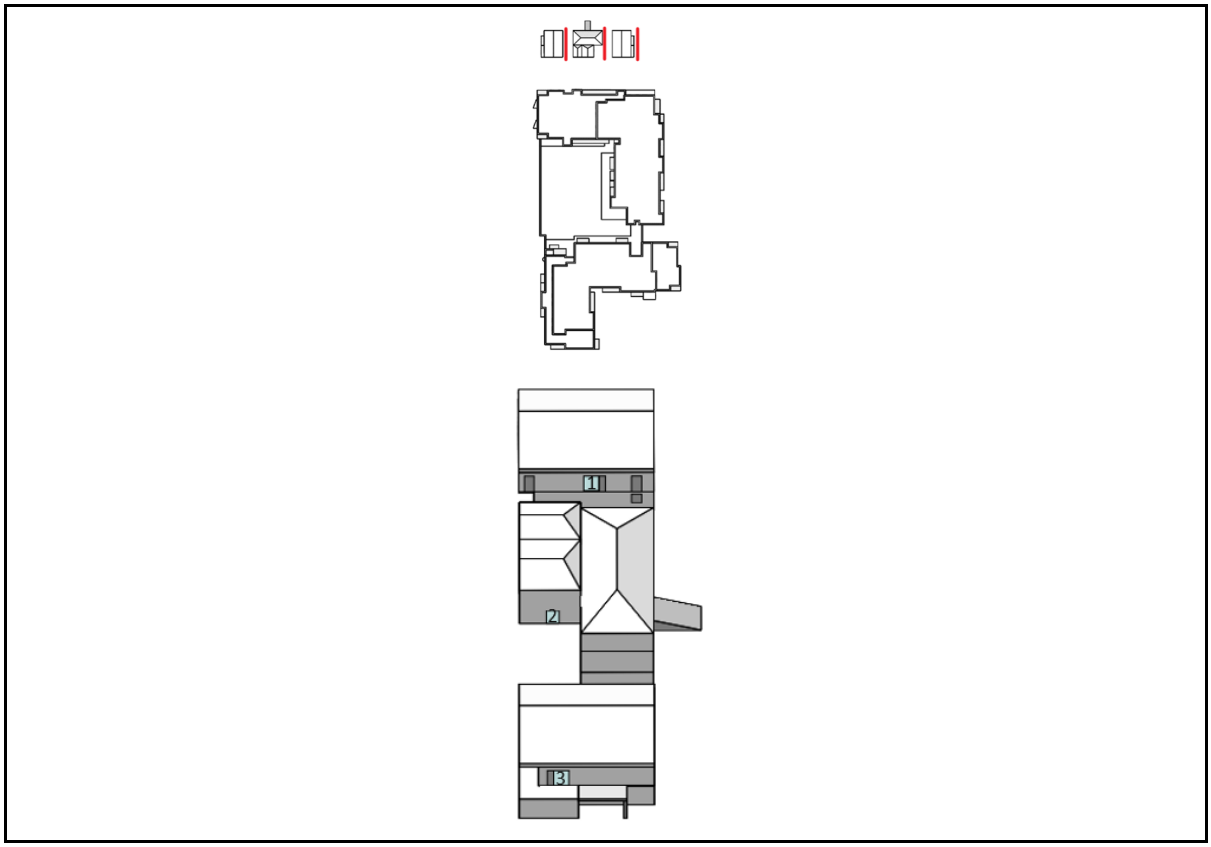
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	26.47	4.67	✓ / x	✓
2	27.10	14.10	✓ / ✓	✓
3	43.98	8.04	✓ / ✓	✓
4	19.73	2.94	x / x	x

8.3.11 Block GH View 3



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	12.97	0.00	x / x	x
2	28.24	4.46	✓/ x	✓
3	24.74	2.93	x / x	✓

8.3.12 Block GH View 4



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	25.88	2.30	✓/ x	✓
2	33.22	7.76	✓/ ✓	✓
3	49.12	17.71	✓/ ✓	✓

8.4 Discussion

BRE Guide / BS 8206-2:2008

For the sunlight to proposed development assessment, two standards have been analysed: BRE Guide / BS 8206-2:2008 and IS EN 17037:2018. The results under each standard are summarised below.

BRE Guide / BS 8206-2:2008

Within the BS 8206-2:2008 standard, when discussing annual probable sunlight hours regarding proposed developments, it is noted that:

"The degree of satisfaction is related to the expectation of sunlight. If a room is necessarily North facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".

This is also reflected in the BRE Guide which states:

"The BS 8206-2 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met."

Of the 165 no. points tested, 127 no. points (77%) meet the BRE recommended values over the annual period. The compliance rate increases to 80% (132 no. points) during the winter period when sunlight is most valuable.

It should be noted that in the development of any apartment type building achieving in the region of 75% to 80% for this assessment would be considered very high and factors such site constraints and ultimately orientation play a huge part to the outcome of this assessment. As such, the sunlight provision results to the proposed development in accordance with BRE Guide/BS 8206-2:2008 are considered to be excellent in the context of this urban environment, due to the fact that not all living rooms can face south and the inclusion of balconies within the design scheme (as a requirement).

IS EN 17037:2018

As the sunlight exposure assessment in accordance with IS EN 17037:2018 considers the orientation of the rooms similar to the BRE Guide / BS 8206-2:2008 assessment above, it can also be concluded that the criteria for rooms facing significantly north of due east or west is unlikely to be met.

Of the 165 no. points tested, 152 no. points (92%) meet the IS EN 17037:2018 sunlight exposure recommendations of greater than 1.5 hours on March 21st. Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.

Overall, the sunlight provision results to the proposed development in accordance with IS EN 17037:23018 are considered excellent in the context of an urban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

Note, the sunlight exposure results are visually represented in Appendix B.

9 Daylight to Existing Buildings

9.1 Guidance – BRE Guide / BS 8206-2:2008

When designing a new development, it is important to safeguard the daylight to nearby buildings. The BRE Guide provides numerical values that are purely advisory. Although this is true appropriate and reasonable regard has still been taken to the BRE guide. Different criteria may be used based on the requirements for daylighting in an area viewed against other site layout constraints. Another issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light. Any reduction in the total amount of skylight can be calculated by determining the vertical sky component at the centre of key reference points. The vertical sky component definition from the BRE guide is described below:

Vertical sky component (VSC)	Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings.

The maximum possible VSC value for an opening in a vertical wall, assuming no obstructions, is 40%. This VSC at any given point can be tested in RadianceIES, a module of IES VE.

For typical residential schemes the BRE Guide states the following in Section 2.2.7:

> 2.2.7 If this VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear more gloomy, and electric lighting will be needed more of the time.

As such this study will compare the Existing Scheme and Proposed Schemes and consider if the values on the existing buildings are above 27% or not less than 0.8 times their former value (that of the Existing scheme).

It is also important to note that Section 2.1.6 of the BRE Guide states that if the VSC is between 15% and 27%, special measures such as larger windows can provide adequate daylight (refer to extract below).

2.1.6 The amount of daylight a room needs depends on what it is being used for. But roughly speaking, if θ is:

- greater than 65° (obstruction angle less than 25° or VSC at least 27%) conventional window design will usually give reasonable results
- between 45° and 65° (obstruction angle between 25° and 45°, VSC between 15% and 27%) special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight
- between 25° and 45° (obstruction angle between 45° and 65°, VSC between 5% and 15%) it is very difficult to provide adequate daylight unless very large windows are used
- less than 25° (obstruction angle greater than 65°, VSC less than 5%) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed.

9.2 Assessment & Discussion

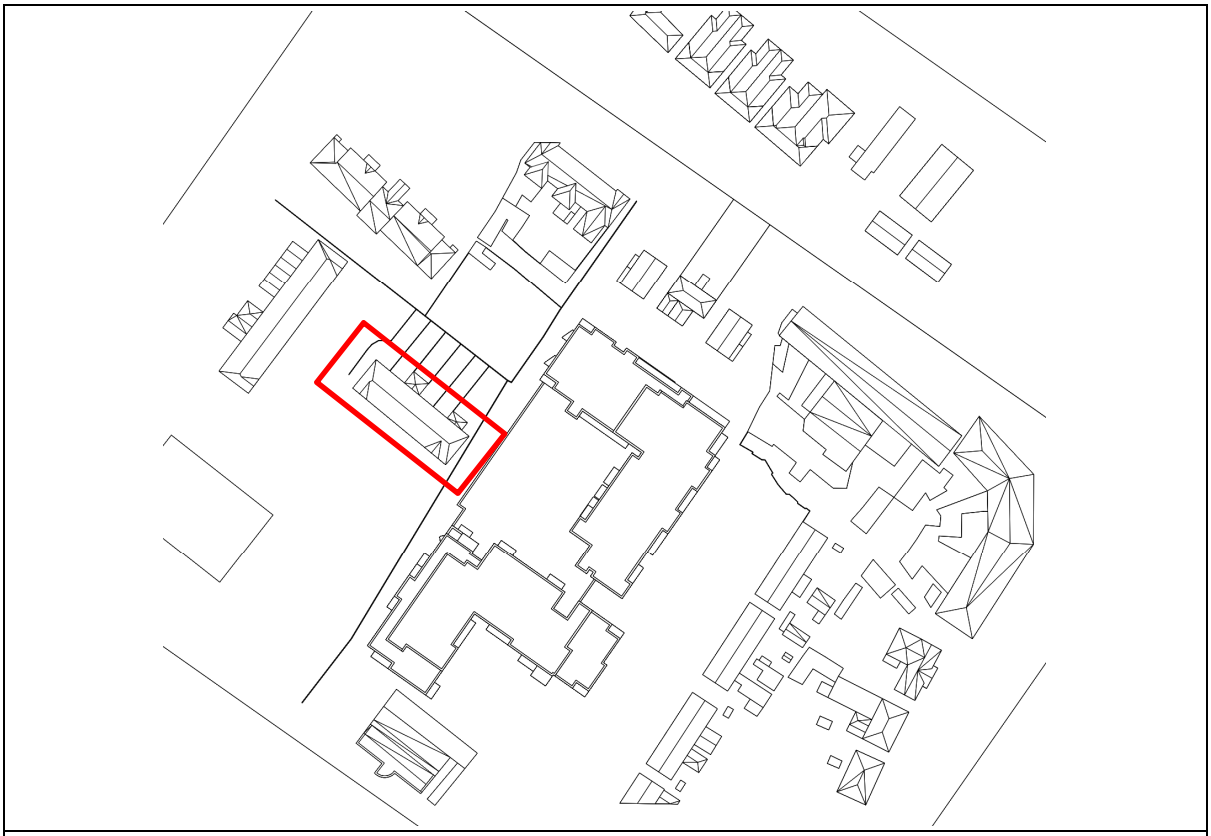
Based on the above criteria, the locations in the following sections have been modelled and analysed with the results also included.

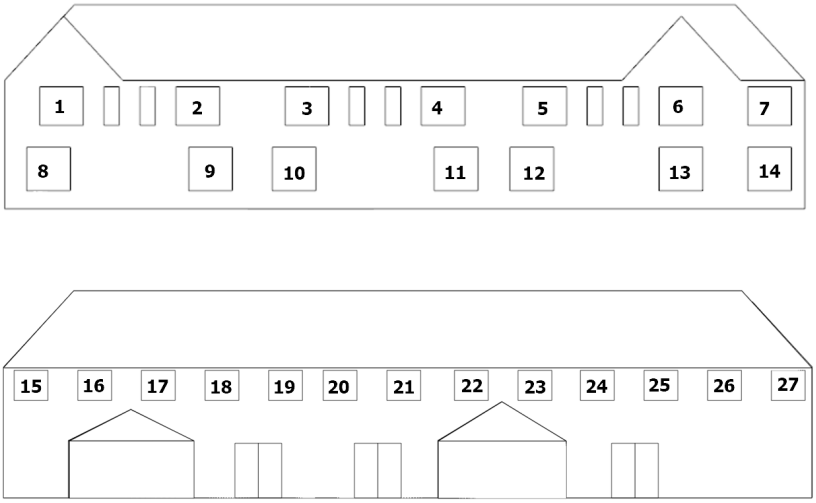
Please note, the "Comment" symbol in each of the tables represents the following:

✓ For these locations, the Proposed Scheme VSC value is greater than 27% or 0.8 times their former value (that of the Existing Situation).

✓1 For these locations, the Proposed Scheme VSC value is between 15% and 27% their former value (that of the Existing Situation).

