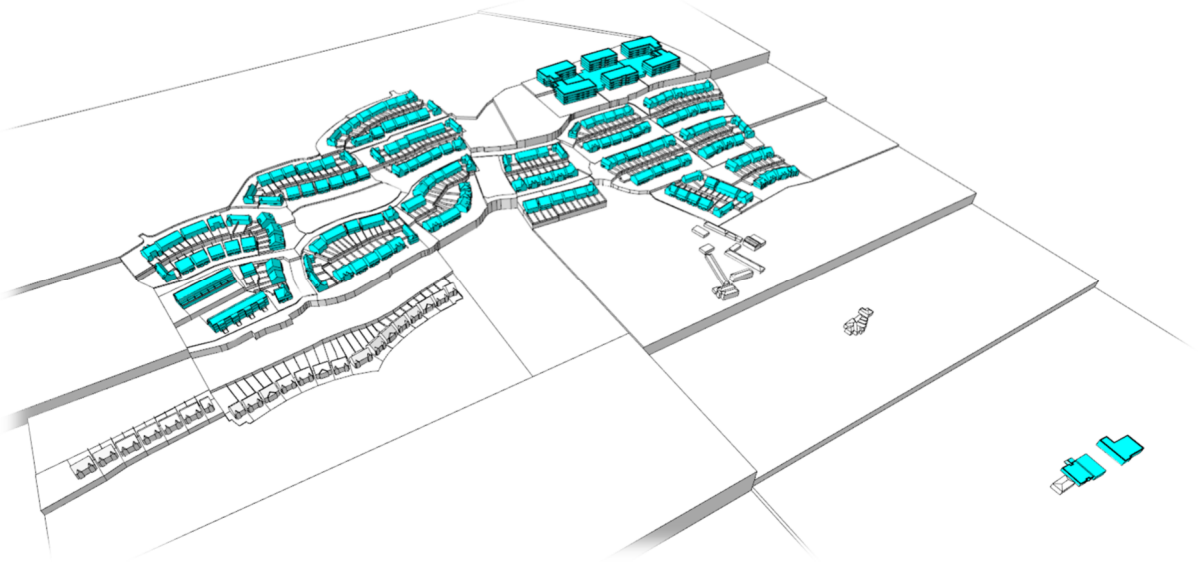
Coolagad, Greystones, Wiclow

Daylight, Sunlight and Overshadowing Study



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1 Executive Summary

This report summarises the analyses undertaken to quantify the Sunlight and Daylight performance of the proposed Coolagad development located in Greystones, County Wicklow. 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

It should be noted at the outset; this study supports the assessment undertaken in accordance with the Development Management Criteria of the Building Height Guidelines 2018. Reference is also made to section 6.6 of the Sustainable Urban Housing Design Standards for New Apartments 2020. As such, the assessment of house type dwellings has been included although not a requirement.

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Buildings – Part 2: Code of Practice for Daylighting'* has been included within this report even though it has now been withdrawn because the *BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) and the BS 8206-2: 2008 directly refer to each other as noted within the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 proposed apartments, duplexes and houses within the proposed development. It should be noted, with regards to the duplex and house type properties, a sampling including the perceived worst-case units was employed. This approach was taken as these property types do not face the same issues with regards to daylight when compared to apartments, mainly as they do not have balconies in place and are only two/three stories in height.
- **View Out**
  - Assessed in accordance with IS EN 17037:2018
- **Glare**
  - Assessed in accordance with IS EN 17037:2018

The following can be concluded based on the assessments undertaken:

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:

Waverly Avenue

Minor additional shading observed from the proposed development on these existing residential properties during the months of March (1800) and June (2000) when the sun is lower in the sky at the end of the day and shadows cast are much longer. No additional shading is noted at any other point through the year.

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.

To note, the proposed pitch and open space situated to the east of the proposed development have not been included within this assessment as they are located too far from the proposed units for them to have any impact on these open spaces.

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.

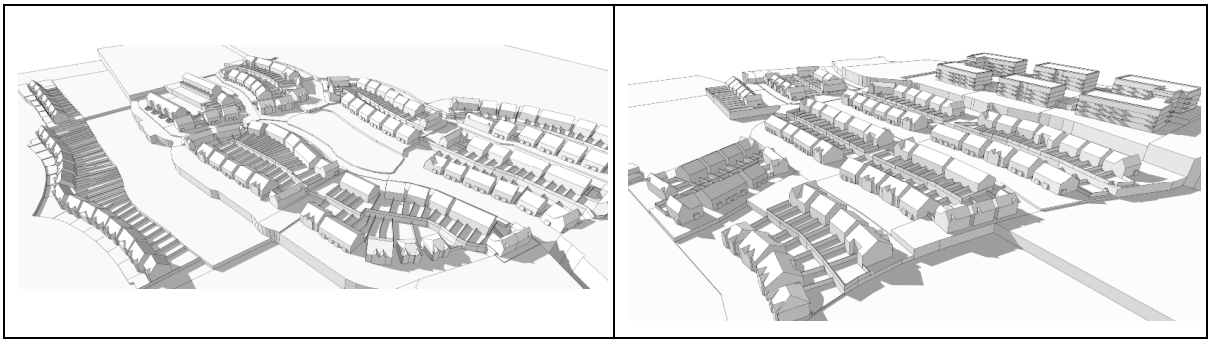
Proposed Amenity Spaces

Private Gardens

Based on the results in the tables above, of 63% of sampled private amenity spaces (41 of 65) situated within the development site will receive at least 2 hours of sunlight on March 21st in excess of 50% of their area, thus exceeding BRE recommendations.

It should be noted that sample plots have been selected from those with similar orientation. Then the private gardens situated in the middle and ends of plots have been selected including the worst-case locations as a sample from there. As such the within development as a whole we would expect this percentage to far higher.

The gardens that do fall below the recommended sunlight target are noted to be self-shaded (by the building they sit with) as they are north facing amenities or are impacted by the site constraint of the location on a hill. In March when the test is carried out and the sun is lower in the sky this will be more evident. These properties will perform better in the summer months when the azimuth of the sun is much higher in the sky.



Communal Apartment Amenity

On March 21st, 87% of the proposed communal amenity space situated within the apartments area of 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.

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
Communal	4856	4238	87%	✓

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

Duplex Amenity

On March 21st, 98 and 96% of the proposed communal amenity space situated within the Duplexes of the development will receive at least 2 hours of sunlight over the total area provided, thus complying with the 50% recommendation noted in the BRE Guide.

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
33	557	548	98%	✓
34	783	753	96%	✓

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

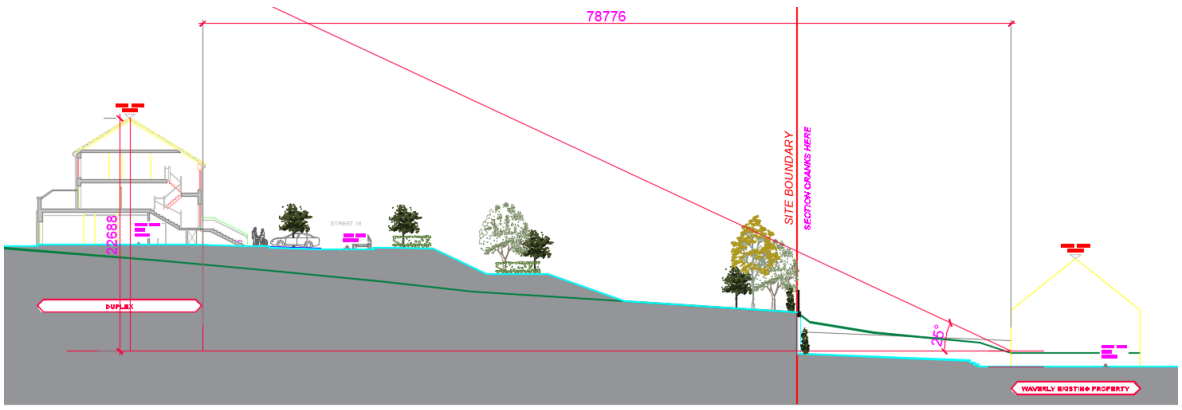
1.5 Sunlight to Existing Buildings

None of the existing neighbouring dwellings were included within the APSH assessment as they did not meet the criterion as laid out within the BRE guide. Section 3.2.7 of the BRE guidance notes the following:

"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."

Given the statement above the distance between the existing dwellings adjacent and the proposed development was verified noting that it exceeds the height, distance rule outlined above. Therefore, the existing neighbouring 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. To note, as an added check the 25-degree check was also carried out for good measure which the proposed development passed as can be seen from the image below.



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. 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 203 no. points tested, 162 no. points (80%) meet the BRE recommended values over the annual period. The compliance rate increases to 90% (182 no. points) during the winter period when sunlight is most valuable. 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.

It should be noted that in the development of any housing scheme 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 suburban

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 203 no. points tested, 187 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.

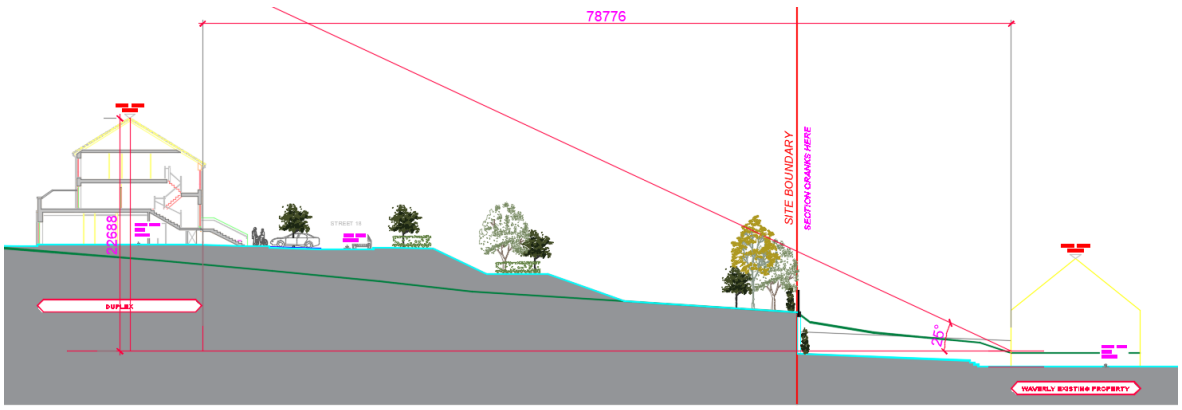
Overall, the sunlight provision results to the proposed development in accordance with IS EN 17037:23018 are considered excellent in the context of a suburban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

1.7 Daylight to Existing Buildings

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. 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. Section 2.2.4 of the BRE guidance goes on to note the following:

"Loss of light to existing windows need not be analysed 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. In these cases loss of light will be small"

As noted in Section 9.1 of this report, the distance between the existing dwellings adjacent to the proposed development was verified noting that it exceeds the height, distance rule outlined above. Therefore, the existing neighbouring properties were excluded on the basis, as noted in section 2.2.4 of the BRE guidance, that these windows need not be analysed as daylight impact will be unnoticeable to the existing occupants. To note, as an added check the 25-degree check was also carried out for good measure which the proposed development passed as can be seen from the image below.



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

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.

To note, a sample of the duplexes and homes property types have been selected and not all as these property types do not face the same daylight issues that apartment property types do. As such a sample were chosen from the middle of rows or locations that were in close proximity to neighbouring proposed properties which would be seen as worst-case location as a check that there were no performance issues with regards to daylight.

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 91% 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.

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:

- All of the apartments exceed the minimum standard and the majority are more than ten percent larger than the minimum standard 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.
- 58% of the apartment & duplex 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.
- A total of 10.43 ha of open space is provided as part of the development. This includes a mix of zoned open space, zoned active open space, linear parks and residential open space.

- 5192 sqm of communal open space is provided.

To note, further results for an alternative design value were collated and can be found within Appendix B of this report. A 98% compliance rate is achieved when LKDs are assessed against this alternative 1.5% design value. Overall the quality of daylight provision across the development is high.