9.2.1 View 1: Somerville Green





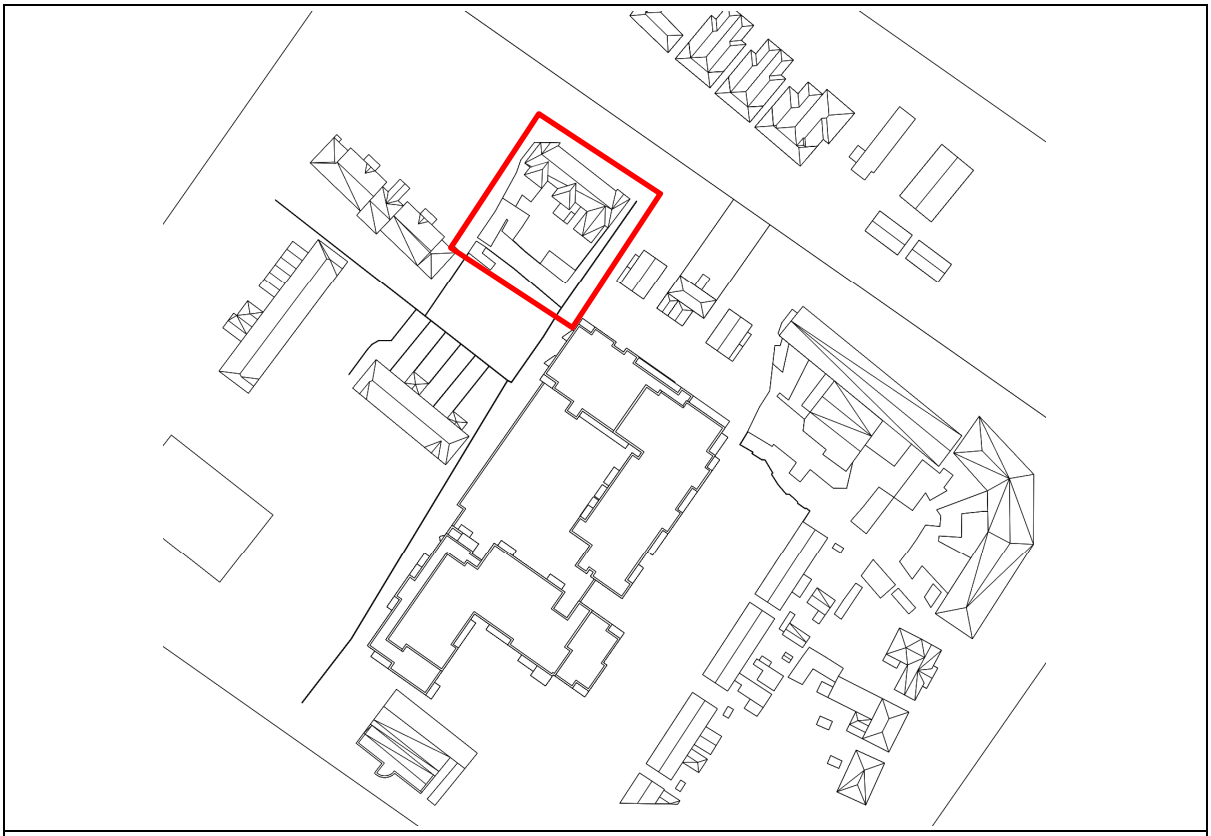
Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
1	37.99	36.45	96%	✓
2	38.25	36.24	95%	✓
3	38.31	35.79	93%	✓
4	38.33	35.32	92%	✓
5	38.44	34.79	91%	✓
6	38.42	33.72	88%	✓
7	38.52	32.53	84%	✓
8	36.83	35.09	95%	✓
9	37.20	35.23	95%	✓
10	37.40	34.93	93%	✓
11	37.55	34.40	92%	✓
12	37.80	33.89	90%	✓
13	37.93	32.55	86%	✓
14	37.65	31.30	83%	✓
15	38.24	34.00	89%	✓
16	38.11	34.41	90%	✓
17	38.17	34.97	92%	✓
18	38.19	35.34	93%	✓
19	38.20	35.83	94%	✓
20	38.13	35.91	94%	✓
21	38.03	36.15	95%	✓
22	38.11	36.32	95%	✓
23	38.17	36.52	96%	✓
24	37.93	36.57	96%	✓
25	37.85	36.70	97%	✓
26	37.79	36.71	97%	✓
27	37.56	36.64	98%	✓

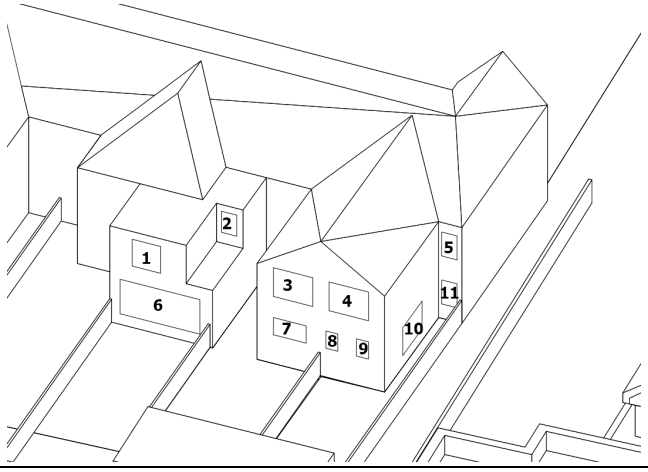
9.2.2 View 2: Somerville Drive

Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
1	38.55	30.55	79%	✓
2	38.49	29.94	78%	✓
3	38.49	29.91	78%	✓
4	38.70	29.79	77%	✓

Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
5	38.47	29.40	76%	✓
6	38.46	28.96	75%	✓
7	38.71	29.01	75%	✓
8	38.60	28.74	74%	✓
9	38.77	28.74	74%	✓
10	38.75	28.68	74%	✓
11	38.70	28.66	74%	✓
12	38.70	28.59	74%	✓
13	38.78	28.55	74%	✓
14	38.61	29.04	75%	✓
15	38.61	29.38	76%	✓
16	38.72	29.41	76%	✓
17	38.76	29.63	76%	✓
18	38.84	29.64	76%	✓
19	38.82	29.87	77%	✓
20	38.81	30.04	77%	✓
21	37.66	30.43	81%	✓
22	38.72	30.77	79%	✓
23	38.91	31.30	80%	✓
24	38.64	31.74	82%	✓
25	37.44	27.53	74%	✓
26	37.55	27.32	73%	✓
27	37.47	26.52	71%	✓[1]
28	37.76	26.52	70%	✓[1]
29	37.79	26.43	70%	✓[1]
30	37.81	26.34	70%	✓[1]
31	37.76	26.35	70%	✓[1]
32	37.81	26.94	71%	✓[1]
33	37.82	27.42	73%	✓
34	37.72	27.23	72%	✓
35	37.76	28.85	76%	✓
36	37.97	29.15	77%	✓

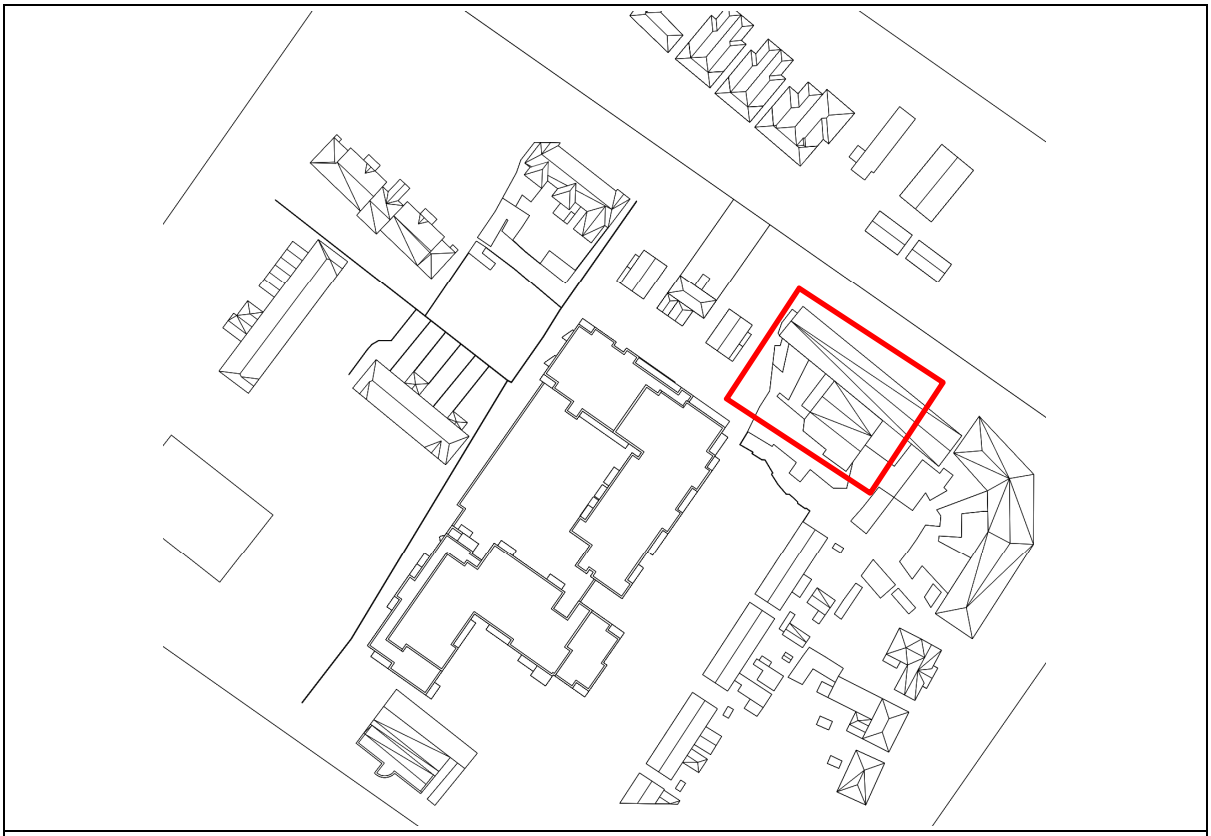
9.2.3 View 3: St Agnes Terrace

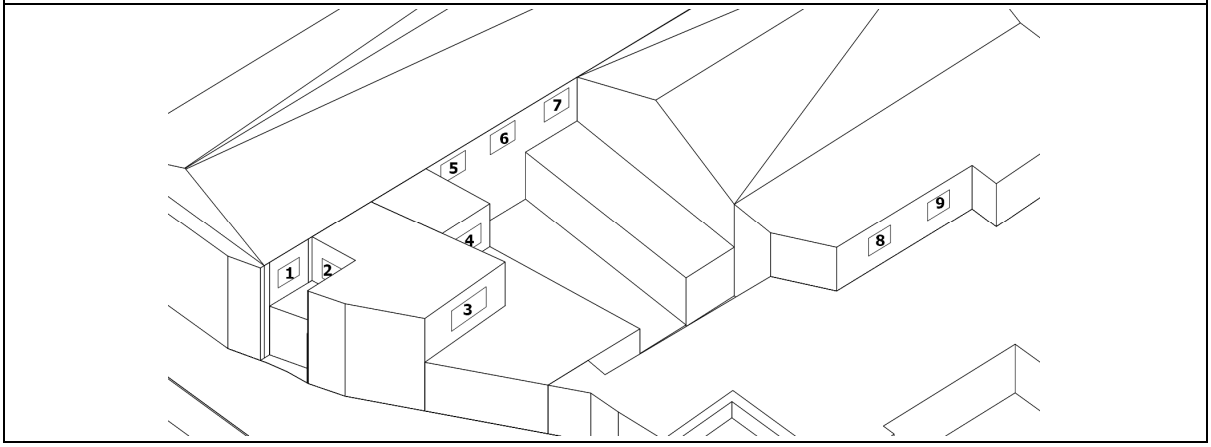




Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
1	37.43	35.45	95%	✓
2	25.96	24.96	96%	✓
3	37.17	34.83	94%	✓
4	36.59	34.31	94%	✓
5	23.90	21.78	91%	✓
6	34.57	33.35	96%	✓
7	34.27	33.21	97%	✓
8	32.93	32.57	99%	✓
9	31.96	32.44	100%	✓
10	30.41	28.22	93%	✓
11	17.05	16.22	95%	✓

9.2.4 View 4: Flats St Agnes Road





Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
1	25.29	23.01	91%	✓
2	21.42	20.30	95%	✓
3	38.16	31.19	82%	✓
4	26.20	25.29	96%	✓
5	31.15	29.79	96%	✓
6	34.48	30.28	88%	✓
7	28.54	24.35	85%	✓
8	38.21	32.64	85%	✓
9	36.36	31.78	87%	✓

9.2.5 View 5: St Agnes Road

Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
1	37.67	37.32	99%	✓
2	37.52	37.07	99%	✓
3	37.42	37.09	99%	✓
4	37.24	36.83	99%	✓
5	37.29	36.67	98%	✓
6	37.23	36.48	98%	✓

Points	Existing Situation VSC (%)	Proposed Scheme VSC (%)	Proposed VSC % of Existing Situation	Comment
7	37.2	36.37	98%	✓
8	37.47	36.32	97%	✓
9	37.49	36.46	97%	✓
10	37.24	36.41	98%	✓
11	37.39	36.40	97%	✓
12	37.33	36.26	97%	✓
13	37.47	36.29	97%	✓
14	37.22	36.11	97%	✓
15	37.41	35.84	96%	✓
16	37.14	35.80	96%	✓
17	31.26	30.05	96%	✓
18	35.78	34.51	96%	✓
19	37	36.02	97%	✓
20	37.02	35.83	97%	✓
21	36.85	36.12	98%	✓
22	35.33	34.40	97%	✓
23	35.05	34.32	98%	✓
24	36.53	36.02	99%	✓
25	36.53	36.13	99%	✓
26	36.44	35.85	98%	✓
27	34.51	34.47	100%	✓
28	34.71	34.47	99%	✓

9.3 Discussion

This study considers the Proposed Scheme and tests if the VSC results are greater than 27% or not less than 0.8 times the value of the Existing Situation.

When compared to the Existing Situation, of the 111 no. points tested, 95% (105 points) have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing Situation. The remaining 6 points have VSC values of 26.34% and 26.94% which is just below the 27% recommendations. Therefore, the Proposed Scheme has a negligible impact when compared to the Existing Situation and complies with the BRE guidance.

10 Daylight to Proposed Development

This section addresses daylight provision to the proposed apartments. The purpose of the calculations is to quantify an overall percentage of units which exceeds the daylight provision recommendations. Our proposed methodology is to complete the calculations for all of the apartments within the development. The objective of the design team is to maximise the number of units which exceed the minimum recommendations.

10.1 Reference Standards

The daylight provision to the proposed development was assessed against the following standards for completeness:

- BRE Guide / BS 8206-2:2008
- IS EN 17037:2018
- BS EN 17037:2018

The following sections summarise the various requirements of each standard.

10.1.1 BRE Guide / BS 8206-2:2008

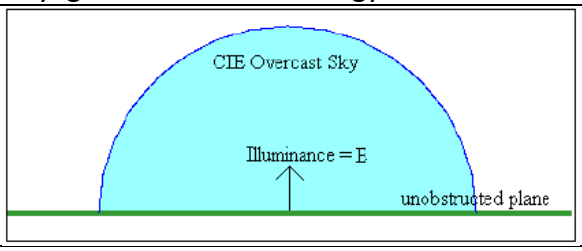
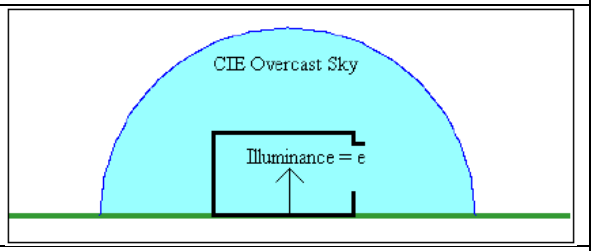
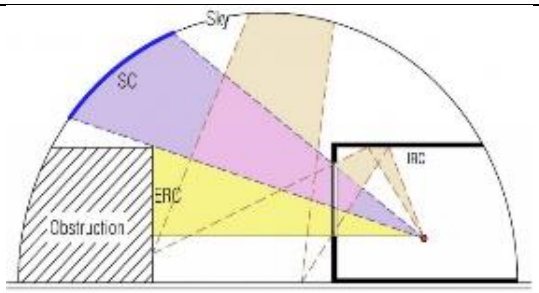
The BRE Guide states that the "*advice is not mandatory and that the guide should not be seen as an instrument of planning policy*". Although this is true, appropriate and reasonable regard has still been taken to the BRE guide. It should be further noted, when trying to achieve height and density within a development where deep plan, single aspect, combined living, kitchen and dining spaces exist (in some situations with a balcony in place as well), it is very difficult to achieve good levels of daylight across the whole space. Therefore, when considering the modelling approach noted above, results should be interpreted with flexibility as noted in the BRE guide:

"Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design."

10.1.1.1 Introduction to ADF

Daylight is constantly changing, so its level at a point in a building is usually defined as an average daylight factor (ADF).

This is the ratio of the indoor illuminance at the point in question to the outdoor unobstructed horizontal illuminance.

Daylight Factor Methodology	
	
E = illuminance on unobstructed plane	e = illuminance at point in interior
Daylight Factor = e/E (often expressed as a percentage)	
SC – Sky Component ERC – Externally Reflected Component IRC – Internally Reflected Component  Sources of Daylight at a Point Within a Room	

Both illuminances are measured under the same standard sky, a CIE overcast sky. Since the sun is in a particular position for only a short period each day, direct sunlight is excluded. Instead diffuse sunlight is used for average daylight calculations. Diffuse sunlight describes the sunlight that has been scattered by molecules and particles in the atmosphere but has still made it down to surface of the earth.

For average daylight factor there are three possible paths along which diffuse light can get into a room through glazed windows.

1. Light from the patch of sky visible at the point considered, is expressed as the sky component.
2. Light reflected from opposing exterior surfaces and then reaches the point, is expressed as the externally reflected component.
3. Light entering through the window but reaching the point only after reflection from internal surfaces, is expressed as the internally reflected component.

Average Daylight Factor is an average of all measured points within the space.

10.1.1.2 ADF Requirements

The BRE Guide states the following in Appendix C with respect to Average Daylight Factors (ADF):

> C4 If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These additional recommendations are minimum values of ADF which should be attained even if a predominantly daylit appearance is not achievable.

Therefore, the recommended Average Daylight Factors (ADF) are summarised as follows:

- Bedrooms – 1.0%
- Living Rooms – 1.5%
- Kitchens – 2.0%

The BRE Guide does not provide explicit guidance for an open space that is a combination of Living/Kitchen/Dining (LKD) functions. However, the BS 8206-2:2008 standard states:

"Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%."

Although the above target is referenced within BS 8206-2:2008, it also states, "*The aim of the standard is to give guidance to architects, builders and others who carry out lighting design. It is recognised that lighting is only one of many matters that influence fenestration. These include other aspects of environmental performance (such as noise, thermal equilibrium and the control of energy use), fire hazards, constructional requirements, the external appearance and the surroundings of the site. The best design for a building does not necessarily incorporate the ideal solution for any individual function. For this reason, careful judgement should be exercised when using the criteria given in the standard for other purposes, particularly town planning*."

For the purposes of clarity, we have assessed all LKDs against the 2% ADF target.

10.1.2 IS EN 17037:2018

As outlined in Section 5.1.2 of the IS EN 17037:2018 standard:

"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. In addition, for spaces with vertical or inclined daylight openings, a minimum target illuminance level is also to be achieved across the reference plane".

Annex A of IS EN 17037:2018 gives three levels of recommendation for the assessment of daylight provision in interior spaces which are summarised as follows:

"The three levels are: minimum, medium and high, and the minimum recommendation should be provided."

It is important to note that IS EN 17037:2018 does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

Table A.1 of IS EN 17037:2018 (included below) provides recommendations for daylight provision by daylight openings in vertical and inclined surfaces. Note, Table A.2 provides similar recommendations for daylight openings in horizontal surfaces, e.g. rooflights. As there are no rooflights in the proposed development, the recommendations in Table A.2 are not followed.

To achieve the minimum level of daylight provision for vertical and inclined openings as per Table A.1, the following must be achieved:

- A target illuminance (E_T) of 300 lux must be achieved on over 50% of the floor area for over 50% of the available daylight hours, and
- A minimum target illuminance (E_{TM}) of 100 lux must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

Table A.1 — Recommendations of daylight provision by daylight openings in vertical and inclined surface

Level of recommendation for vertical and inclined daylight opening	Target illuminance E_T lx	Fraction of space for target level $F_{plane,\%}$	Minimum target illuminance E_{TM} lx	Fraction of space for minimum target level $F_{plane,\%}$	Fraction of daylight hours $F_{time,\%}$
Minimum	300	50 %	100	95 %	50 %
Medium	500	50 %	300	95 %	50 %
High	750	50 %	500	95 %	50 %
NOTE Table A.3 gives target daylight factor (D_T) and minimum target daylight factor (D_{TM}) corresponding to target illuminance level and minimum target illuminance, respectively, for the CEN capital cities.					

The recommendations in Table A.1 can also be expressed in terms of a daylight factor "D". Table A.3 provides the corresponding daylight factor (D) relative to a recommended target illuminance E_T (lx) and target minimum illuminance E_{TM} (lx) depending on the location for daylight openings in vertical and inclined surfaces. Note, Table A.4 provides similar target values for openings in horizontal surfaces, e.g. rooflights. As there are no rooflights in the proposed development, the recommendations in Table A.4 are not followed.

The extract from Table A.3 below is for Dublin with the daylight factor targets highlighted, i.e. to achieve the target illuminance (E_T) of 300 lux outlined in Table A.1, an equivalent target daylight factor is 2.0%. Furthermore, to achieve the minimum target illuminance (E_{TM}) of 100 lux outlined in Table A.1, an equivalent target daylight factor is 0.7%.

Table A.3 — Values of *D* for daylight openings to exceed an illuminance level of 100, 300, 500 or 750 lx for a fraction of daylight hours $F_{time,\%}$ = 50 % for 33 capitals of CEN national members

Nation	Capital [a]	Geographical latitude φ [°]	Median External Diffuse Illuminance $E_{v,d,med}$	*D* to exceed 100 lx	*D* to exceed 300 lx	*D* to exceed 500 lx	*D* to exceed 750 lx
Ireland	Dublin	53,43	14 900	0,7 %	2,0 %	3,4 %	5,0 %

Therefore, to achieve the minimum level of daylight provision for vertical and inclined openings as per Table A.3, the following must be achieved:

- A target daylight factor (D_T) of 2.0% must be achieved on over 50% of the floor area for over 50% of the available daylight hours, and
- A minimum target daylight factor (D_{TM}) of 0.7% must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3. The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1. The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

As outlined in Section 5.1.4, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *"a representative model of the space is required together with the key parameters (such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building. This can be determined using either Method 1 or Method 2."*

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037:2018.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

10.1.3 BS EN 17037:2018 National Annex

In the UK, EN17037:2018 was adopted to form "BS EN 17037:2018". However, a "National Annex NA" was included which states:

"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."

Whereas IS EN 17037:2018 does not provide different illuminance targets for different space types, the BS EN 17037:2018 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 below. It is also important to note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.

Table NA.1 — Values of target illuminance for room types in UK dwellings

Room type	Target illuminance E_T (lx)
Bedroom	100
Living room	150
Kitchen	200

The BS National Annex also states:

"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."

Therefore, combined LKDs are to be assessed using a 200 lux target illuminance (E_T).

Finally, the BS National Annex also states that:

"It is the opinion of the UK committee that the recommendation in Clause A.2 – that a target illuminance level should be achieved across the entire (i.e. 95 %) fraction of the reference plane within a space – need not be applied to rooms in dwellings."

Therefore, when assessing the daylight provisions in residential dwellings in accordance with BS EN 17037:2018, only the target illuminance (E_T) or target daylight factor (D_T) will be assessed for Bedrooms, Living Rooms, Kitchens (or combined LKDs) on over 50% of the floor area over 50% of the available daylight hours. The minimum target illuminance (E_{TM}) or minimum target daylight factor (D_{TM}) will not be assessed.

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table NA.1 of BS EN 17037:2018.

10.2 Daylight Model Inputs

The following inputs were used in the study:

BRE Guide / BS 8206-2:2008

- Sky Conditions: Standard CIE overcast sky
- Time (24hr): 12:00
- Date: 21 September

IS EN / BS EN 17037:2018

- Weather File: Dublin.epw (15 year average)

Common Inputs to all Standards

- Working Plane Height: 0.85m
- Glazing Light Transmittance: 70%
- Window Frame thickness: 50 mm

The following surface reflectance values are used in the study:

Material Surface	Reflectance
External Wall – Yellow Brick	0.30
Internal Partition – White Paint	0.85
Roof	0.20
Ground	0.20
Floor/Ceiling (Floor) – Light Veneers	0.40
Floor/Ceiling (Ceiling) – White Paint	0.85

10.3 Daylight Results

The following tables summarise the daylight provision results for the 2 blocks assessed against the various standards. Individual room results can be viewed in Appendix A.

The purpose of the calculations is to quantify an overall percentage of rooms which exceed the recommendations of the various standards that were assessed. The objective of the design team is to maximise the number of units which exceed the recommendations.

As outlined previously in Section 10.1.1.2, where there are combined Living/Kitchen/Dining areas (LKDs) within the development, these have been assessed as whole spaces against an initial 2% ADF target.

The results are summarised in the following tables:

Total for The Development

The overall daylight provision results for the tested spaces in the development under the various standards are summarised below. A 95% compliance rate is achieved in accordance with the BRE Guide / BS 8206:2008 when LKDs are assessed against a 2% ADF target. Under IS EN 17037:2018 Method 2, a compliance rate of 90% is achieved which increases 99% under BS EN 17037:2018 Method 2 National Annex. Overall the quality of daylight provision across the development is high, with the majority of rooms that are failing located on the lower floors.

Rooms Tested	No. Rooms
Total No. Bedrooms Tested	229
Total No. LKDs Tested	149
No. KDs Tested	2
No. Living Tested	1
Total No. Spaces Tested	**381**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	226	99%	3	1%
No. LKDs	135	91%	14	9%
No. KDs	1	50%	1	50%
No. Living	1	100%	0	0%
Total No.	**363**	**95%**	**18**	**5%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	205	90%	24	10%
No. LKDs	137	92%	12	8%
No. KDs	1	50%	1	50%
No. Living	1	100%	0	0%
Total No.	**344**	**90%**	**37**	**10%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	229	100%	0	0%
No. LKDs	146	98%	3	2%
No. KDs	1	50%	1	50%
No. Living	1	100%	0	0%
Total No.	**377**	**99%**	**4**	**1%**

10.4 Compensatory Measures

10.4.1.1 Irish Standards and Design Development

With regards to internal daylighting, Section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments December 2020, states the following:

"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 (sic). This may arise due to 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."

Furthermore, Section 3.2 of the Urban Development and Building Heights: Guidelines for Planning Authorities December 2018, states the following:

Where a proposal may not be able to fully meet all 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, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints 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.

Having regard to the statements above, it should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme. Initial testing was producing daylight results of 89% for the 2% target. Optimisation solutions were tested which included the following:

- Increased window sizes to improve daylight provision to the apartments.

The introduction of the above design solutions improved the daylight to the scheme as a whole as anticipated producing final daylight results of 95% for the 2% target and.

In addition to this, design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against. These design features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:

- 69% of the apartment units (104 no. of 150 no.) have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (Dec 2020). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.
- 59% of the apartment units are dual aspect which is above the 50% minimum requirement as required by the Design Standards (Dec 2020). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.
- An additional 3% of public open space (905 sq m) above the minimum requirements (10% = 878 sq m) required by the Dublin City Development Plan 2016-2022 is proposed across the development which provides additional residential amenity.
- Furthermore, an additional 94% of communal open space above the minimum requirements (838 sq m) required by the Design Standards (Dec 2020) is proposed across the development.

11 View Out

11.1 Guidance – IS EN 17037:2018

In accordance with Section 5.2.1 of IS EN 17037:2018, windows in buildings provide occupants a connection to the outdoors. It is recommended the view out should be made up of "*sky, city or landscape, and ground.*" Table A.5 summarises the recommendations for outward views from a given position within a new development.

Table A.5 — Assessment of the view outwards from a given position

	Parameter [a]		
Level of recommendation for view out	**Horizontal sight angle**	**Outside distance of the view**	**Number of layers to be seen from at least 75 % of utilized area:** **- sky** **- landscape (urban and/or nature)** **- ground**
Minimum	≥ 14°	≥ 6,0 m	At least landscape layer is included
Medium	≥ 28°	≥ 20,0 m	Landscape layer and one additional layer is included in the same view opening
High	≥ 54°	≥ 50,0 m	all layers are included in the same view opening
[a] For a space with room depth more than 4 m, it is recommended that the respective sum of the view opening(s) dimensions is at least 1,0 m × 1,25 m (width × height).			

11.2 Assessment

The View Out assessment is related to buildings such as offices or schools where seating layouts are typically fixed compared to domestic settings where an occupant can move around the space freely. In their own home occupants can choose to sit near to or even at a window which will inevitably provide the varying layers of a 'View Out' such as the ground, landscape or sky. This ability to choose their position within a domestic setting means they would always have access to a position in the apartment with the minimum requirements of 'View Out'. Therefore, all the properties would meet the minimum requirement as outlined in IS EN 17037:2018/ BS EN 17037:2018 National Annex.