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, 99.7% 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, 100% 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/house/duplex 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 no 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 Coolagad development located in Greystones, County Wicklow in Ireland. 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.

It should be noted at the outset; this study supports the assessment undertaken in accordance with the Development Management Criteria of the Building Height Guidelines 2018. Reference is also made to section 6.6 of the Sustainable Urban Housing Design Standards for New Apartments 2020. As such, the assessment of house type dwellings has been included although not a requirement.

2.1 Development Description

In summary, the proposed development consists of 586 residential units (351 houses; 203 apartments and 32 duplex units) at a site c. 26.03 ha at Coolagad, Greystones. The development will also include the provision of a community building, a creche, a sport field and a MUGA. A proposed new vehicular entrance with signalised junction from the R761 Rathdown Road to the north of Gate Lodge, Rathdown Road opposite Sea View and Redford Cemetery, providing a distributor road as part of the long-term objective to provide a northern access route from Greystones to the N11 is also proposed. The development also includes site development infrastructure, a hierarchy of internal streets including bridges, cycle paths & footpaths; new watermain connection and foul and surface water drainage; the development also provides for the upgrading of the public sewer within the wayleave of the R761/R762 (Rathdown Road) from the site entrance as far as the R762 in front of St. Kevin's National School , Rathdown Road, Greystones.

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 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."

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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 - BRE Guide
- **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

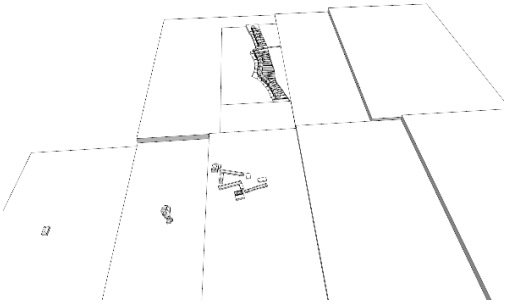
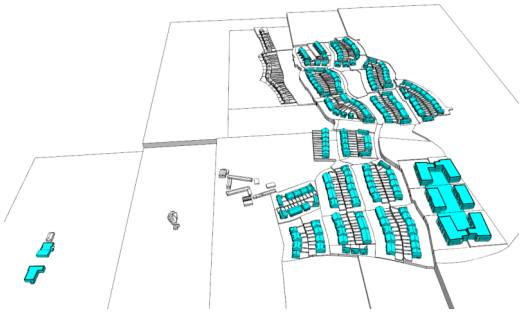
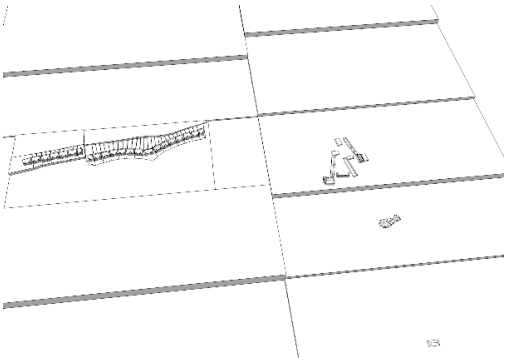
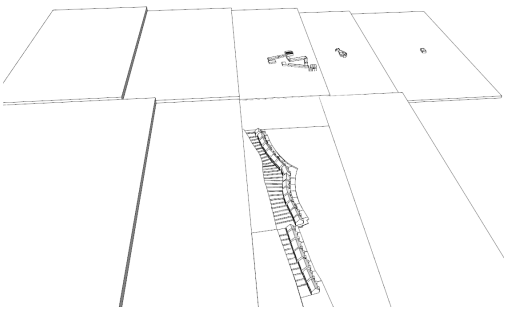
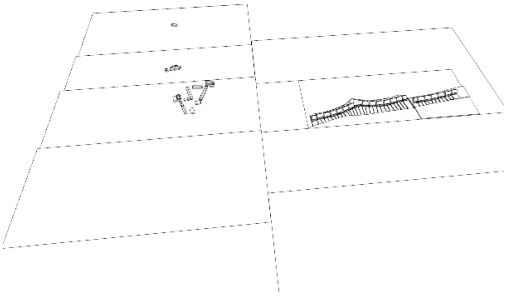
4.3 Orientation

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. All other properties surrounding the proposed development were situated a greater distance away from the site and hence would not be impacted with regards to sunlight and daylight and were excluded from this report on this basis.

	Proposed Site
	Waverly Ave

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.

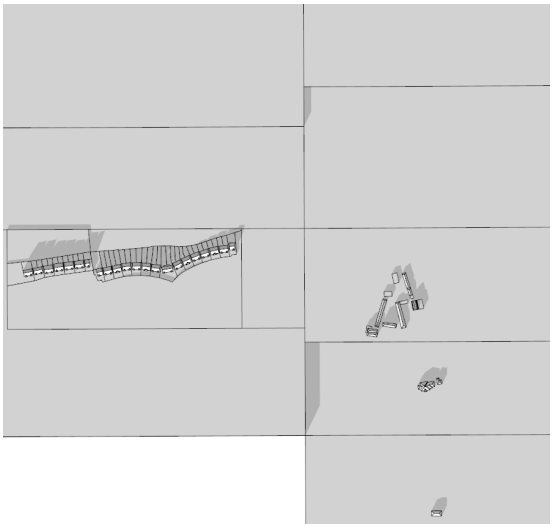
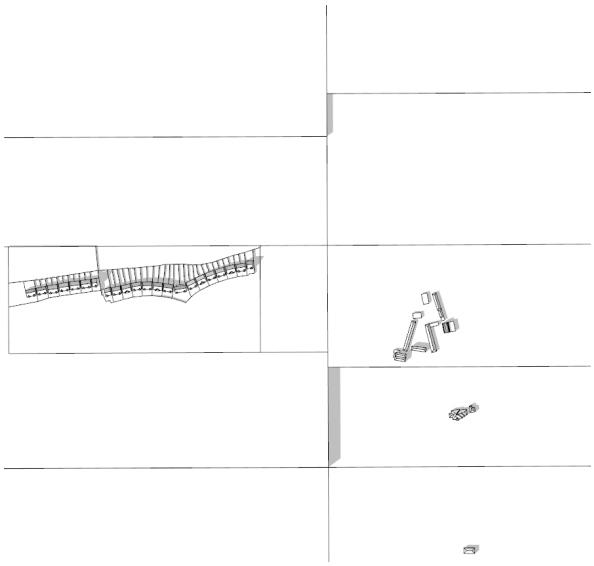
This section will consider the shadows cast by the proposed development on the following dates:

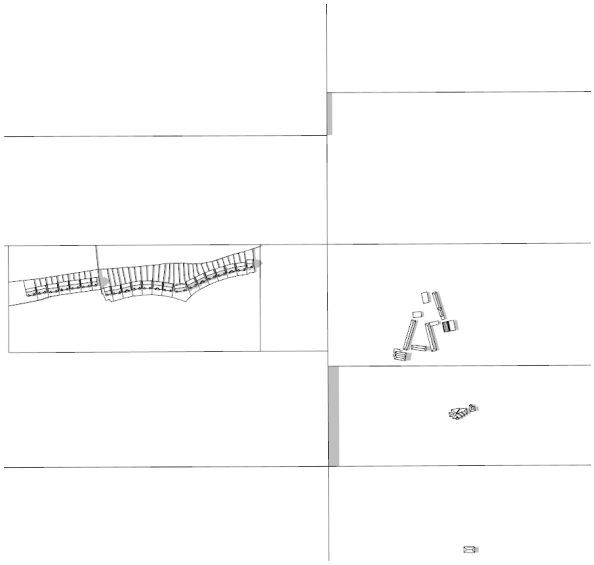
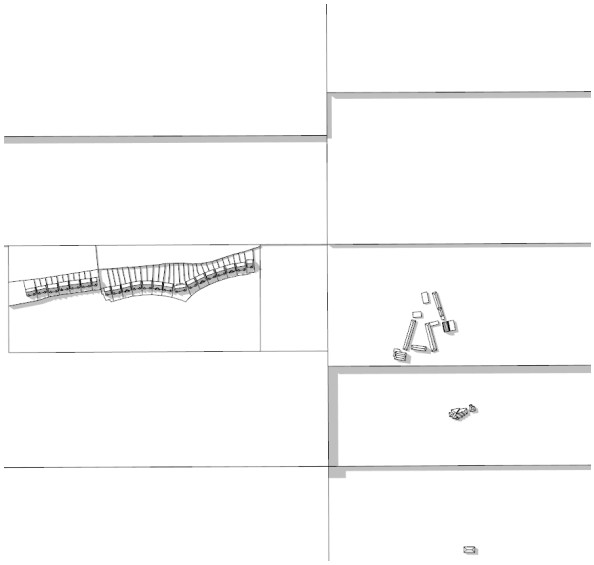
- March 21st / September 21st (Equinox)
- June 21st (Summer Solstice)
- December 21st (Winter Solstice)

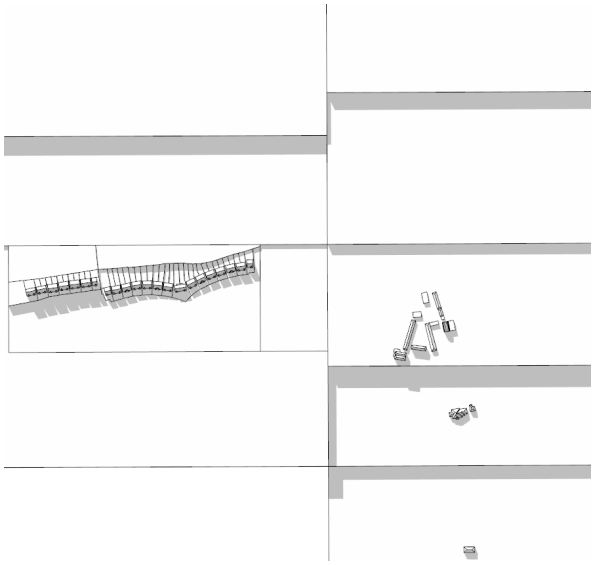
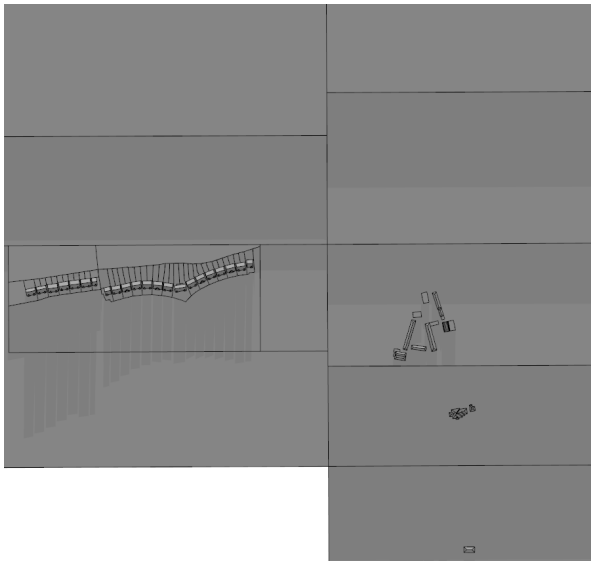
These images illustrate shadows cast for 'perfect sunny' conditions with no clouds and assumed that the sun is shining for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

5.1 Plan View

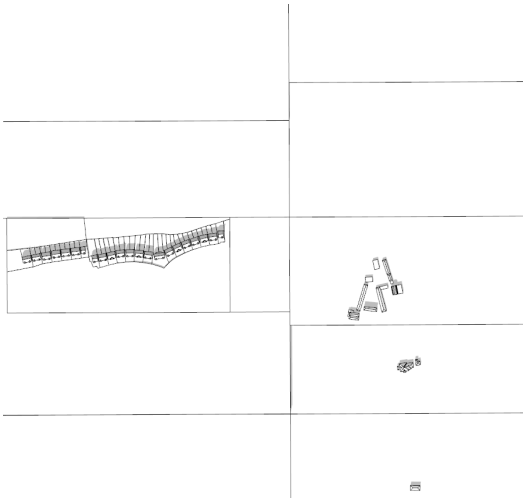
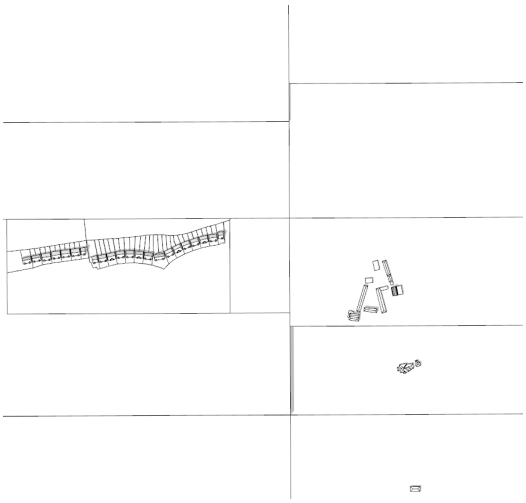
5.1.1 March 21st

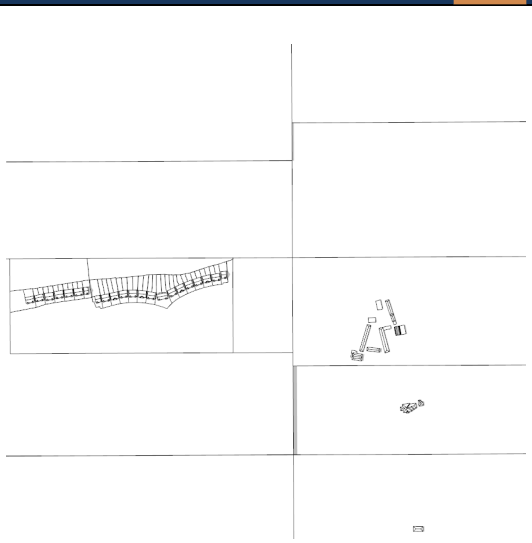
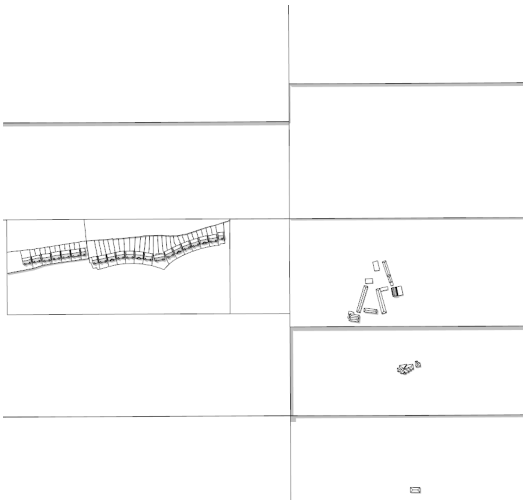
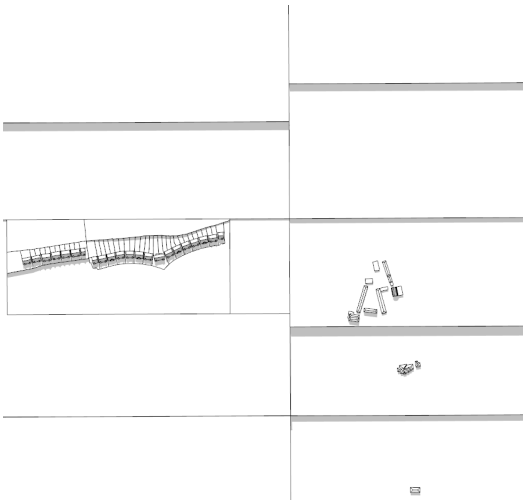
	Existing	Proposed
March 21st - 8:00		
March 21st - 10:00		

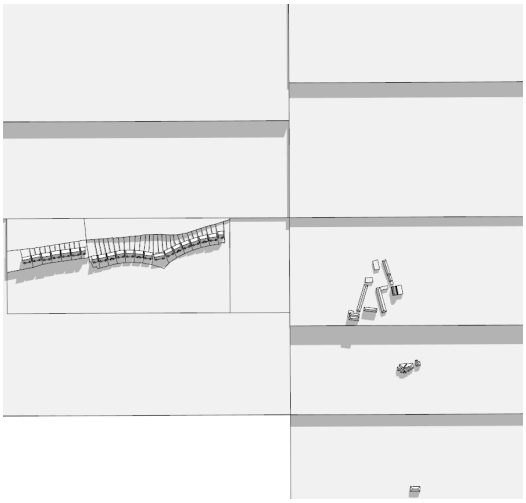
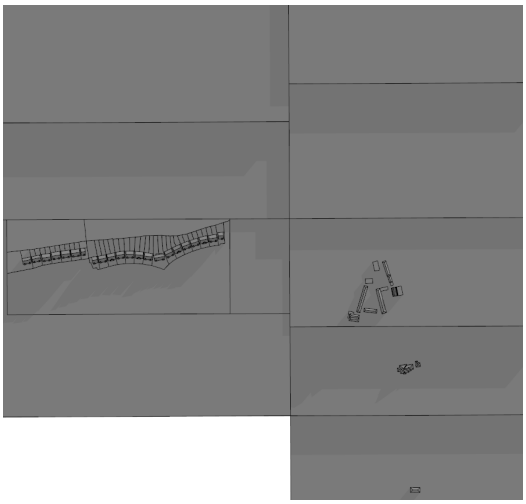
March 21st - 12:00		
March 21st - 14:00		

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

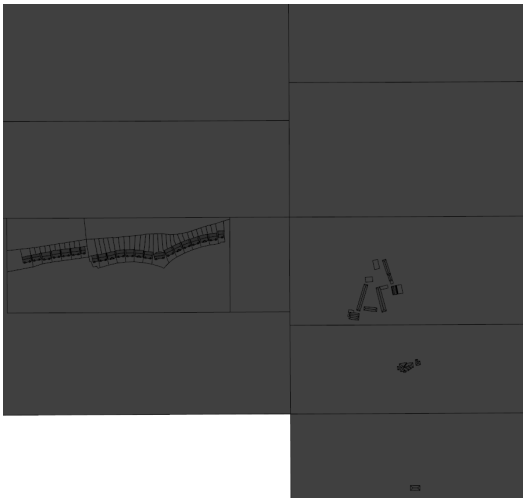
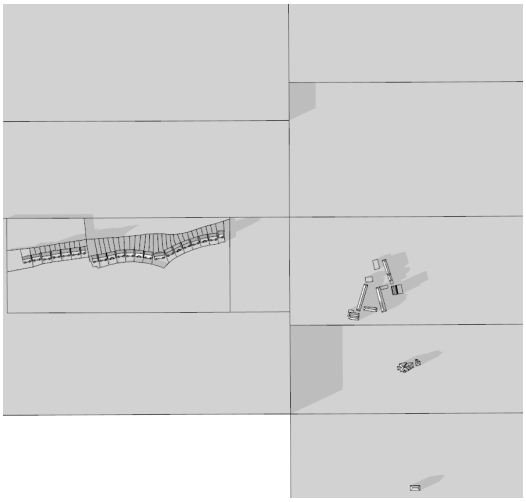
5.1.2 June 21st

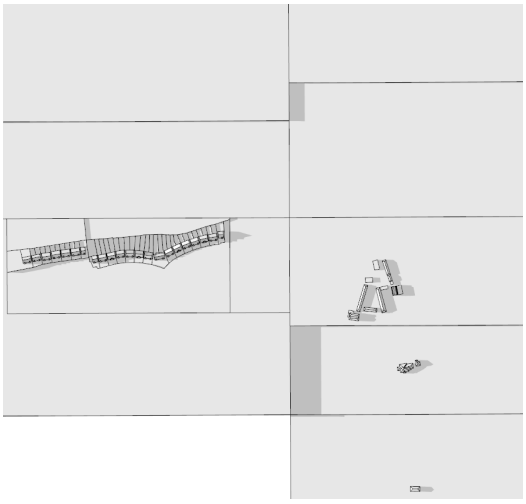
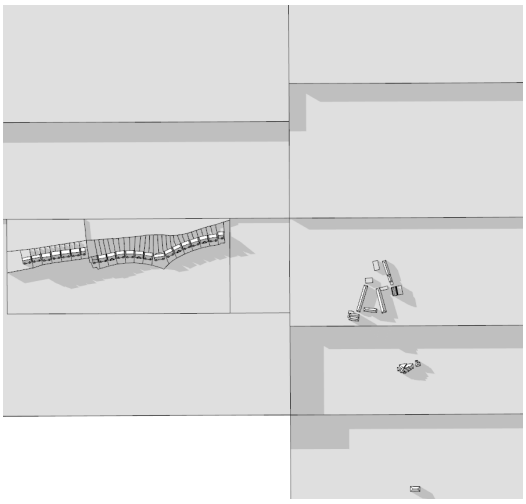
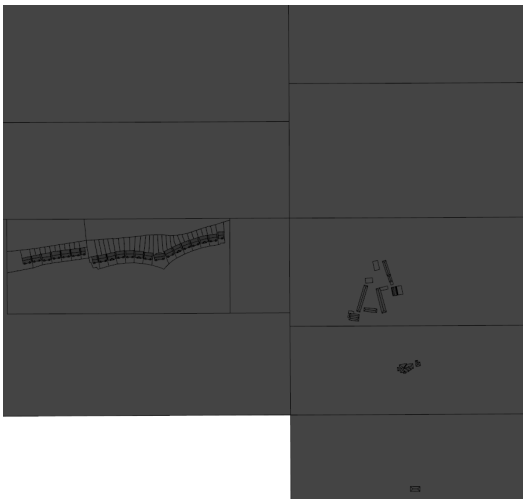
	Existing	Proposed
June 21st - 8:00		
June 21st - 10:00		

	Existing	Proposed
June 21st - 12:00		
June 21st - 14:00		
June 21st - 16:00		

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

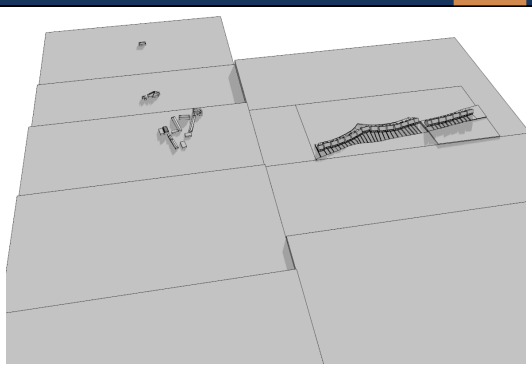
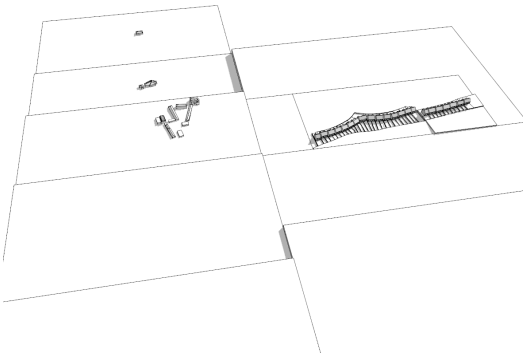
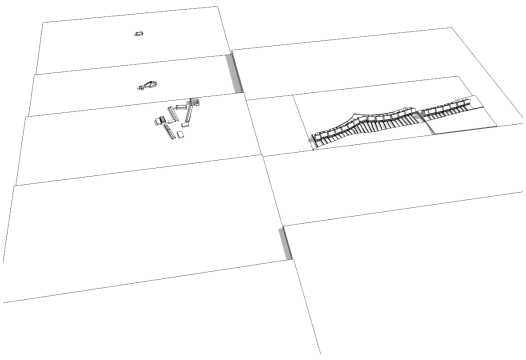
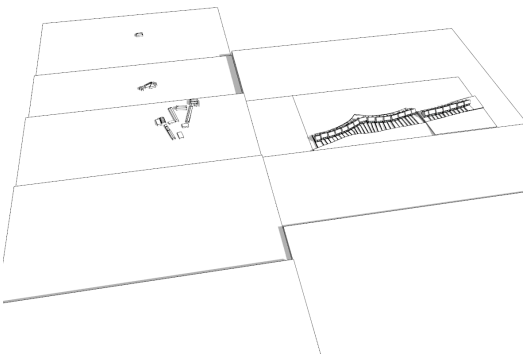
5.1.3 December 21st