12 Glare

12.1 Guidance – IS EN 17037:2018

In accordance with Section 5.4.1 of IS EN 17037:2018, glare is a *"negative sensation and the cause is bright areas with sufficiently greater luminance than the luminance to which the eyes are adapted to, producing annoyance, discomfort or loss in visual performance and visibility."* Daylight Glare Probability (DGP) is the metric used to assess protection from glare. Table A.7 summarises the recommendations for glare protection within a new development.

Table A.7 — Proposed different levels of threshold $DGP_{e<5\,\%}$ for glare protection

Level of recommendation for glare protection	$DGP_{e<5\,\%}$
Minimum	0,45
Medium	0,40
High	0,35

12.2 Assessment

As outlined in IS EN 17037:2018/ BS EN 17037:2018 National Annex, a Glare assessment is suggested in spaces where the *"expected activities are comparable to reading, writing or using display devices and the user is not able to choose freely their position and viewing direction".* Given that occupants within a domestic setting are free to move around, on this basis a glare assessment for the proposed development has not been carried out.

13 Conclusion

The following can be concluded based on the assessments undertaken:

13.1 Shadow Analysis

The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation, previously Permitted Scheme and the Proposed Scheme. The results from the study are summarised as follows:

Somerville Green

Additional shading observed from the proposed development on these existing residential properties during the months of March (0800) and December* (0800-1400). No additional shading is noted at any other point through the year.

St Agnes Road

Minor additional shading observed from the proposed development on these existing residential properties during the month of December* (1400). No additional shading is noted at any other point through the year.

St Agnes Terrace

Additional shading observed from the proposed development on these existing residential properties during the months of March (0800 -1000) and December* (0800-1400). No additional shading is noted at any other point through the year.

Somerville Drive

Minor additional shading observed from the proposed development on these existing residential properties during the month of June (1800-2000). No additional shading is noted at any other point through the year.

***** Overshadowing can be expected in December when the sun is lower in the sky and shadows cast are much longer. Although this is the case, overshadowing is least noticeable during the winter months as there is a lot less sunlight available at this time of year and so the overall impact is vastly reduced.

The potential shading impact is quantified via the “Sunlight to Amenity Spaces” and “Daylight to Existing Buildings” section of this report.

13.2 Sunlight to Amenity Spaces

The BRE Guide states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then

the BRE recommends the results kept to within 80% of the existing situation with the proposed development in place.

Existing Amenity Spaces

The existing communal and private amenity spaces in the adjacent properties have been analysed and the results demonstrate they continue to receive the same level of sunlight even with the proposed development in place on March 21st, thus complying with the recommendations in the BRE Guide as outlined above.

Proposed Amenity Spaces

On March 21st 88% of the combined proposed public amenity spaces and 60% of the combined proposed communal amenity spaces provided within the development will receive at least 2 hours of sunlight over the total area provided, thus exceeding the 50% recommendation noted in the BRE Guide. In addition, all individual spaces meet the BRE recommendations confirming the amenity areas provided will be a quality spaces in terms of sunlight.

The images included confirm the amenity area provided will be a quality spaces in terms of sunlight.

13.3 Sunlight to Existing Buildings

This study considers the proposed scheme and tests if the Annual Probable Sunlight Hours (APSH) results for the living room windows are greater than 25% annual and 5% winter sunlight or are greater than 0.8 times their former value with the proposed development in place.

When compared to the Existing Situation, of the 13 no. points tested on St Agnes Road, 100% (13 no. points) meet the annual and winter recommendations outlined in the BRE Guide. Therefore, the Proposed Scheme has a negligible impact when compared to the Existing Situation.

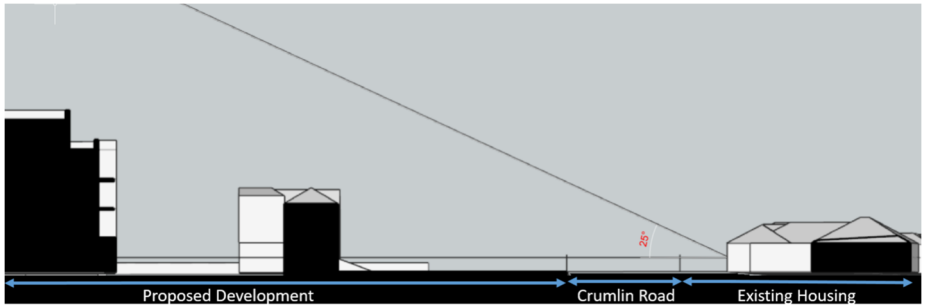
Based on the criteria outlined in Section 3.2.7 of the BRE guidance, only 13 windows of the existing neighbouring dwellings are included within the APSH assessment as the rest did not meet the criterion as laid out within the BRE guide.

“It is not always necessary to do a full calculation to check sunlight potential. The guideline above is net provided either the following is true:

- If the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window.”
- The existing building has living room with a main window which faces within 90 degrees of due south and the 25° rule is applied.

Given the statement above the 25-degree check was carried out for the existing dwellings adjacent to the proposed development across St Agnes Road. The proposed development passed as can be seen from the image below and as such these properties were excluded on the basis, as noted in section 3.2.7 of the BRE guidance, that these windows need not be analysed as sunlight impact will be unnoticeable to the existing occupants.

In addition, the properties on Summerville Drive were excluded from the assessment as they did not have a main living room window that sat within 90 degrees of due south.



Site Section – Qualification of Distance/Height Rule & 25° Rule

13.4 Sunlight to Proposed Development

For the sunlight to proposed development assessment, two standards have been analysed: BRE Guide / BS 8206-2:2008 and IS EN 17037:2018. All main living room windows within the proposed development have been assessed and the results are summarised below under each standard.

BRE Guide / BS 8206-2:2008

Within the BS 8206-2:2008 standard, when discussing annual probable sunlight hours regarding proposed developments, it is noted that:

"The degree of satisfaction is related to the expectation of sunlight. If a room is necessarily North facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".

This is also reflected in the BRE Guide which states:

"The BS 8206-2 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met."

Of the 165 no. points tested, 127 no. points (77%) meet the BRE recommended values over the annual period. The compliance rate increases to 80% (132 no. points) during the winter period when sunlight is most valuable.

It should be noted that in the development of any apartment type building achieving in the region of 75% to 80% for this assessment would be considered very high and factors such site constraints and ultimately orientation play a huge part to the outcome of this assessment. As such, the sunlight provision results to the proposed development in accordance with BRE Guide/BS 8206-2:2008 are considered to be excellent in the context of this urban environment, due to the fact that not all living rooms can face south and the inclusion of balconies within the design scheme (as a requirement).

IS EN 17037:2018

As the sunlight exposure assessment in accordance with IS EN 17037:2018 considers the orientation of the rooms similar to the BRE Guide / BS 8206-2:2008 assessment above, it can also be concluded that the criteria for rooms facing significantly north of due east or west is unlikely to be met.

Of the 165 no. points tested, 152 no. points (92%) meet the IS EN 17037:2018 sunlight exposure recommendations of greater than 1.5 hours on March 21st. Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.

Overall, the sunlight provision results to the proposed development in accordance with IS EN 17037:23018 are considered excellent in the context of an urban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

Note, the sunlight exposure results are visually represented in Appendix B.

13.5 Daylight to Existing Buildings

This study considers the Proposed Scheme and tests if the VSC results are greater than 27% or not less than 0.8 times the value of the Existing Situation.

When compared to the Existing Situation, of the 111 no. points tested, 95% (105 points) have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing Situation. The remaining 6 points have VSC values of 26.34% and 26.94% which is just below the 27% recommendations. Therefore, the Proposed Scheme has a negligible impact when compared to the Existing Situation and complies with the BRE guidance.

13.6 Daylight to Proposed Development

For the daylight to proposed development assessment, three standards have been analysed: BRE Guide / BS 8206-2:2008, IS EN 17037:2018 and BS EN 17037:2018 National Annex. The results under each standard are summarised below.

BRE Guide / BS 8206-2:2008

Across the proposed development, 95% of the tested rooms are achieving Average Daylight Factors (ADF) in accordance with the BRE Guide / BS 8206-2:2008 when Living/Kitchen/Dining

spaces are assessed as whole rooms against a 2% ADF target and Bedrooms against a 1% ADF target. The majority of rooms that are failing are located on the lower floors. However, overall the quality of daylight provision across the development can be considered high.

Compensatory Measures

With regards to internal daylighting, Section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments December 2020, states the following:

"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 (sic). This may arise due to 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."

Furthermore, Section 3.2 of the Urban Development and Building Heights: Guidelines for Planning Authorities December 2018, states the following:

Where a proposal may not be able to fully meet all 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, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints 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.

Having regard to the statements above, it should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme. Initial testing was producing daylight results of 89% for the 2% target. Optimisation solutions were tested which included the following:

- Increased window sizes to improve daylight provision to the apartments.

The introduction of the above design solutions improved the daylight to the scheme as a whole as anticipated producing final daylight results of 95% for the 2% target and.

In addition to this, design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they

were assessed against. These design features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:

- 69% of the apartment units (104 no. of 150 no.) have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (Dec 2020). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.
- 59% of the apartment units are dual aspect which is above the 50% minimum requirement as required by the Design Standards (Dec 2020). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.
- An additional 3% of public open space (905 sq m) above the minimum requirements (10% = 878 sq m) required by the Dublin City Development Plan 2016-2022 is proposed across the development which provides additional residential amenity.
- Furthermore, an additional 94% of communal open space above the minimum requirements (838 sq m) required by the Design Standards (Dec 2020) is proposed across the development.

IS EN 17037:2018

It is important to note that IS EN 17037:2018 does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 of IS EN 17037:2018 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3 (refer to Section 10.1.2 of this report). The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1 (refer to Section 10.1.2 of this report). The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

As outlined in Section 5.1.4 of the standard, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *"a representative model of the space is required together with the key parameters*

(such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building. This can be determined using either Method 1 or Method 2."

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037:2018.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

Across the proposed development, 90% of the tested rooms are achieving the daylight provision targets in accordance with Table A.1 of IS EN 17037:2018 using Method 2.

BS EN 17037:2018 National Annex

In the UK, EN17037:2018 was adopted to form "BS EN 17037:2018". However, a National Annex was included which states:

"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."

Whereas IS EN 17037:2018 does not provide different illuminance targets for different space types, the BS EN 17037:2018 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 (refer to Section 10.1.3 of this report). It is also important to note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.

The BS National Annex also states:

"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."

Therefore, combined LKDs were assessed using a 200 lux target illuminance (E_T).

Across the proposed development, 99% of the tested rooms are achieving the daylight provision targets in accordance with Table NA.1 of BS EN 17037:2018 using Method 2.

13.7 View Out

The View Out assessment is related to buildings such as offices or schools where seating layouts are typically fixed compared to domestic settings where an occupant can move around the space freely. In their own home occupants can choose to sit near to or even at a window which will inevitably provide the varying layers of a 'View Out' such as the ground, landscape or sky. This ability to choose their position within a domestic setting means they would always have access to a position in the apartment with the minimum requirements of 'View Out'. Therefore, all the properties would meet the minimum requirement as outlined in IS EN 17037:2018/ BS EN 17037:2018 National Annex.

13.8 Glare

As outlined in IS EN 17037:2018/ BS EN 17037:2018 National Annex, a Glare assessment is suggested in spaces where the *"expected activities are comparable to reading, writing or using display devices and the user is not able to choose freely their position and viewing direction".* Given that occupants within a domestic setting are free to move around, on this basis a glare assessment for the proposed development has not been carried out.

13.9 Observations

It is important to note that the recommendations within the BRE Guide itself states "*although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of many factors in site layout design"*, Although this is true appropriate and reasonable regard has still been taken to the BRE guide.

Whilst the results shown relate to the criteria as laid out in the BRE Guide, it is important to note that the BRE targets are guidance only and should therefore be used with flexibility and caution when dealing with different types of sites.

In addition, the foreword of BS 8206-2:2008 also states "*The aim of the standard is to give guidance to architects, builders and others who carry out lighting design. It is recognised that lighting is only one of many matters that influence fenestration. These include other aspects of environmental performance (such as noise, thermal equilibrium and the control of energy*

use), fire hazards, constructional requirements, the external appearance and the surroundings of the site. The best design for a building does not necessarily incorporate the ideal solution for any individual function. For this reason, careful judgement needs to be exercised when using the criteria given in the standard for other purposes, particularly town planning control."

Taking all of the above information into account and based on the results from each of the assessments undertaken, the proposed development performs well when compared to the recommendations in the BRE Guide / BS 8206-2:2008, IS EN 17037:2018 and BS EN 17037:2018 National Annex. With regards to the existing properties there is a negligible impact when considering sunlight and daylight as a result of the proposed development and the proposed development itself performs well with the same regard.

14 Appendix A – Daylight Provision Results

The tables in the following sections summarise the daylight provision results for the rooms that were assessed in the proposed development. Note, within the tables the code "LKD" equates to combined Living, Kitchen, Dining area.

The results for the following daylight standards are included in each table:

- BRE Guide / BS 8206-2:2008
- IS EN 17037:2018
- BS EN 17037:2018 National Annex

Please note, the "Comment" symbol in each of the tables represents the following:

BRE Guide / BS 8206-2:2008

✓ These rooms have an ADF greater than the recommended minimum values (2.0% for combined L/K/Ds and 1.0% for bedrooms) as stated within the BRE Guide.

x The ADF in these rooms falls below the BRE recommendation for a L/K/D when the whole space is assessed against the 2% ADF design value or in the case of Bedrooms, is less than the 1% ADF target.

IS EN 17037:2018

✓ These rooms achieve both the target illuminance (E_T) and minimum target illuminance (E_{TM}) over the minimum floor area requirements, i.e. 300 lux for over 50% of their floor area (E_T) and 100 lux for over 95% of their floor area (E_{TM}).

x These rooms do not achieve both the target illuminance (E_T) and minimum target illuminance (E_{TM}) over the minimum floor area requirements.

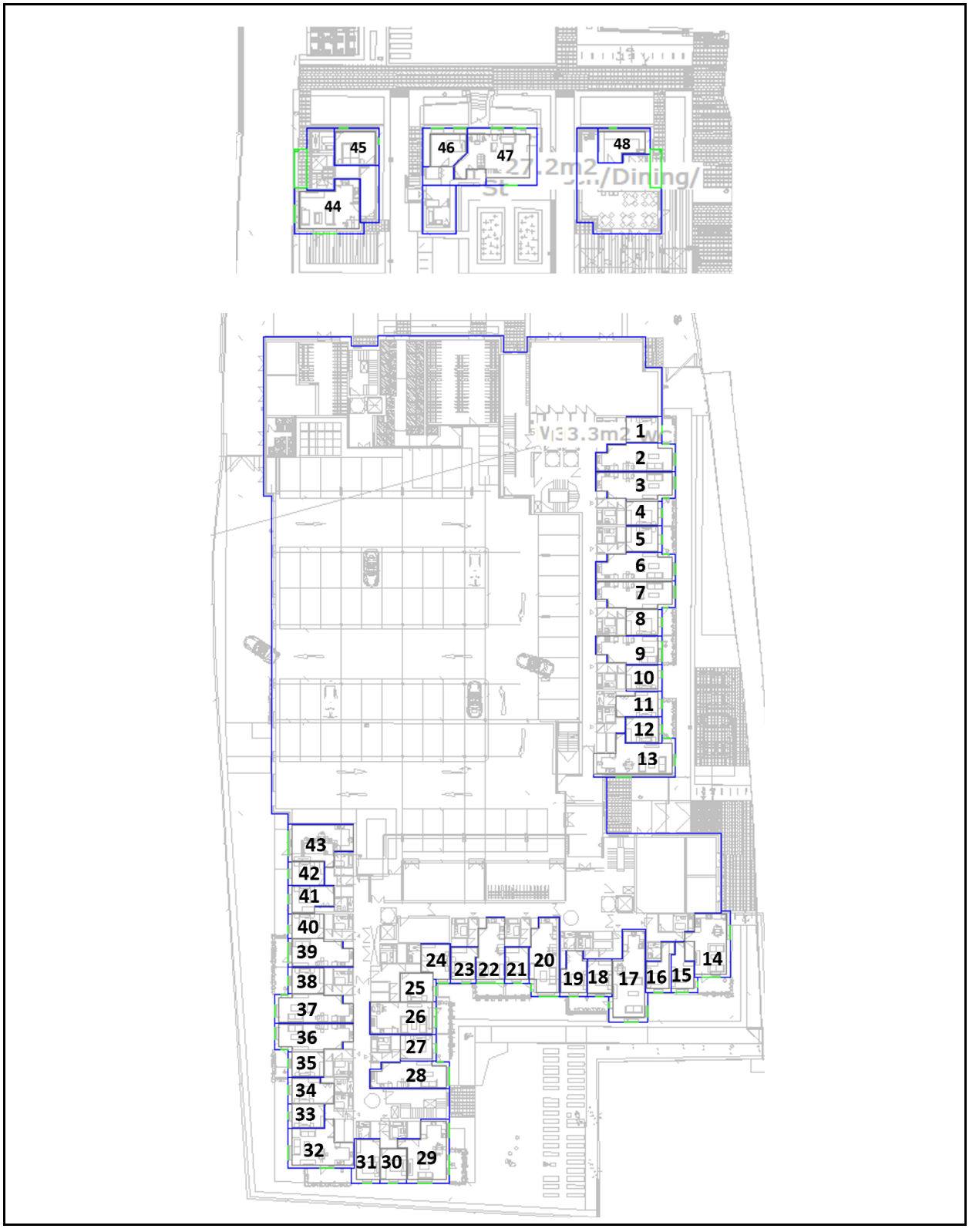
BS EN 17037:2018 National Annex

✓ These rooms achieve the target illuminance (E_T) over the minimum floor area requirements, i.e. 100 lux for over 50% of bedroom floor areas, and 200 lux for over 50% of LKD floor areas.

x These rooms do not achieve the target illuminance (E_T) over the minimum floor area requirements.

14.1 Daylight Provision Results

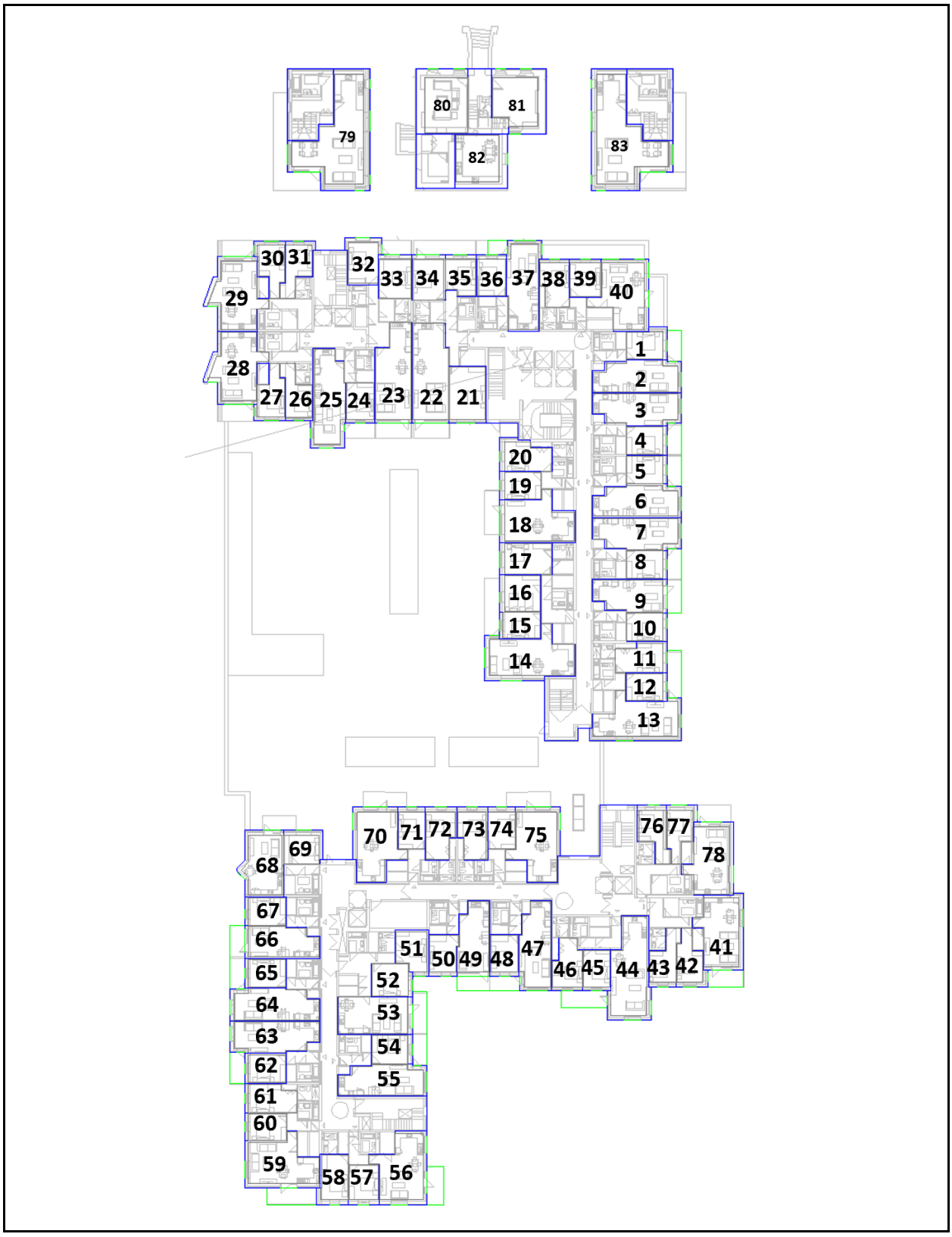
14.1.1 Blocks A & B – Level 0



Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	Bedroom	1.51	✓	100	100	✓	100	✓
2	LKD	2.11	✓	53	100	✓	73	✓
3	LKD	2.16	✓	90	100	✓	100	✓
4	Bedroom	1.51	✓	100	100	✓	100	✓
5	Bedroom	1.45	✓	100	100	✓	100	✓
6	LKD	2.08	✓	73	100	✓	100	✓
7	LKD	2.12	✓	62	100	✓	88	✓
8	Bedroom	1.43	✓	100	100	✓	100	✓
9	LKD	2.20	✓	100	100	✓	100	✓
10	Bedroom	2.39	✓	100	100	✓	100	✓
11	Bedroom	1.53	✓	100	100	✓	100	✓
12	Bedroom	1.41	✓	100	100	✓	100	✓
13	LKD	2.05	✓	87	100	✓	100	✓
14	LKD	3.54	✓	100	100	✓	100	✓
15	Bedroom	3.55	✓	100	100	✓	100	✓
16	Bedroom	2.40	✓	88	100	✓	100	✓
17	LKD	2.38	✓	100	100	✓	100	✓
18	Bedroom	1.07	✓	100	100	✓	100	✓
19	Bedroom	1.27	✓	100	100	✓	100	✓
20	LKD	2.08	✓	55	100	✓	73	✓
21	Bedroom	1.24	✓	73	100	✓	100	✓
22	LKD	2.08	✓	65	100	✓	91	✓
23	Bedroom	1.55	✓	45	100	x	100	✓
24	Bedroom	1.06	✓	23	100	x	100	✓
25	Bedroom	1.03	✓	25	96	x	96	✓
26	LKD	1.75	x	40	100	x	61	✓
27	Bedroom	1.08	✓	50	100	✓	100	✓
28	LKD	2.01	✓	54	100	✓	79	✓
29	LKD	2.02	✓	92	100	✓	100	✓
30	Bedroom	1.64	✓	65	100	✓	100	✓
31	Bedroom	2.14	✓	96	100	✓	100	✓
32	LKD	3.18	✓	100	100	✓	100	✓
33	Bedroom	2.75	✓	100	100	✓	100	✓
34	Bedroom	2.31	✓	100	100	✓	100	✓
35	Bedroom	1.50	✓	100	100	✓	100	✓
36	LKD	2.00	✓	52	100	✓	77	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
37	LKD	2.09	✓	44	100	x	64	✓
38	Bedroom	1.55	✓	100	100	✓	100	✓
39	LKD	2.25	✓	81	100	✓	100	✓
40	Bedroom	2.48	✓	100	100	✓	100	✓
41	Bedroom	2.31	✓	81	100	✓	100	✓
42	Bedroom	2.88	✓	100	100	✓	100	✓
43	LKD	3.41	✓	100	100	✓	100	✓
44	LKD	3.14	✓	45	98	x	78	✓
45	Bedroom	1.68	✓	100	100	✓	100	✓
46	Bedroom	2.44	✓	100	100	✓	100	✓
47	LKD	1.71	x	100	100	✓	100	✓
48	Kitchen	3.22	✓	100	100	✓	100	✓