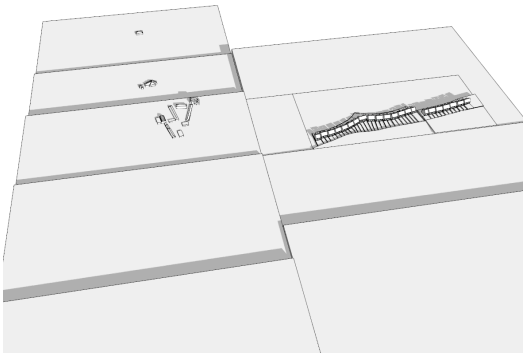
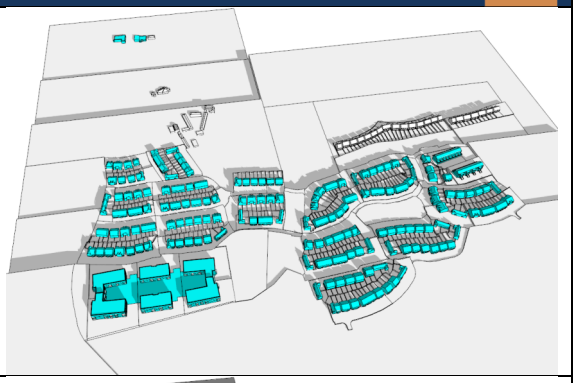
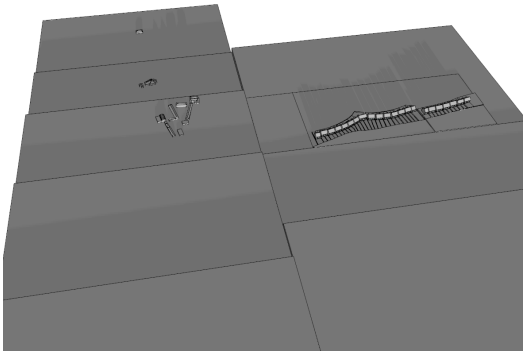
	Existing	Proposed
December 21st - 8:00		
December 21st - 10:00		

December 21st - 12:00		
December 21st - 14:00		
December 21st - 16:00		

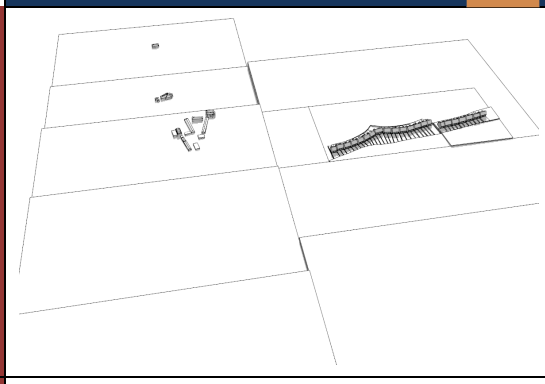
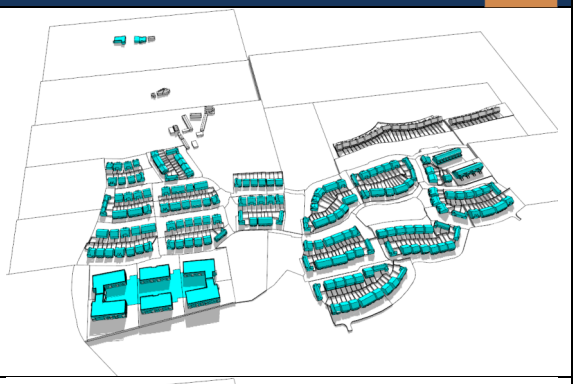
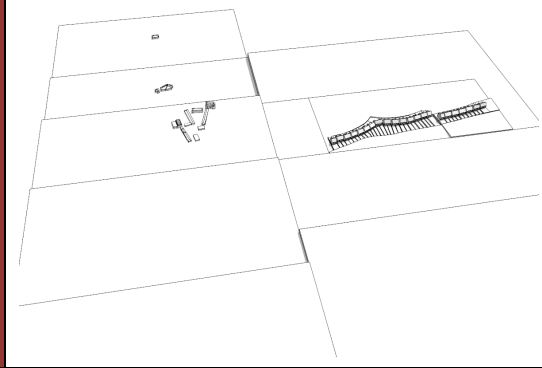
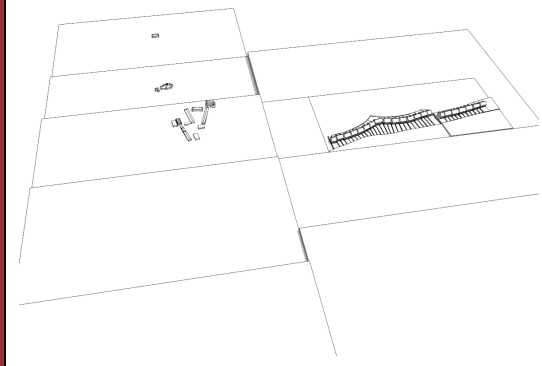
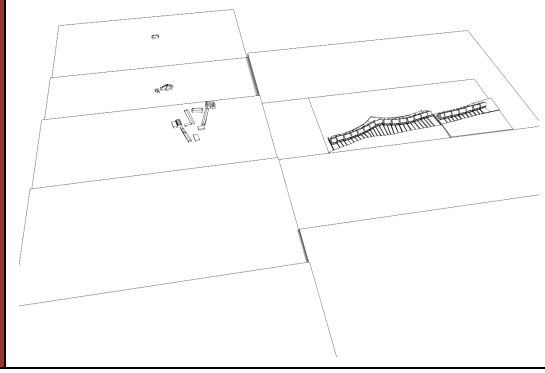
5.2 3D View

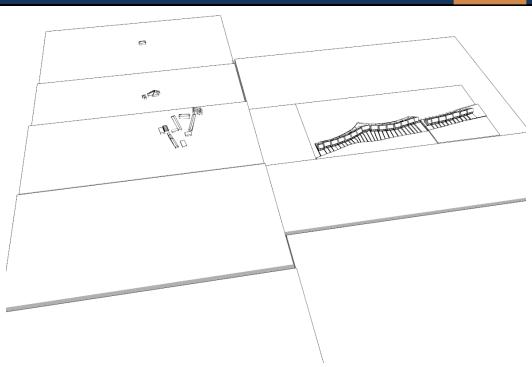
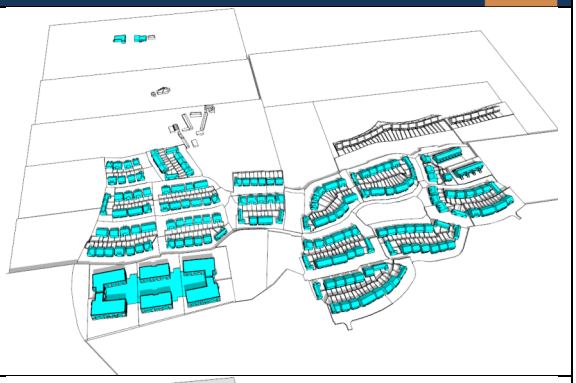
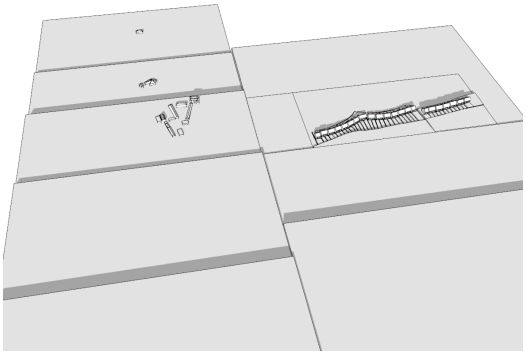
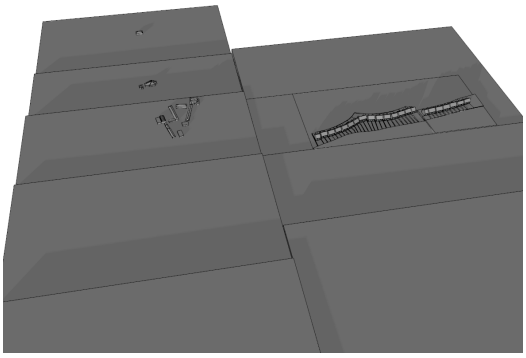
5.2.1 March 21st

	Existing	Proposed
March 21st - 8:00		
March 21st - 10:00		
March 21st - 12:00		
March 21st - 14:00		

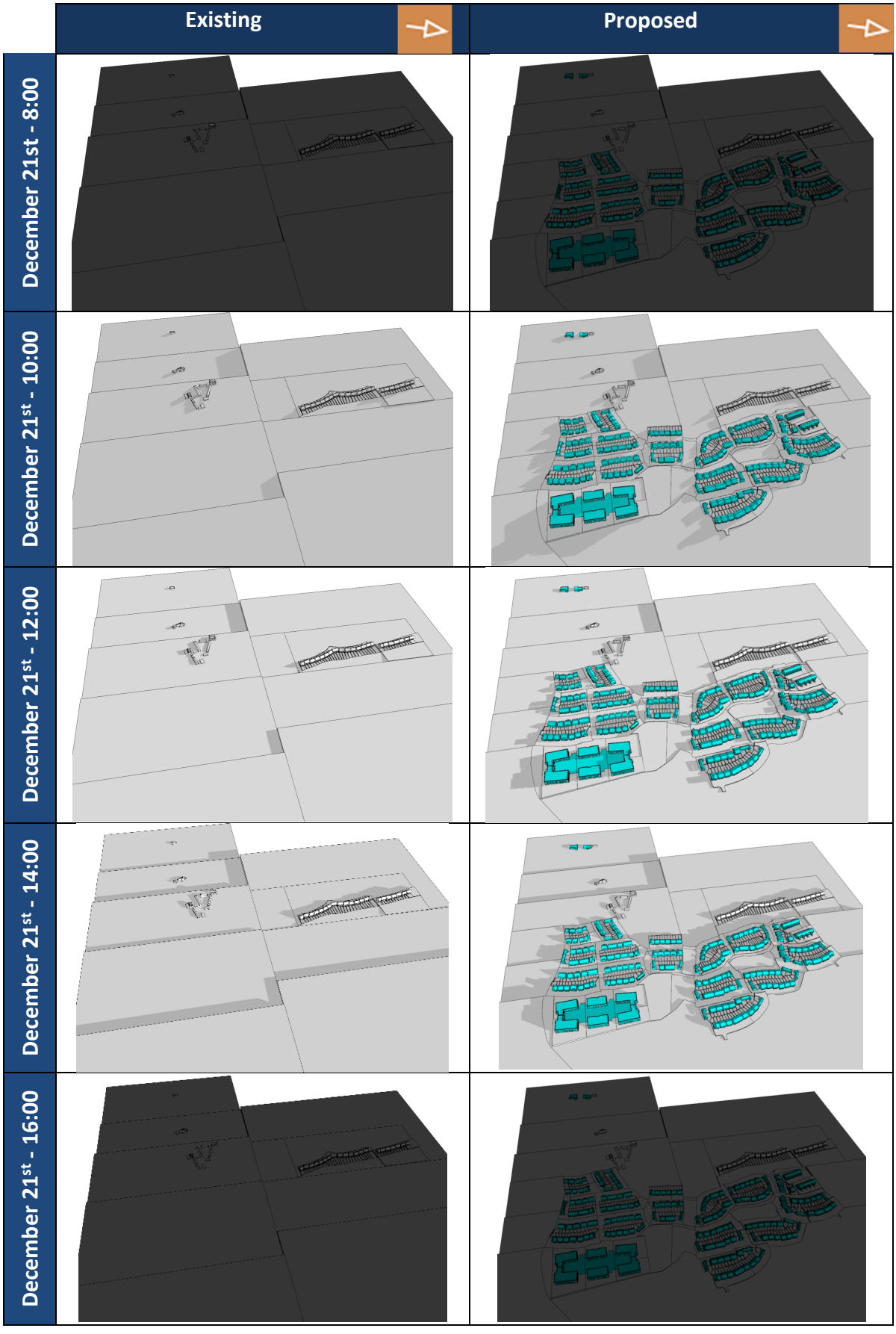
	Existing	Proposed
March 21st - 16:00		
March 21st - 18:00		

5.2.2 June 21st

	Existing	Proposed
June 21st - 8:00		
June 21st - 10:00		
June 21st - 12:00		
June 21st - 14:00		

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

5.2.3 December 21st



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:

Waverly Avenue

Minor additional shading observed from the proposed development on these existing residential properties during the months of March (1800) and June (2000) when the sun is lower in the sky at the end of the day and shadows cast are much longer. 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.