14.1.2 Blocks A & B – Level 1

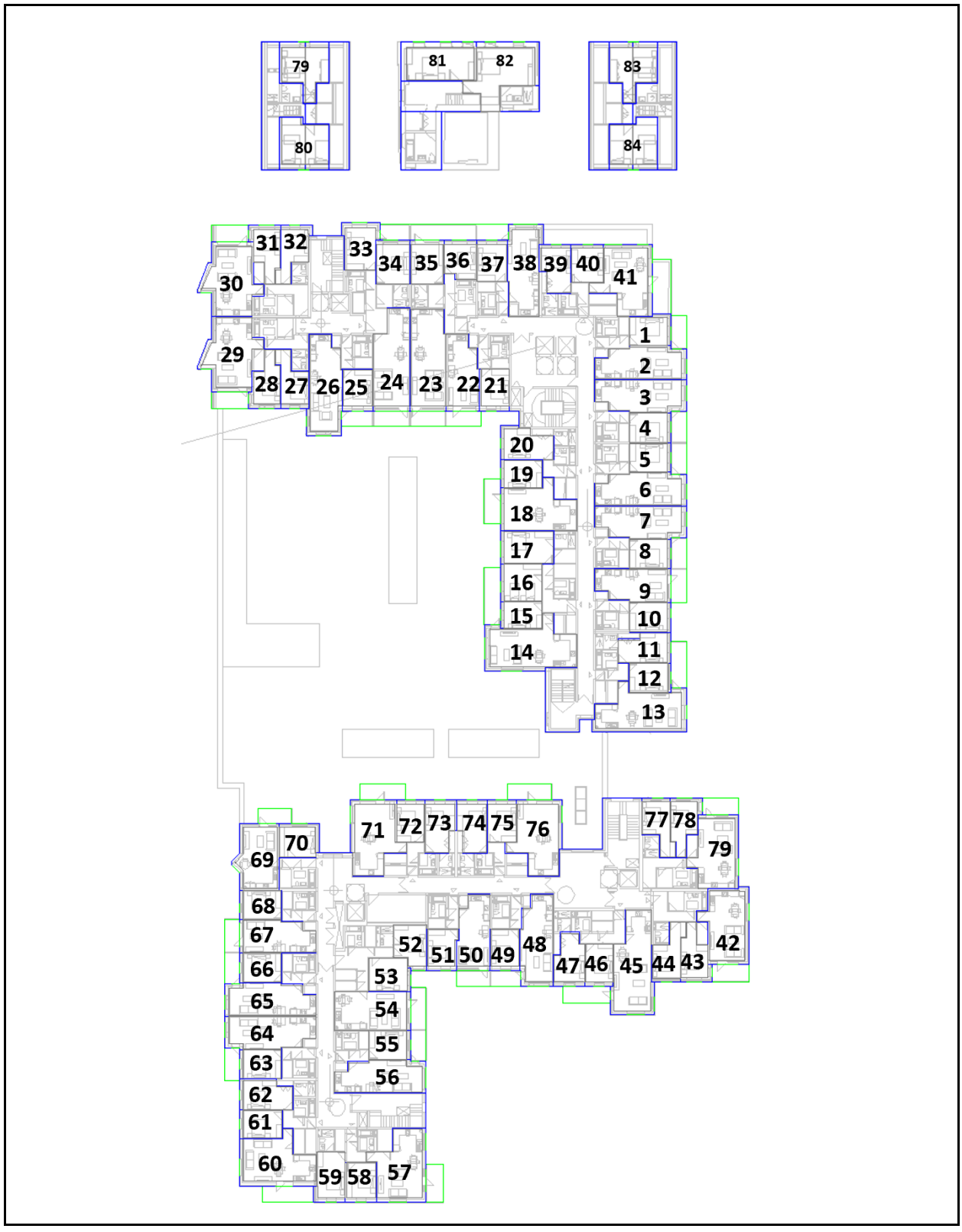


Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	Bedroom	1.57	✓	100	100	✓	100	✓
2	LKD	2.12	✓	100	100	✓	100	✓
3	LKD	2.14	✓	93	100	✓	100	✓
4	Bedroom	1.53	✓	100	100	✓	100	✓
5	Bedroom	1.55	✓	100	100	✓	100	✓
6	LKD	2.01	✓	100	100	✓	100	✓
7	LKD	2.10	✓	72	100	✓	97	✓
8	Bedroom	1.53	✓	100	100	✓	100	✓
9	LKD	2.14	✓	100	100	✓	100	✓
10	Bedroom	2.21	✓	100	100	✓	100	✓
11	Bedroom	1.49	✓	75	100	✓	100	✓
12	Bedroom	1.43	✓	100	100	✓	100	✓
13	LKD	2.25	✓	79	100	✓	100	✓
14	LKD	2.41	✓	100	100	✓	100	✓
15	Bedroom	1.40	✓	100	100	✓	100	✓
16	Bedroom	1.17	✓	100	100	✓	100	✓
17	Bedroom	2.49	✓	100	100	✓	100	✓
18	LKD	2.14	✓	100	100	✓	100	✓
19	Bedroom	1.77	✓	94	100	✓	100	✓
20	Bedroom	1.27	✓	40	100	x	100	✓
21	Bedroom	1.03	✓	30	100	x	100	✓
22	LKD	1.31	x	43	80	x	58	✓
23	LKD	1.53	x	69	99	✓	86	✓
24	Bedroom	1.00	✓	30	100	x	100	✓
25	LKD	2.17	✓	99	100	✓	100	✓
26	Bedroom	1.97	✓	94	100	✓	100	✓
27	Bedroom	3.63	✓	100	100	✓	100	✓
28	LKD	2.02	✓	100	100	✓	100	✓
29	LKD	2.00	✓	100	100	✓	100	✓
30	Bedroom	4.07	✓	100	100	✓	100	✓
31	Bedroom	2.59	✓	94	100	✓	100	✓
32	Bedroom	3.47	✓	100	100	✓	100	✓
33	Bedroom	1.33	✓	89	100	✓	100	✓
34	Bedroom	2.61	✓	100	100	✓	100	✓
35	Bedroom	1.91	✓	100	100	✓	100	✓
36	Bedroom	1.39	✓	96	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
37	LKD	2.53	✓	100	100	✓	100	✓
38	Bedroom	1.98	✓	100	100	✓	100	✓
39	Bedroom	2.57	✓	100	100	✓	100	✓
40	LKD	4.41	✓	89	100	✓	100	✓
41	LKD	3.41	✓	100	100	✓	100	✓
42	Bedroom	3.59	✓	100	100	✓	100	✓
43	Bedroom	2.22	✓	96	100	✓	100	✓
44	LKD	2.31	✓	89	100	✓	100	✓
45	Bedroom	1.12	✓	100	100	✓	100	✓
46	Bedroom	1.35	✓	100	100	✓	100	✓
47	LKD	2.33	✓	65	100	✓	93	✓
48	Bedroom	1.20	✓	60	100	✓	100	✓
49	LKD	2.04	✓	71	100	✓	96	✓
50	Bedroom	1.44	✓	80	100	✓	100	✓
51	Bedroom	1.14	✓	23	100	x	100	✓
52	Bedroom	1.00	✓	33	100	x	100	✓
53	LKD	1.57	x	37	100	x	56	✓
54	Bedroom	1.02	✓	30	100	x	100	✓
55	LKD	2.16	✓	52	100	✓	75	✓
56	LKD	2.89	✓	100	100	✓	100	✓
57	Bedroom	2.16	✓	100	100	✓	100	✓
58	Bedroom	2.18	✓	100	100	✓	100	✓
59	LKD	3.12	✓	100	100	✓	100	✓
60	Bedroom	2.56	✓	100	100	✓	100	✓
61	Bedroom	2.16	✓	100	100	✓	100	✓
62	Bedroom	1.63	✓	100	100	✓	100	✓
63	LKD	2.19	✓	69	100	✓	89	✓
64	LKD	2.18	✓	61	100	✓	92	✓
65	Bedroom	1.57	✓	100	100	✓	100	✓
66	LKD	2.00	✓	100	100	✓	100	✓
67	Bedroom	2.32	✓	100	100	✓	100	✓
68	LKD	2.57	✓	98	100	✓	100	✓
69	Bedroom	3.38	✓	100	100	✓	100	✓
70	LKD	2.48	✓	100	100	✓	100	✓
71	Bedroom	1.88	✓	100	100	✓	100	✓
72	Bedroom	1.58	✓	58	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
73	Bedroom	1.41	✓	58	100	✓	100	✓
74	Bedroom	1.29	✓	46	100	x	100	✓
75	LKD	1.27	x	20	74	x	37	x
76	Bedroom	1.31	✓	21	100	x	100	✓
77	Bedroom	2.20	✓	100	100	✓	100	✓
78	LKD	2.98	✓	100	100	✓	100	✓
79	LKD	2.66	✓	100	100	✓	100	✓
80	Living	1.56	✓	100	100	✓	100	✓
81	Bedroom	1.65	✓	100	100	✓	100	✓
82	KD	0.50	x	3	77	x	10	x
83	LKD	2.61	✓	100	100	✓	100	✓

14.1.1 Blocks A & B – Level 2

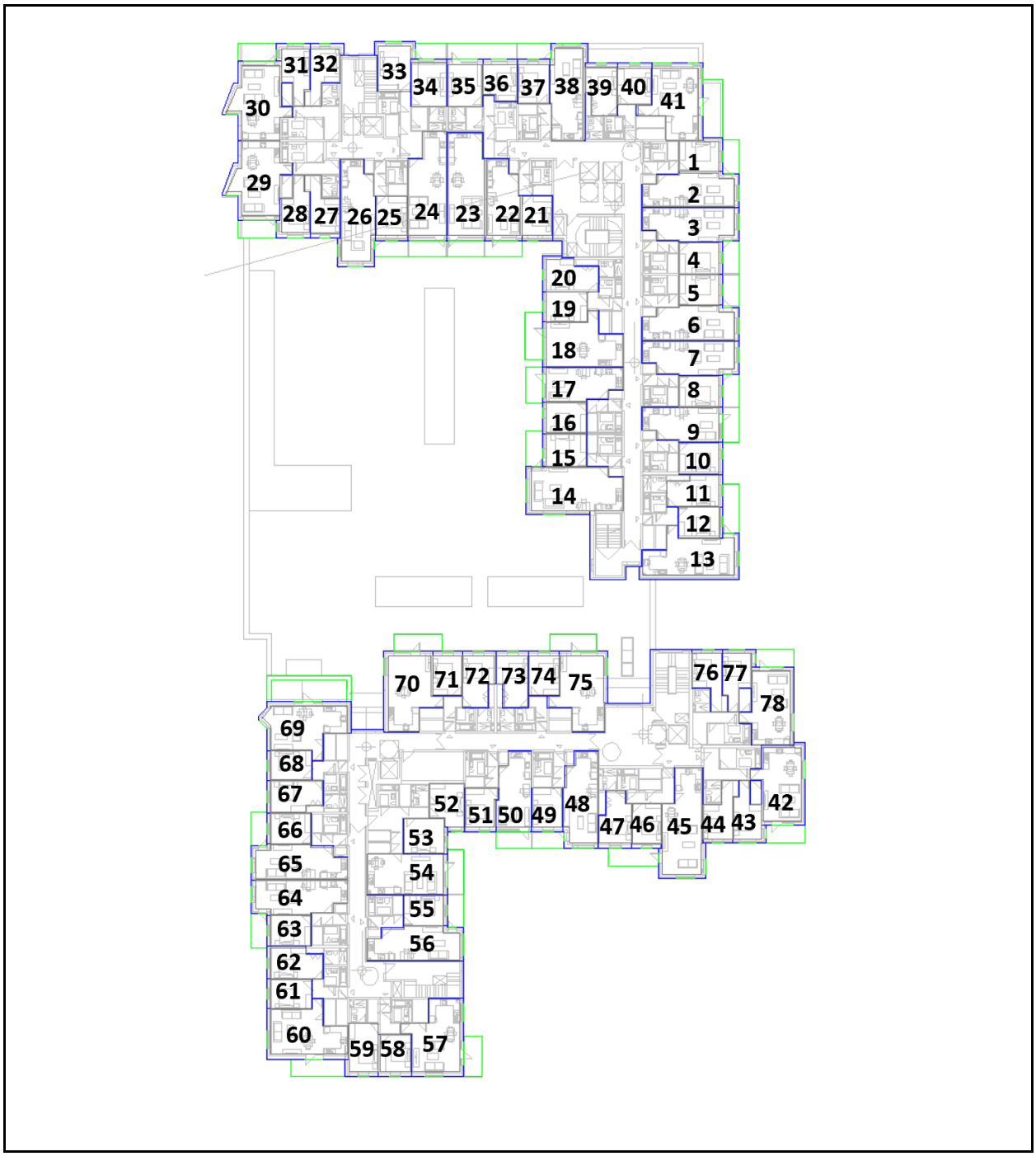


Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	Bedroom	1.75	✓	100	100	✓	100	✓
2	LKD	2.13	✓	100	100	✓	100	✓
3	LKD	2.14	✓	67	100	✓	90	✓
4	Bedroom	1.47	✓	100	100	✓	100	✓
5	Bedroom	1.49	✓	100	100	✓	100	✓
6	LKD	2.02	✓	57	100	✓	75	✓
7	LKD	2.12	✓	60	100	✓	77	✓
8	Bedroom	1.47	✓	100	100	✓	100	✓
9	LKD	2.07	✓	89	100	✓	100	✓
10	Bedroom	2.20	✓	100	100	✓	100	✓
11	Bedroom	1.46	✓	100	100	✓	100	✓
12	Bedroom	1.40	✓	100	100	✓	100	✓
13	LKD	2.04	✓	81	100	✓	100	✓
14	LKD	2.63	✓	100	100	✓	100	✓
15	Bedroom	1.44	✓	100	100	✓	100	✓
16	Bedroom	1.81	✓	100	100	✓	100	✓
17	Bedroom	1.65	✓	100	100	✓	100	✓
18	LKD	2.06	✓	75	100	✓	100	✓
19	Bedroom	1.95	✓	100	100	✓	100	✓
20	Bedroom	1.46	✓	43	100	x	100	✓
21	Bedroom	1.15	✓	33	100	x	100	✓
22	LKD	1.50	x	49	97	x	64	✓
23	LKD	1.55	x	46	100	x	61	✓
24	LKD	1.87	x	69	100	✓	88	✓
25	Bedroom	1.05	✓	75	100	✓	100	✓
26	LKD	2.23	✓	96	100	✓	100	✓
27	Bedroom	2.07	✓	95	100	✓	100	✓
28	Bedroom	4.02	✓	100	100	✓	100	✓
29	LKD	2.16	✓	100	100	✓	100	✓
30	LKD	2.20	✓	100	100	✓	100	✓
31	Bedroom	4.24	✓	100	100	✓	100	✓
32	Bedroom	2.70	✓	95	100	✓	100	✓
33	Bedroom	3.34	✓	100	100	✓	100	✓
34	Bedroom	1.40	✓	91	100	✓	100	✓
35	Bedroom	2.86	✓	100	100	✓	100	✓
36	Bedroom	2.03	✓	100	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
37	Bedroom	1.40	✓	67	100	✓	100	✓
38	LKD	2.25	✓	100	100	✓	100	✓
39	Bedroom	1.99	✓	100	100	✓	100	✓
40	Bedroom	2.70	✓	100	100	✓	100	✓
41	LKD	4.53	✓	100	100	✓	100	✓
42	LKD	3.40	✓	100	100	✓	100	✓
43	Bedroom	4.43	✓	100	100	✓	100	✓
44	Bedroom	2.22	✓	96	100	✓	100	✓
45	LKD	2.34	✓	85	100	✓	94	✓
46	Bedroom	1.10	✓	100	100	✓	100	✓
47	Bedroom	1.32	✓	85	100	✓	100	✓
48	LKD	2.38	✓	62	100	✓	84	✓
49	Bedroom	1.17	✓	100	100	✓	100	✓
50	LKD	2.00	✓	83	100	✓	100	✓
51	Bedroom	1.46	✓	60	100	✓	100	✓
52	Bedroom	1.13	✓	21	100	x	100	✓
53	Bedroom	1.03	✓	38	100	x	100	✓
54	LKD	1.07	x	33	99	x	55	✓
55	Bedroom	1.01	✓	40	100	x	100	✓
56	LKD	2.22	✓	58	100	✓	88	✓
57	LKD	3.66	✓	100	100	✓	100	✓
58	Bedroom	2.74	✓	100	100	✓	100	✓
59	Bedroom	2.31	✓	100	100	✓	100	✓
60	LKD	3.15	✓	100	100	✓	100	✓
61	Bedroom	2.64	✓	100	100	✓	100	✓
62	Bedroom	2.21	✓	100	100	✓	100	✓
63	Bedroom	1.56	✓	100	100	✓	100	✓
64	LKD	2.20	✓	93	100	✓	100	✓
65	LKD	2.21	✓	96	100	✓	100	✓
66	Bedroom	1.55	✓	100	100	✓	100	✓
67	LKD	3.16	✓	100	100	✓	100	✓
68	Bedroom	2.41	✓	100	100	✓	100	✓
69	LKD	3.24	✓	98	100	✓	100	✓
70	Bedroom	3.93	✓	100	100	✓	100	✓
71	LKD	2.58	✓	100	100	✓	100	✓
72	Bedroom	2.06	✓	100	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
73	Bedroom	1.77	✓	84	100	✓	100	✓
74	Bedroom	1.61	✓	55	100	✓	100	✓
75	Bedroom	1.50	✓	88	100	✓	100	✓
76	LKD	1.04	x	21	66	x	37	x
77	Bedroom	1.06	✓	20	100	x	100	✓
78	Bedroom	2.62	✓	100	100	✓	100	✓
79	LKD	3.02	✓	100	100	✓	100	✓
80	Bedroom	1.11	✓	100	100	✓	100	✓
81	Bedroom	0.52	x	13	100	x	100	✓
82	Bedroom	1.00	✓	100	100	✓	100	✓
83	Bedroom	0.66	x	100	100	✓	100	✓
84	Bedroom	1.09	✓	100	100	✓	100	✓
85	Bedroom	0.43	x	80	100	✓	100	✓