Finally, it should be noted that the schools were not considered within this analysis as they will not be affected given their greater distance away from the proposed development.

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.

To note, the proposed pitch and open space situated to the east of the proposed development have not been included within this assessment as they are located too far from the proposed units for them to have any impact on these open spaces.

It should also be noted that sample plots have been selected from those with similar orientation. Then the private gardens situated in the middle and ends of plots have been selected including the worst-case locations as a sample from there. As such the within development as a whole we would expect this percentage to far higher.

Amenity Spaces	
Existing Neighbouring Amenities Existing Private Amenity Spaces Proposed Communal Amenities	

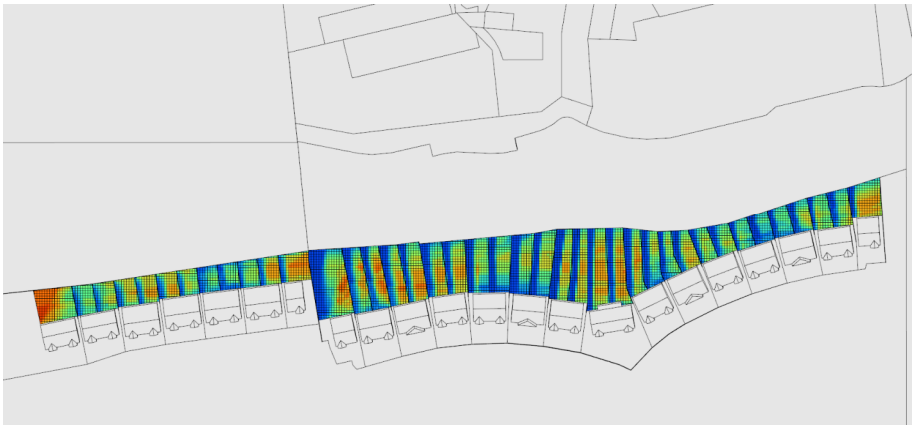
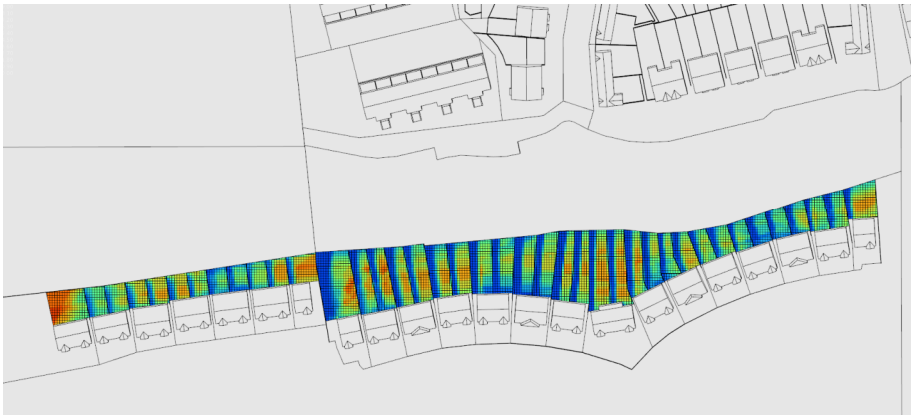
The following images illustrate the predicted results with respect to this space receiving at least 2 hours of sunlight on March 21st. Any areas that receive less than 2 hours of sunlight are colour-coded in grey.

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 Back Garden Amenity


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 9.00 8.10 7.20 6.30 5.40 4.50 3.60 2.70 1.80 0.90 0.00	
Proposed Situation: Absolute Scale Showing all Hours of Sunlight Received	
21/Mar - 00:00 to 21/Mar - 23:00 Hours 9.00 8.10 7.20 6.30 5.40 4.50 3.60 2.70 1.80 0.90 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 Private 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	189	189	100%	189	100%	100%	✓
2	92	74	80%	74	80%	100%	✓
3	92	78	85%	78	85%	100%	✓
4	88	74	84%	74	84%	100%	✓
5	85	72	85%	72	85%	100%	✓
6	82	65	79%	65	79%	100%	✓
7	77	66	86%	66	86%	100%	✓
8	82	46	56%	46	56%	100%	✓
9	82	68	83%	68	83%	100%	✓
10	83	63	76%	63	76%	100%	✓
11	88	68	77%	68	77%	100%	✓
12	130	112	86%	112	86%	100%	✓
13	373	238	64%	238	64%	100%	✓
14	184	123	67%	123	67%	100%	✓
15	180	117	65%	117	65%	100%	✓
16	177	116	66%	116	66%	100%	✓
17	187	140	75%	140	75%	100%	✓
18	177	119	67%	119	67%	100%	✓
19	173	126	73%	126	73%	100%	✓
20	189	119	63%	119	63%	100%	✓
21	189	121	64%	121	64%	100%	✓
22	199	114	57%	114	57%	100%	✓
23	207	136	66%	136	66%	100%	✓
24	201	116	58%	116	58%	100%	✓
25	187	112	60%	112	60%	100%	✓

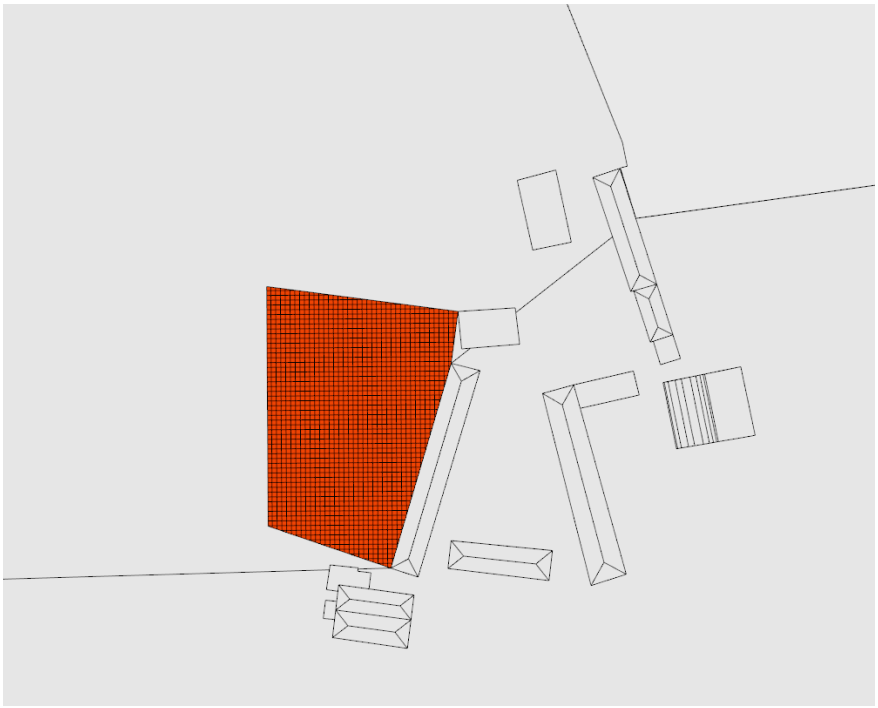
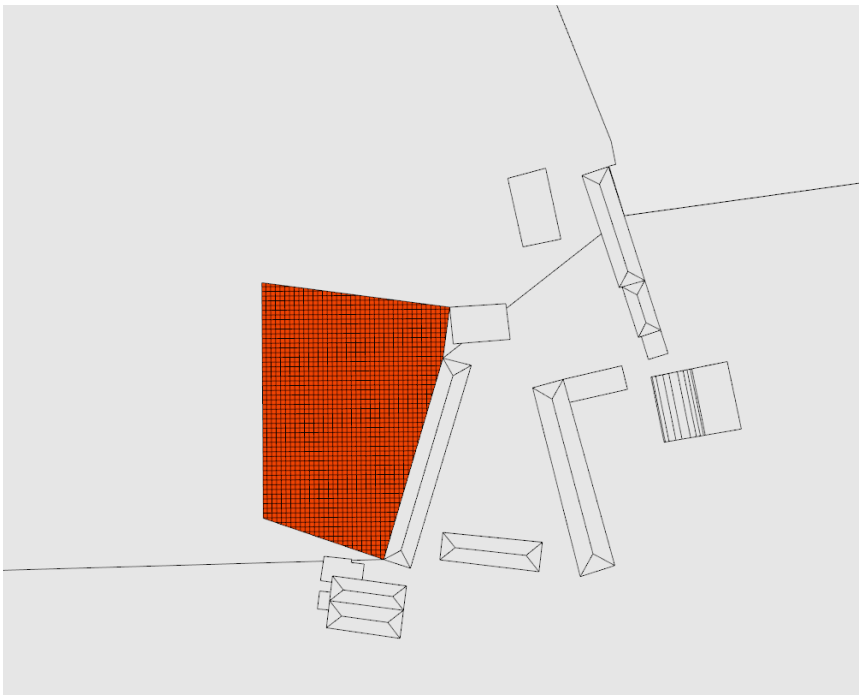
Ref	Area (m^2)	Existing Area >2 hrs		Existing Area with Proposed Development in Place >2 hrs		Proposed vs Existing (%)	Comment
		(m^2)	(%)	(m^2)	(%)		
26	242	176	73%	176	73%	100%	✓
27	215	153	71%	153	71%	100%	✓
28	176	117	66%	117	66%	100%	✓
29	153	90	59%	90	59%	100%	✓
30	112	71	63%	71	63%	100%	✓
31	125	88	70%	88	70%	100%	✓
32	98	74	76%	74	76%	100%	✓
33	100	69	69%	69	69%	100%	✓
34	89	70	79%	70	79%	100%	✓
35	97	39	40%	39	40%	100%	✓
36	95	58	61%	58	61%	100%	✓
37	101	60	59%	60	59%	100%	✓
38	109	82	75%	82	75%	100%	✓
39	117	74	63%	74	63%	100%	✓
40	174	137	79%	137	79%	100%	✓
Total	**5796**	**4030**	**70%**	**4030**	**70%**	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 able 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.