14.1.1 Blocks A & B – Level 3

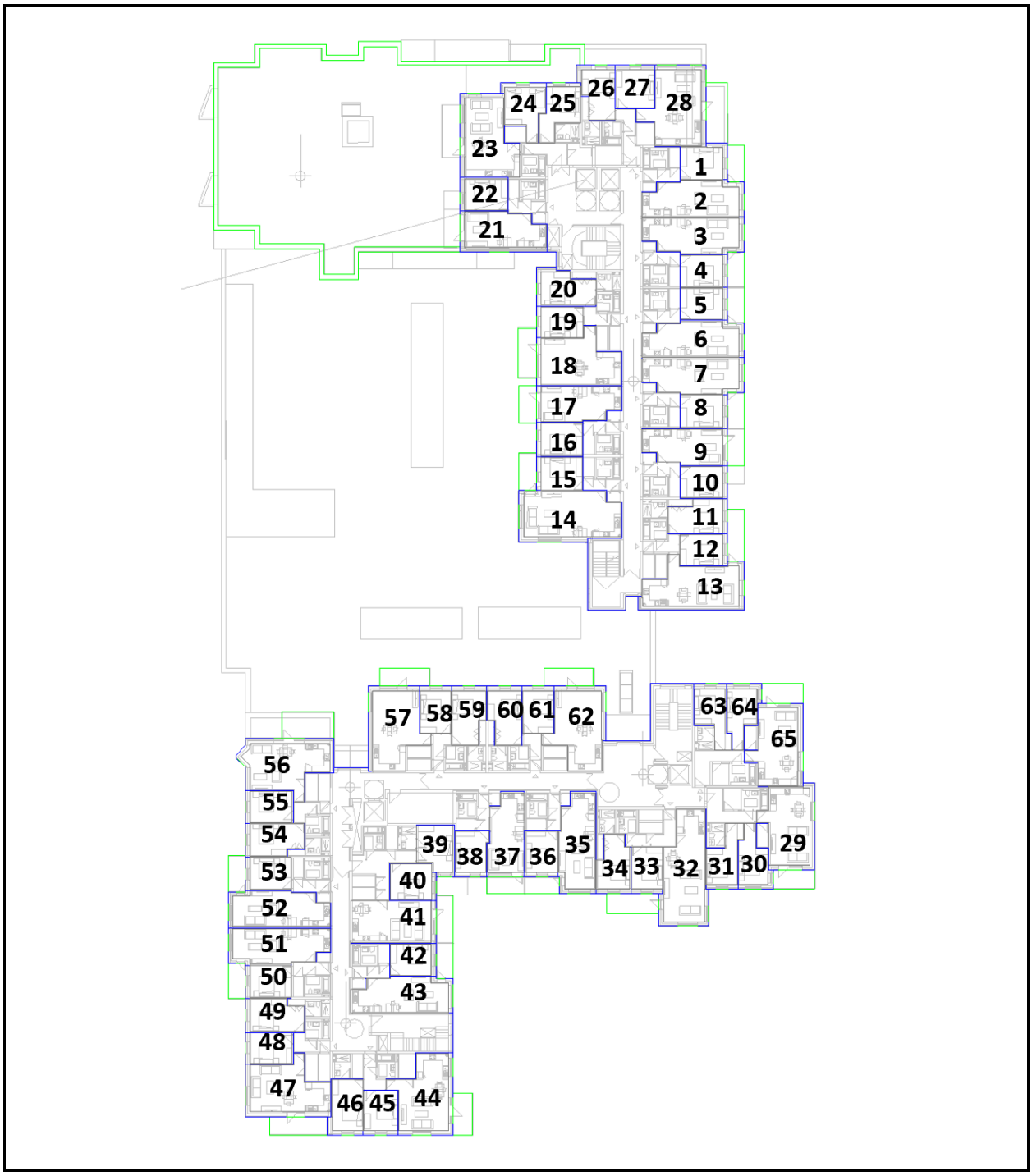


Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	Bedroom	1.55	✓	100	100	✓	100	✓
2	LKD	2.15	✓	73	100	✓	99	✓
3	LKD	2.16	✓	60	100	✓	83	✓
4	Bedroom	1.48	✓	100	100	✓	100	✓
5	Bedroom	1.50	✓	100	100	✓	100	✓
6	LKD	2.03	✓	53	100	✓	74	✓
7	LKD	2.14	✓	62	100	✓	88	✓
8	Bedroom	1.49	✓	100	100	✓	100	✓
9	LKD	2.10	✓	91	100	✓	100	✓
10	Bedroom	2.24	✓	100	100	✓	100	✓
11	Bedroom	1.47	✓	96	100	✓	100	✓
12	Bedroom	1.33	✓	83	100	✓	100	✓
13	LKD	2.06	✓	55	100	✓	76	✓
14	LKD	2.91	✓	100	100	✓	100	✓
15	Bedroom	1.16	✓	100	100	✓	100	✓
16	Bedroom	2.15	✓	100	100	✓	100	✓
17	LKD	2.32	✓	65	100	✓	91	✓
18	LKD	2.25	✓	80	100	✓	100	✓
19	Bedroom	2.23	✓	100	100	✓	100	✓
20	Bedroom	1.67	✓	100	100	✓	100	✓
21	Bedroom	1.46	✓	46	100	x	100	✓
22	LKD	2.31	✓	69	100	✓	91	✓
23	LKD	2.32	✓	50	100	✓	66	✓
24	LKD	2.63	x	87	100	✓	92	✓
25	Bedroom	2.15	✓	100	100	✓	100	✓
26	LKD	2.15	✓	69	100	✓	86	✓
27	Bedroom	2.19	✓	95	100	✓	100	✓
28	Bedroom	4.87	✓	100	100	✓	100	✓
29	LKD	3.30	✓	96	100	✓	100	✓
30	LKD	3.36	✓	100	100	✓	100	✓
31	Bedroom	4.96	✓	100	100	✓	100	✓
32	Bedroom	2.76	✓	95	100	✓	100	✓
33	Bedroom	4.07	✓	100	100	✓	100	✓
34	Bedroom	2.48	✓	100	100	✓	100	✓
35	Bedroom	5.08	✓	100	100	✓	100	✓
36	Bedroom	3.70	✓	100	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
37	Bedroom	2.51	✓	100	100	✓	100	✓
38	LKD	2.50	✓	95	100	✓	100	✓
39	Bedroom	2.14	✓	74	100	✓	100	✓
40	Bedroom	2.75	✓	100	100	✓	100	✓
41	LKD	4.60	✓	100	100	✓	100	✓
42	LKD	3.42	✓	100	100	✓	100	✓
43	Bedroom	4.48	✓	100	100	✓	100	✓
44	Bedroom	2.25	✓	88	100	✓	100	✓
45	LKD	2.40	✓	77	100	✓	86	✓
46	Bedroom	1.13	✓	100	100	✓	100	✓
47	Bedroom	1.37	✓	73	100	✓	100	✓
48	LKD	2.00	✓	58	100	✓	82	✓
49	Bedroom	1.23	✓	100	100	✓	100	✓
50	LKD	2.11	✓	83	100	✓	100	✓
51	Bedroom	1.57	✓	95	100	✓	100	✓
52	Bedroom	1.10	✓	21	100	x	100	✓
53	Bedroom	1.13	✓	38	100	x	100	✓
54	LKD	1.18	x	40	100	x	70	✓
55	Bedroom	1.09	✓	65	100	✓	100	✓
56	LKD	2.35	✓	52	100	✓	67	✓
57	LKD	3.93	✓	100	100	✓	100	✓
58	Bedroom	2.88	✓	100	100	✓	100	✓
59	Bedroom	2.37	✓	100	100	✓	100	✓
60	LKD	3.20	✓	100	100	✓	100	✓
61	Bedroom	2.67	✓	100	100	✓	100	✓
62	Bedroom	2.24	✓	100	100	✓	100	✓
63	Bedroom	1.57	✓	100	100	✓	100	✓
64	LKD	2.22	✓	84	100	✓	100	✓
65	LKD	2.23	✓	51	100	✓	67	✓
66	Bedroom	1.56	✓	100	100	✓	100	✓
67	Bedroom	2.23	✓	93	100	✓	100	✓
68	Bedroom	2.80	✓	100	100	✓	100	✓
69	LKD	2.82	✓	94	100	✓	100	✓
70	LKD	2.88	✓	77	100	✓	100	✓
71	Bedroom	2.21	✓	100	100	✓	100	✓
72	Bedroom	1.93	✓	77	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
73	Bedroom	1.82	✓	52	100	✓	100	✓
74	Bedroom	1.77	✓	71	100	✓	100	✓
75	LKD	1.38	x	32	79	x	48	x
76	Bedroom	1.38	✓	35	100	x	100	✓
77	Bedroom	3.03	✓	100	100	✓	100	✓
78	LKD	3.12	✓	100	100	✓	100	✓