6.2.1.3 Existing Communal Amenity Space Results

Existing Situation: Absolute Scale Showing all Hours of Sunlight Received	
21/Mar - 00:00 to 21/Mar - 23:00 Hours 11.00 9.90 8.80 7.70 6.60 5.50 4.40 3.30 2.20 1.10 0.00	
Proposed Situation: Absolute Scale Showing all Hours of Sunlight Received	
21/Mar - 00:00 to 21/Mar - 23:00 Hours 11.00 9.90 8.80 7.70 6.60 5.50 4.40 3.30 2.20 1.10 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	

6.2.1.4 Existing Private Amenity Results

Existing Communal Amenity Results

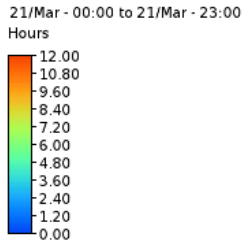
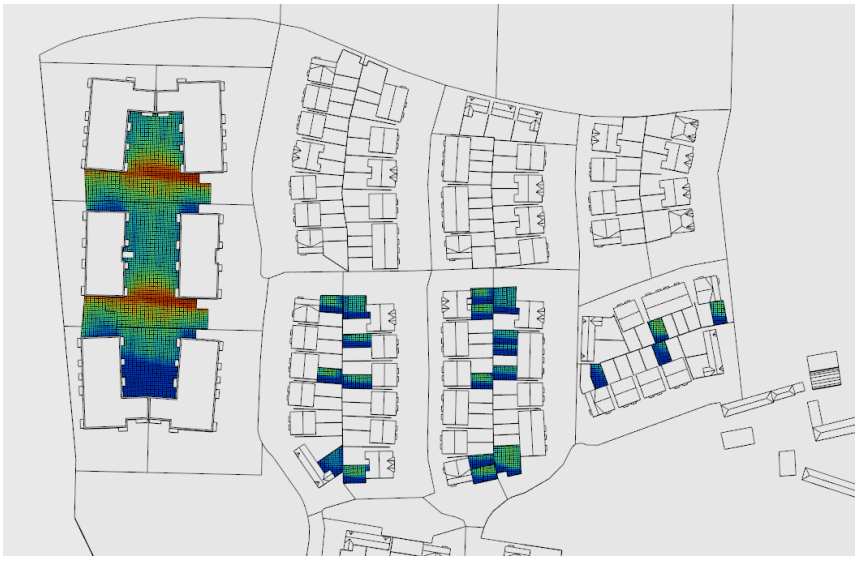
Ref	Area (m^2)	Existing Area >2 hrs		Existing Area with Proposed Development in Place >2 hrs		Proposed vs Existing (%)	Comment
		(m^2)	(%)	(m^2)	(%)		
1	1777	1777	100%	1777	100%	100%	✓
Total	**1777**	**1777**	**100%**	**1777**	**100%**	**100%**	✓

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 able 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 noted above.

6.2.2 Proposed Amenity Spaces

6.2.2.1 Proposed Private and Communal Amenity Spaces (Part 1)

<table>
<tr><th colspan="2">Absolute Scale Showing All Hours of Sunlight Received</th></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><th colspan="2">Area Showing >2 Hours</th></tr>
<tr><td>Receives more than 2 hours of sunlight

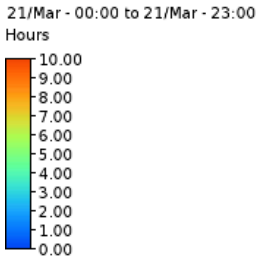
Receives less than 2 hours of sunlight</td><td>  </td></tr>
</table>

Private and Communal Amenity Space Results (Part 1)

Ref. Communal	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
1	4856	4238	87%	✓

Ref. Private	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
2	91	52	57%	✓
3	131	90	69%	✓
4	91	54	59%	✓
5	86	43	50%	✓
6	96	52	54%	✓
7	111	47	43%	x
8	99	61	62%	✓
9	87	44	50%	✓
10	85	43	51%	✓
11	145	106	73%	✓
12	82	52	63%	✓
13	62	29	47%	x
14	79	50	63%	✓
15	80	50	63%	✓
16	70	32	46%	x
17	86	61	71%	✓
18	174	142	82%	✓
19	71	12	17%	x
20	71	17	24%	x
21	75	58	77%	✓
22	72	50	69%	✓

6.2.2.2 Proposed Private and Communal Amenity Spaces (Part 2)

<table>
<tr><th colspan="2">Absolute Scale Showing All Hours of Sunlight Received</th></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><th colspan="2">Area Showing >2 Hours</th></tr>
<tr><td>Receives more than 2 hours of sunlight

Receives less than 2 hours of sunlight</td><td>  </td></tr>
</table>

Public and Community Amenity Space Results (Part 2)

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
1	84	38	45%	x
2	86	43	50%	✓
3	80	37	47%	x
4	67	26	39%	x
5	144	87	60%	✓
6	91	69	76%	✓
7	112	46	41%	x
8	123	67	54%	✓
9	115	43	39%	x
10	135	81	60%	✓
11	90	53	59%	✓
12	80	40	50%	✓
13	109	64	59%	✓
14	140	86	61%	✓
15	150	122	81%	✓
16	118	60	51%	✓
17	100	10	10%	x
18	75	3	4%	x
19	141	108	77%	✓
20	137	33	24%	x
21	75	38	51%	✓
22	83	52	63%	✓
23	107	0	0%	x
24	86	0	0%	x
25	116	68	59%	✓
26	93	22	24%	x
27	87	53	61%	✓
28	76	1	1%	x
29	80	36	45%	x
30	74	54	73%	✓
31	76	42	55%	✓
32	128	97	76%	✓
33	557	548	98%	✓
34	783	753	96%	✓
35	105	21	20%	x
36	136	16	12%	x
37	106	0	0%	x
38	152	107	70%	✓
39	155	53	34%	x
40	118	44	42%	x
41	111	59	53%	✓
42	80	34	43%	x
43	142	98	69%	✓
44	3915	3852	98%	✓

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.

To note, the proposed pitch and open space situated to the east of the proposed development have not been included within this assessment as they are located too far from the proposed units for them to have any impact on these open spaces.

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

Private Gardens

Based on the results in the tables above, of 63% of sampled private amenity spaces (41 of 65) situated within the development site will receive at least 2 hours of sunlight on March 21st in excess of 50% of their area, thus exceeding BRE recommendations.

It should be noted that sample plots have been selected from those with similar orientation. Then the private gardens situated in the middle and ends of plots have been selected including the worst-case locations as a sample from there. As such the within development as a whole we would expect this percentage to far higher.

The gardens that do fall below the recommended sunlight target are noted to be self-shaded (by the building they sit with) as they are north facing amenities or are impacted by the site constraint of the location on a hill. In March when the test is carried out and the sun is lower in the sky this will be more evident. These properties will perform better in the summer months when the azimuth of the sun is much higher in the sky.

Communal Apartment Amenity

On March 21st, 87% of the proposed communal amenity space situated within the apartments area of the development will receive at least 2 hours of sunlight over the total area provided, thus complying with the 50% recommendation noted in the BRE Guide.

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
Communal	4856	4238	87%	✓

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

Duplex Amenity

On March 21st, 98 and 96% of the proposed communal amenity space situated within the Duplexes of the development will receive at least 2 hours of sunlight over the total area provided, thus complying with the 50% recommendation noted in the BRE Guide.

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
33	557	548	98%	✓
34	783	753	96%	✓

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

7 Sunlight to Existing Buildings

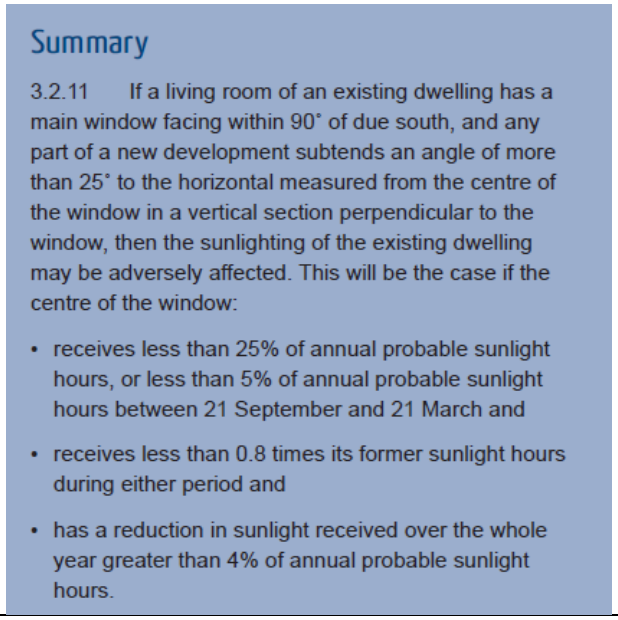
7.1 Guidance – BRE Guide / BS 8206-2:2008

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

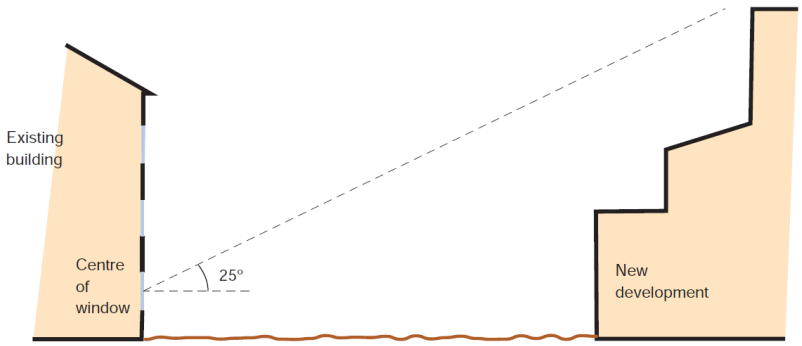
As such this study will compare the Existing Scheme and Proposed Schemes and consider if the values on the existing buildings meet the requirements outlined above when compared to their former value (that of the Existing scheme).

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%.

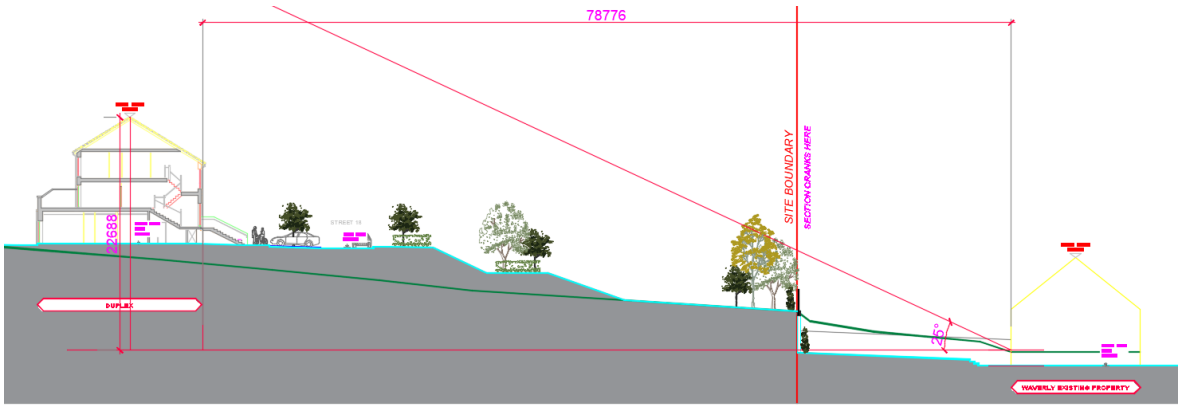
7.3 APSH Assessment & Discussion

Based on the criteria outlined above, none of the existing neighbouring dwellings were included within the APSH assessment as they did not meet the criterion as laid out within the BRE guide. Section 3.2.7 of the BRE guidance notes the following:

"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."

Given the statement above the distance between the existing dwellings adjacent and the proposed development was verified noting that it exceeds the height, distance rule outlined above. Therefore, the existing neighbouring 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. To note, as an added check the 25-degree check was also carried out for good measure which the proposed development passed as can be seen from the image below.



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

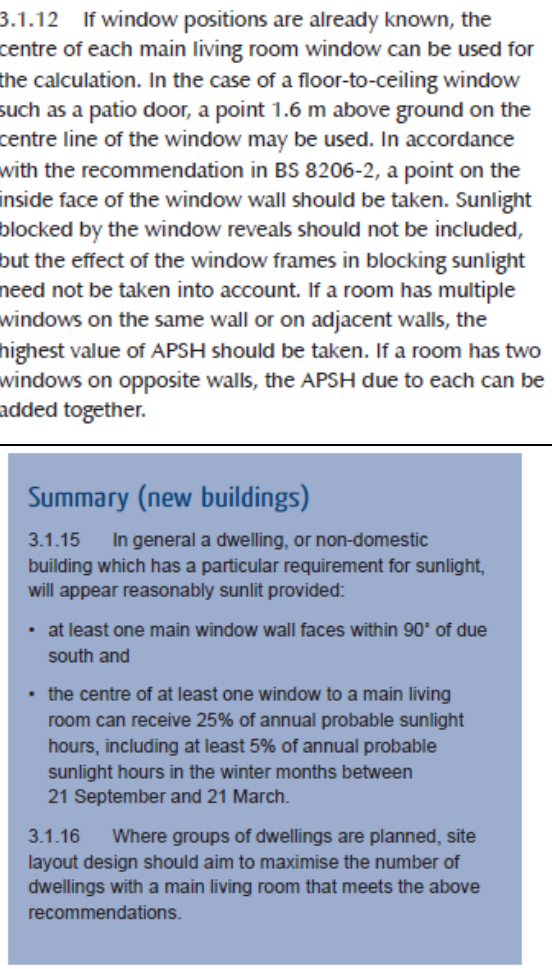
8 Sunlight to Proposed Development

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 A1 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	45.10	15.38	✓/✓	✓
2	36.88	14.58	✓/✓	✓
3	36.53	14.23	✓/✓	✓
4	45.22	18.85	✓/✓	✓
5	45.11	15.38	✓/✓	✓
6	36.37	13.61	✓/✓	✓
7	35.64	13.33	✓/✓	✓
8	38.53	16.31	✓/✓	✓
9	45.80	16.08	✓/✓	✓
10	33.22	13.09	✓/✓	✓
11	33.13	13.00	✓/✓	✓
12	39.89	17.24	✓/✓	✓
13	51.05	20.28	✓/✓	✓
14	35.59	17.26	✓/✓	✓
15	35.02	16.70	✓/✓	✓
16	40.53	18.61	✓/✓	✓
17	44.40	14.68	✓/✓	✓
18	31.86	11.54	✓/✓	✓
19	31.86	11.54	✓/✓	✓
20	41.40	19.01	✓/✓	✓

8.3.2 Blocks A1 & A2 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	16.78	0.00	x / x	x
2	16.33	0.00	x / x	x
3	16.58	0.00	x / x	x
4	17.48	0.00	x / x	x
5	16.08	0.00	x / x	x
6	15.93	0.00	x / x	x
7	16.21	0.00	x / x	x

8.3.3 Block B1 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	52.45	20.98	✓/✓	✓
2	41.15	19.80	✓/✓	✓
3	40.37	19.03	✓/✓	✓
4	42.89	19.46	✓/✓	✓
5	52.45	20.98	✓/✓	✓
6	35.12	16.85	✓/✓	✓
7	34.71	16.43	✓/✓	✓
8	38.22	17.80	✓/✓	✓
9	52.45	20.98	✓/✓	✓
10	35.86	17.52	✓/✓	✓
11	35.45	17.11	✓/✓	✓
12	38.82	18.31	✓/✓	✓
13	52.45	20.98	✓/✓	✓
14	35.44	17.14	✓/✓	✓
15	35.02	16.72	✓/✓	✓
16	38.49	18.04	✓/✓	✓

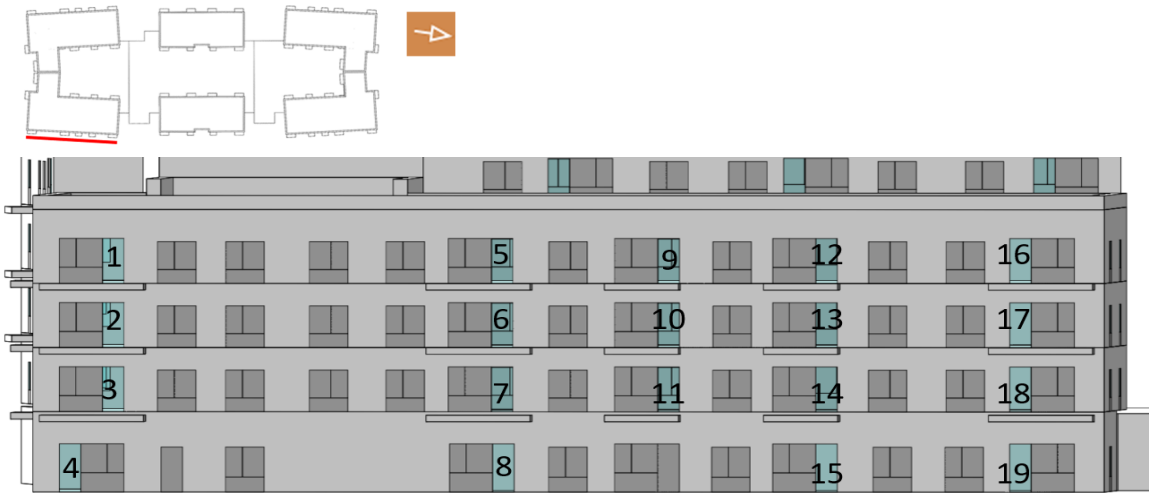
8.3.4 Block C1 View 4

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	47.90	17.13	✓/✓	✓
2	39.61	15.99	✓/✓	✓
3	38.36	15.40	✓/✓	✓
4	53.85	21.68	✓/✓	✓
5	45.81	19.74	✓/✓	✓
6	45.67	18.91	✓/✓	✓
7	44.17	18.78	✓/✓	✓
8	47.95	18.79	✓/✓	✓
9	53.85	21.68	✓/✓	✓
10	47.12	18.46	✓/✓	✓
11	45.14	18.23	✓/✓	✓
12	47.83	18.69	✓/✓	✓
13	46.85	16.08	✓/✓	✓
14	34.74	13.20	✓/✓	✓
15	34.50	12.95	✓/✓	✓
16	51.91	20.44	✓/✓	✓
17	46.85	16.08	✓/✓	✓
18	36.43	13.34	✓/✓	✓
19	36.43	13.34	✓/✓	✓
20	45.33	20.58	✓/✓	✓

8.3.5 Blocks C1 & C2 View 5

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	73.25	36.89	✓/ ✓	✓
2	52.40	33.51	✓/ ✓	✓
3	51.00	32.93	✓/ ✓	✓
4	66.20	36.54	✓/ ✓	✓
5	65.83	31.15	✓/ ✓	✓
6	38.71	27.90	✓/ ✓	✓
7	36.55	26.97	✓/ ✓	✓
8	43.03	28.90	✓/ ✓	✓
9	67.15	32.50	✓/ ✓	✓
10	36.98	28.64	✓/ ✓	✓
11	38.75	29.64	✓/ ✓	✓
12	78.24	36.98	✓/ ✓	✓
13	51.86	34.46	✓/ ✓	✓
14	55.01	35.33	✓/ ✓	✓

8.3.6 Block C2 View 6

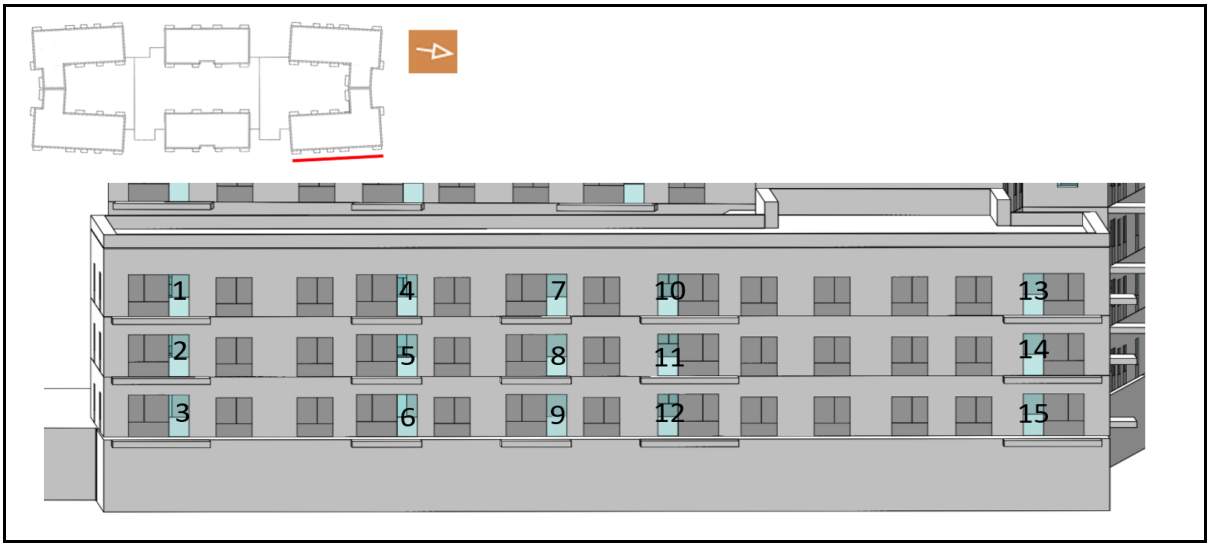


Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	47.53	17.48	✓/ ✓	✓
2	32.20	15.07	✓/ ✓	✓
3	32.53	15.01	✓/ ✓	✓
4	42.13	16.63	✓/ ✓	✓
5	47.55	17.48	✓/ ✓	✓
6	32.23	14.94	✓/ ✓	✓
7	33.16	14.90	✓/ ✓	✓
8	35.51	15.44	✓/ ✓	✓
9	47.55	17.48	✓/ ✓	✓
10	31.83	14.36	✓/ ✓	✓
11	32.82	14.28	✓/ ✓	✓
12	47.55	17.48	✓/ ✓	✓
13	32.13	14.64	✓/ ✓	✓
14	32.83	14.34	✓/ ✓	✓
15	34.65	14.09	✓/ ✓	✓
16	47.55	17.48	✓/ ✓	✓
17	38.78	16.81	✓/ ✓	✓
18	39.35	15.91	✓/ ✓	✓
19	40.39	14.86	✓/ ✓	✓

8.3.7 Block B2 View 7

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	45.42	16.75	✓/ ✓	✓
2	31.87	14.50	✓/ ✓	✓
3	31.84	14.47	✓/ ✓	✓
4	34.84	14.99	✓/ ✓	✓
5	45.43	16.76	✓/ ✓	✓
6	32.54	14.98	✓/ ✓	✓
7	31.86	14.30	✓/ ✓	✓
8	45.43	16.76	✓/ ✓	✓
9	43.67	16.48	✓/ ✓	✓
10	42.95	15.75	✓/ ✓	✓
11	43.54	15.13	✓/ ✓	✓
12	45.42	16.75	✓/ ✓	✓
13	37.49	16.41	✓/ ✓	✓
14	36.78	15.70	✓/ ✓	✓
15	39.63	14.99	✓/ ✓	✓