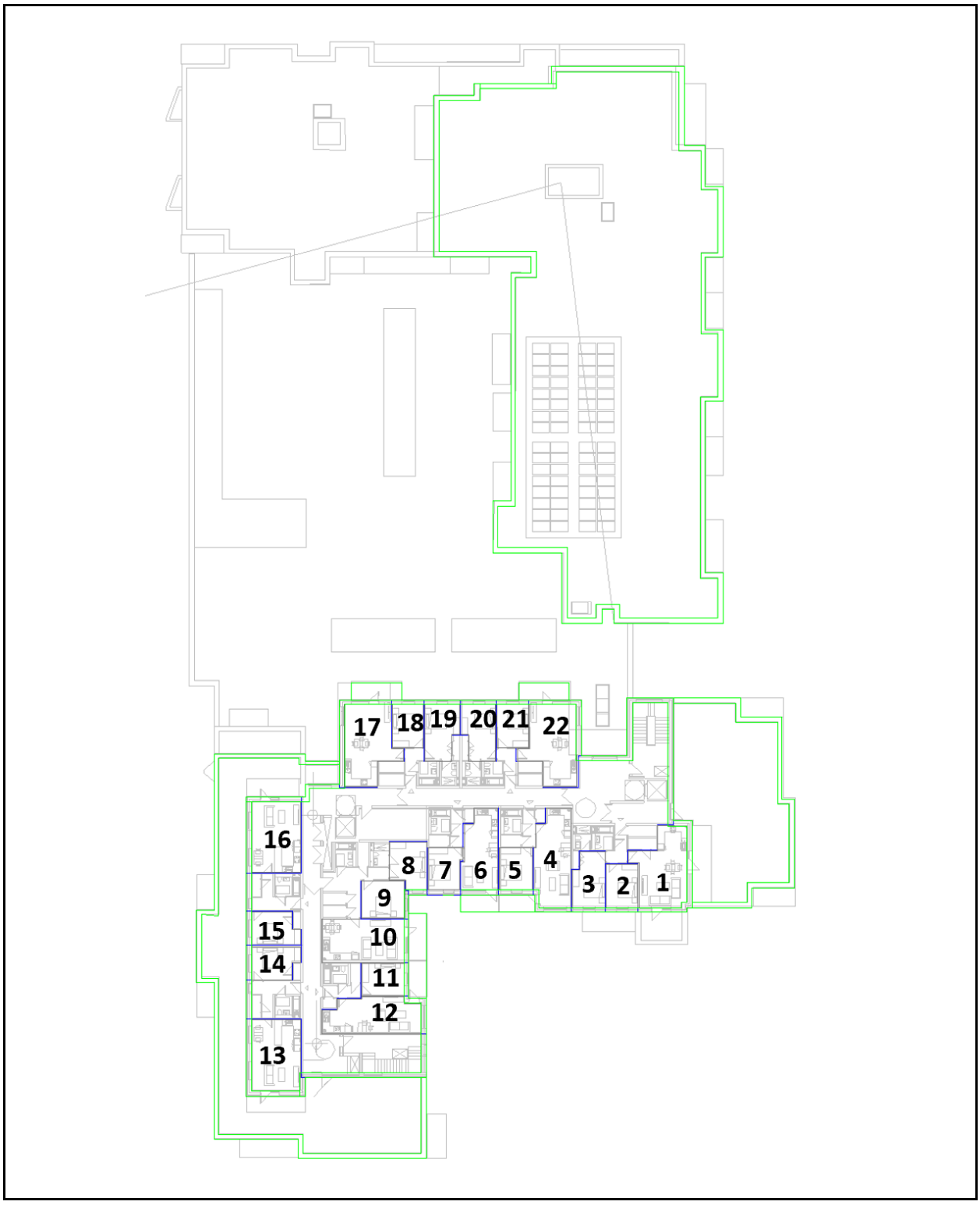
14.1.1 Blocks A & B – Level 4



Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	Bedroom	2.60	✓	100	100	✓	100	✓
2	LKD	2.00	✓	52	100	✓	70	✓
3	LKD	2.42	✓	53	100	✓	70	✓
4	Bedroom	2.55	✓	100	100	✓	100	✓
5	Bedroom	2.60	✓	100	100	✓	100	✓
6	LKD	2.30	✓	52	100	✓	66	✓
7	LKD	2.42	✓	60	100	✓	80	✓
8	Bedroom	2.56	✓	100	100	✓	100	✓
9	LKD	3.36	✓	93	100	✓	100	✓
10	Bedroom	2.37	✓	100	100	✓	100	✓
11	Bedroom	2.28	✓	93	100	✓	100	✓
12	Bedroom	2.46	✓	100	100	✓	100	✓
13	LKD	2.36	✓	55	100	✓	69	✓
14	LKD	3.61	✓	100	100	✓	100	✓
15	Bedroom	2.09	✓	79	100	✓	100	✓
16	Bedroom	2.31	✓	100	100	✓	100	✓
17	LKD	3.23	✓	86	100	✓	100	✓
18	LKD	3.37	✓	94	100	✓	100	✓
19	Bedroom	2.50	✓	100	100	✓	100	✓
20	Bedroom	1.89	✓	83	100	✓	100	✓
21	LKD	5.21	✓	100	100	✓	100	✓
22	Bedroom	2.33	✓	100	100	✓	100	✓
23	LKD	4.25	✓	100	100	✓	100	✓
24	Bedroom	2.36	✓	94	100	✓	100	✓
25	Bedroom	2.24	✓	83	100	✓	100	✓
26	Bedroom	2.38	✓	97	100	✓	100	✓
27	Bedroom	2.64	✓	100	100	✓	100	✓
28	LKD	5.35	✓	100	100	✓	100	✓
29	LKD	4.35	✓	100	100	✓	100	✓
30	Bedroom	5.31	✓	100	100	✓	100	✓
31	Bedroom	2.48	✓	92	100	✓	100	✓
32	LKD	2.76	✓	77	100	✓	87	✓
33	Bedroom	2.38	✓	100	100	✓	100	✓
34	Bedroom	2.35	✓	100	100	✓	100	✓
35	LKD	2.11	✓	59	100	✓	88	✓
36	Bedroom	1.32	✓	100	100	✓	100	✓

Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
37	LKD	2.07	✓	98	100	✓	100	✓
38	Bedroom	1.75	✓	95	100	✓	100	✓
39	Bedroom	1.09	✓	33	100	x	100	✓
40	Bedroom	1.36	✓	46	100	x	100	✓
41	LKD	1.56	x	69	100	✓	100	✓
42	Bedroom	1.20	✓	90	100	✓	100	✓
43	LKD	2.00	✓	54	100	✓	79	✓
44	LKD	5.09	✓	100	100	✓	100	✓
45	Bedroom	2.94	✓	100	100	✓	100	✓
46	Bedroom	2.41	✓	100	100	✓	100	✓
47	LKD	4.03	✓	100	100	✓	100	✓
48	Bedroom	2.69	✓	100	100	✓	100	✓
49	Bedroom	2.30	✓	78	100	✓	100	✓
50	Bedroom	2.61	✓	100	100	✓	100	✓
51	LKD	2.48	✓	44	98	x	61	✓
52	LKD	2.50	✓	57	100	✓	70	✓
53	Bedroom	2.60	✓	100	100	✓	100	✓
54	Bedroom	2.28	✓	79	100	✓	100	✓
55	Bedroom	2.82	✓	100	100	✓	100	✓
56	LKD	4.11	✓	98	100	✓	100	✓
57	LKD	3.11	✓	100	100	✓	100	✓
58	Bedroom	2.33	✓	100	100	✓	100	✓
59	Bedroom	2.07	✓	100	100	✓	100	✓
60	Bedroom	2.03	✓	100	100	✓	100	✓
61	Bedroom	2.11	✓	83	100	✓	100	✓
62	LKD	2.12	✓	49	100	x	66	✓
63	Bedroom	2.16	✓	100	100	✓	100	✓
64	Bedroom	4.48	✓	100	100	✓	100	✓
65	LKD	4.15	✓	100	100	✓	100	✓

14.1.1 Blocks A & B – Level 5



Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	LKD	4.05	✓	100	100	✓	100	✓
2	Bedroom	2.76	✓	100	100	✓	100	✓
3	Bedroom	2.30	✓	97	100	✓	100	✓
4	LKD	2.48	✓	58	100	✓	81	✓
5	Bedroom	2.48	✓	100	100	✓	100	✓
6	LKD	3.99	✓	100	100	✓	100	✓
7	Bedroom	2.10	✓	100	100	✓	100	✓
8	Bedroom	1.42	✓	67	100	✓	100	✓
9	Bedroom	1.87	✓	100	100	✓	100	✓
10	LKD	3.43	✓	100	100	✓	100	✓
11	Bedroom	2.38	✓	100	100	✓	100	✓
12	LKD	2.37	✓	58	100	✓	84	✓
13	LKD	5.14	✓	100	100	✓	100	✓
14	Bedroom	3.87	✓	100	100	✓	100	✓
15	Bedroom	3.89	✓	100	100	✓	100	✓
16	LKD	5.00	✓	100	100	✓	100	✓
17	LKD	4.15	✓	100	100	✓	100	✓
18	Bedroom	2.68	✓	100	100	✓	100	✓
19	Bedroom	2.16	✓	81	100	✓	100	✓
20	Bedroom	2.14	✓	71	100	✓	100	✓
21	Bedroom	2.59	✓	100	100	✓	100	✓
22	LKD	3.56	✓	100	100	✓	100	✓

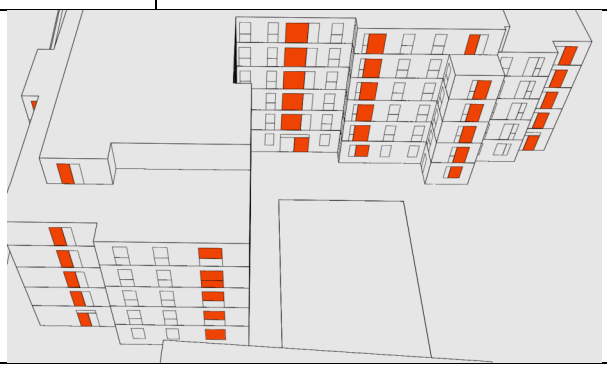
15 Appendix B – Sunlight Exposure Results

The IS EN 17037:2018 sunlight exposure results tabulated in Section 8.3 for the proposed development are visually represented in the following images. The windows highlighted in "red" achieve the minimum 1.5 hours of recommended sunlight on March 21st, while the windows highlighted in "blue" do not achieve the recommended value.

15.1.1 Block A – View 1

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

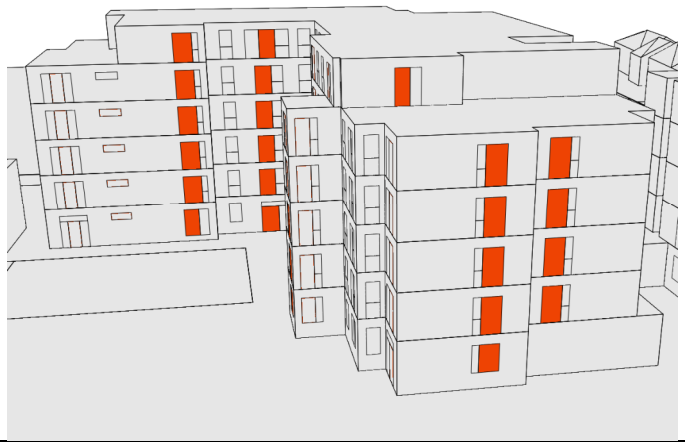


34 out of 34 windows passing

15.1.2 Block A – View 2

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

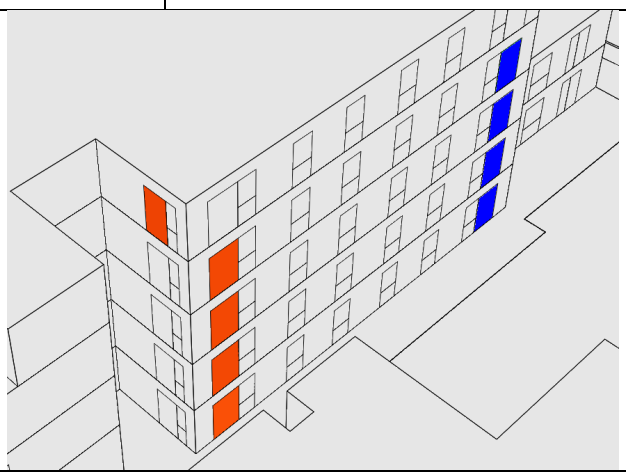


22 out of 22 windows passing

15.1.3 Block A – View 3

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



05 out of 09 windows passing

15.1.4 Block A – View 4

Receives more than 1.5 hours of sunlight

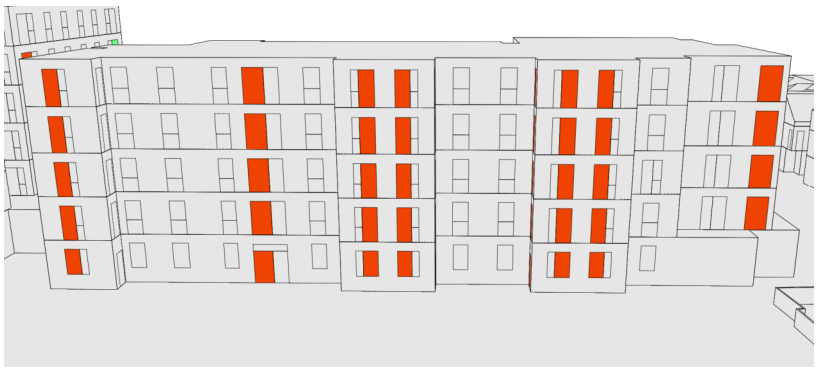
Receives less than 1.5 hours of sunlight

21 out of 21 windows passing

15.1.1 Block B – View 1

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



34 out of 34 windows passing

15.1.2 Block B – View 2

Receives more than 1.5 hours of sunlight

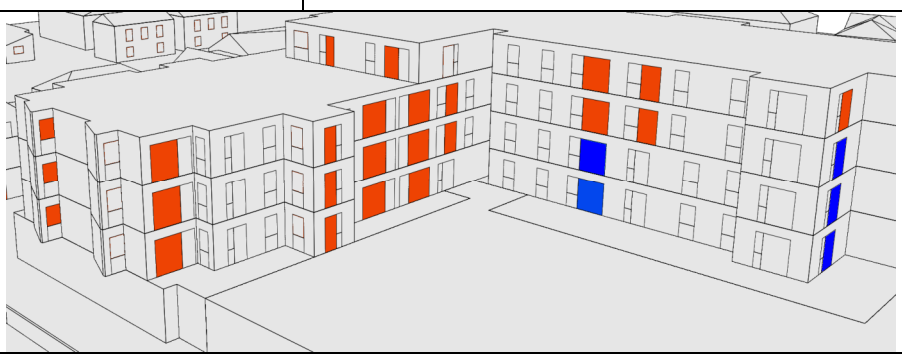
Receives less than 1.5 hours of sunlight

03 out of 03 windows passing

15.1.3 Block B – View 3

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

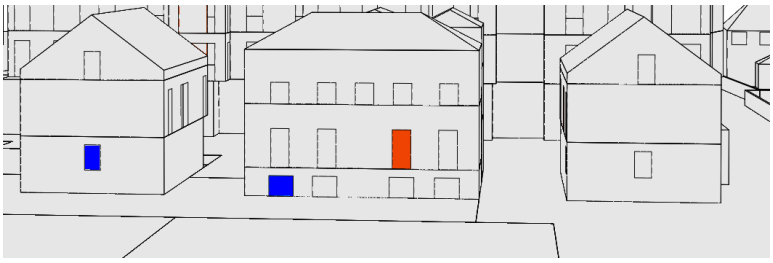


24 out of 29 windows passing

15.1.4 Block GH – View 1

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

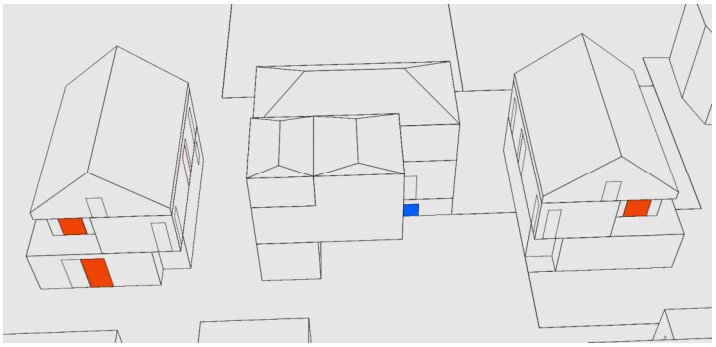


01 out of 03 windows passing

15.1.1 Block GH – View 2

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

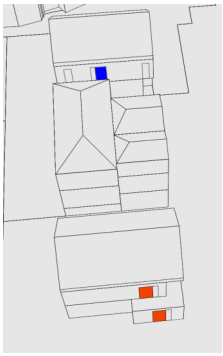


03 out of 04 windows passing

15.1.1 Block GH – View 3

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

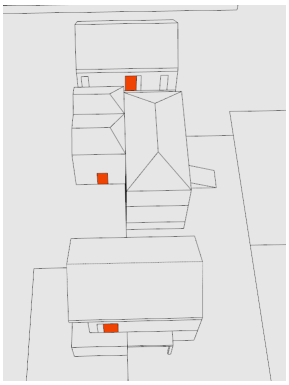


02 out of 03 windows passing

15.1.1 Block GH – View 4

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



03 out of 03 windows passing


IES