8.3.8 Block A2 View 8

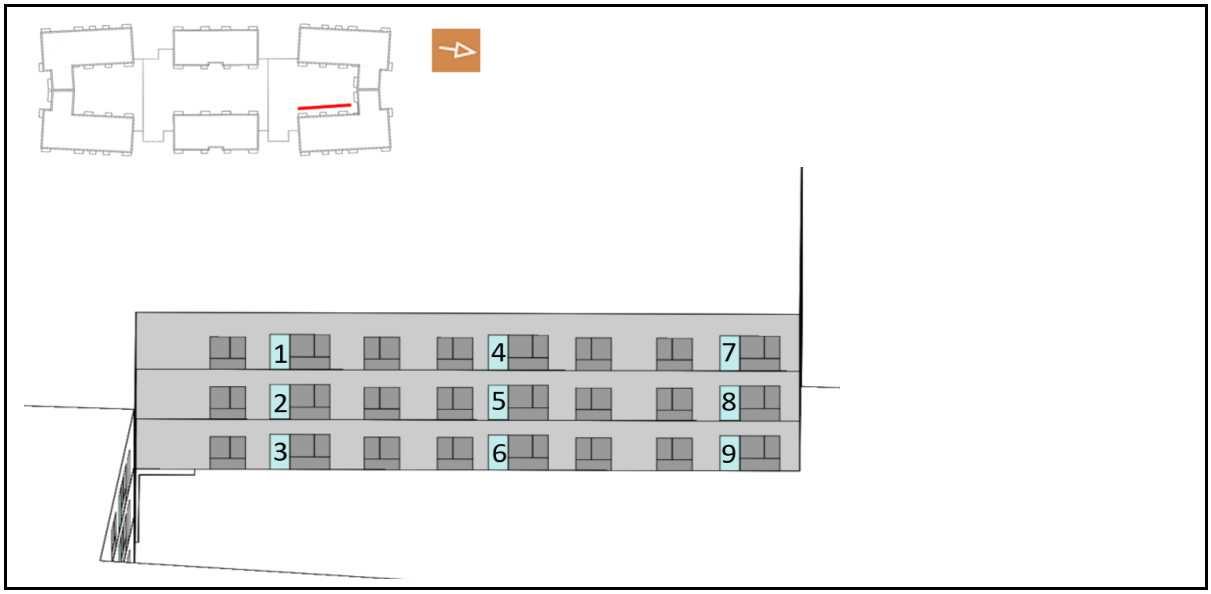


Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	41.94	15.37	✓/✓	✓
2	30.48	13.82	✓/✓	✓
3	31.87	14.26	✓/✓	✓
4	41.96	15.38	✓/✓	✓
5	30.46	13.55	✓/✓	✓
6	31.31	13.36	✓/✓	✓
7	41.96	15.38	✓/✓	✓
8	30.17	13.16	✓/✓	✓
9	30.88	13.00	✓/✓	✓
10	41.96	15.38	✓/✓	✓
11	34.36	13.02	✓/✓	✓
12	34.52	13.07	✓/✓	✓
13	41.96	15.38	✓/✓	✓
14	36.01	15.23	✓/✓	✓
15	36.99	15.05	✓/✓	✓

8.3.9 Blocks A1 & A2 View 9

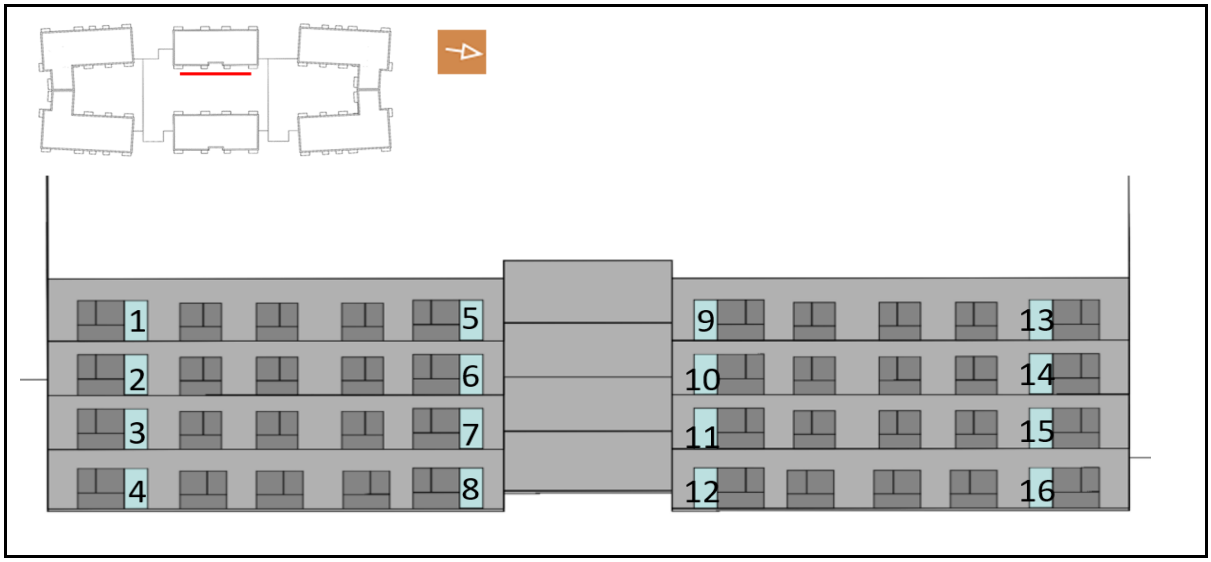
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	16.78	0.00	x / x	✓
2	16.33	0.00	x / x	✓
3	16.58	0.00	x / x	✓
4	17.48	0.00	x / x	✓
5	16.08	0.00	x / x	✓
6	15.93	0.00	x / x	✓
7	16.21	0.00	x / x	✓

8.3.10 Block A2 View 10



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	35.01	11.65	✓/ ✓	✓
2	16.65	7.69	x /✓	✓
3	16.96	8.91	x /✓	x
4	40.60	15.58	✓/ ✓	✓
5	21.76	11.41	x /✓	✓
6	20.52	11.83	x /✓	✓
7	39.49	14.10	✓/ ✓	✓
8	22.25	10.20	x /✓	✓
9	22.96	12.24	x /✓	✓

8.3.11 Block B1 View 11



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	45.45	16.78	✓/ ✓	✓
2	26.42	12.11	✓/ ✓	✓
3	23.50	11.22	x /✓	✓
4	21.08	9.11	x /✓	✓
5	45.40	16.72	✓/ ✓	✓
6	27.15	12.69	✓/ ✓	✓
7	22.47	10.96	x /✓	✓
8	20.30	9.89	x /✓	✓
9	45.32	16.65	✓/ ✓	✓
10	38.63	14.61	✓/ ✓	✓
11	33.00	11.95	✓/ ✓	✓
12	29.06	9.55	✓/ ✓	✓
13	44.79	16.12	✓/ ✓	✓
14	31.60	12.70	✓/ ✓	✓
15	27.63	10.34	✓/ ✓	✓
16	27.68	9.52	✓/ ✓	✓

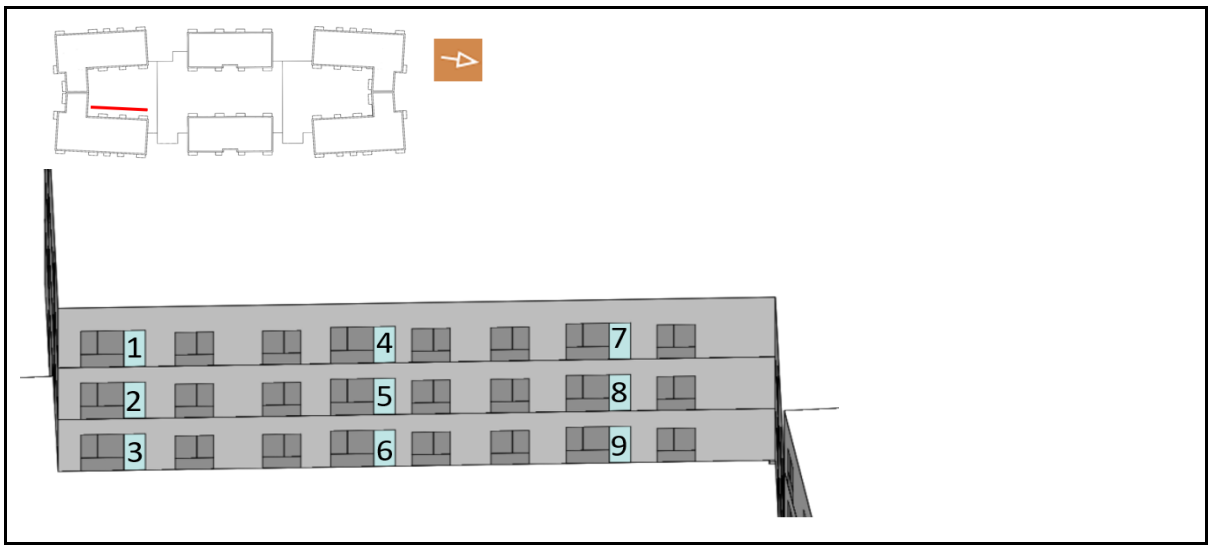
8.3.12 Block B2 View 12

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	43.02	14.61	✓/ ✓	✓
2	31.16	12.58	✓/ ✓	✓
3	25.18	9.42	✓/ ✓	✓
4	41.40	15.62	✓/ ✓	✓
5	21.33	10.74	x /✓	✓
6	14.90	7.54	x /✓	x
7	43.84	18.12	✓/ ✓	✓
8	24.31	13.69	x /✓	✓
9	32.02	12.78	✓/ ✓	✓
10	42.67	17.07	✓/ ✓	✓
11	37.11	14.43	✓/ ✓	✓
12	19.65	11.61	x /✓	✓

8.3.13 Block C1 View 13

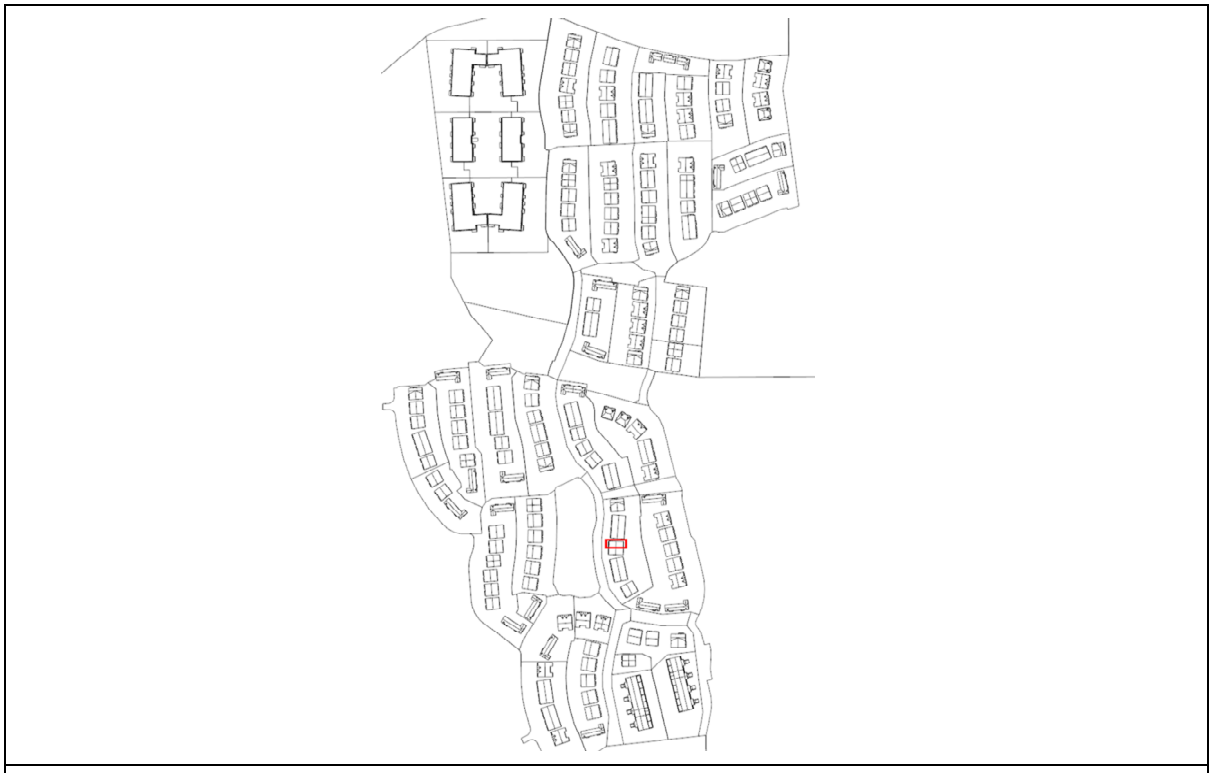
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	27.59	1.53	✓/ x	✓
2	14.37	0.00	x / x	x
3	8.33	0.00	x / x	x
4	8.87	0.00	x / x	x
5	37.05	10.48	✓/ ✓	✓
6	27.62	4.49	✓/ x	✓
7	21.64	1.63	x / x	✓
8	16.93	0.00	x / x	x
9	41.21	14.64	✓/ ✓	✓
10	26.26	8.45	✓/ ✓	✓
11	21.48	4.92	x / x	✓
12	20.65	2.34	x / x	✓

8.3.14 Block C2 View 14



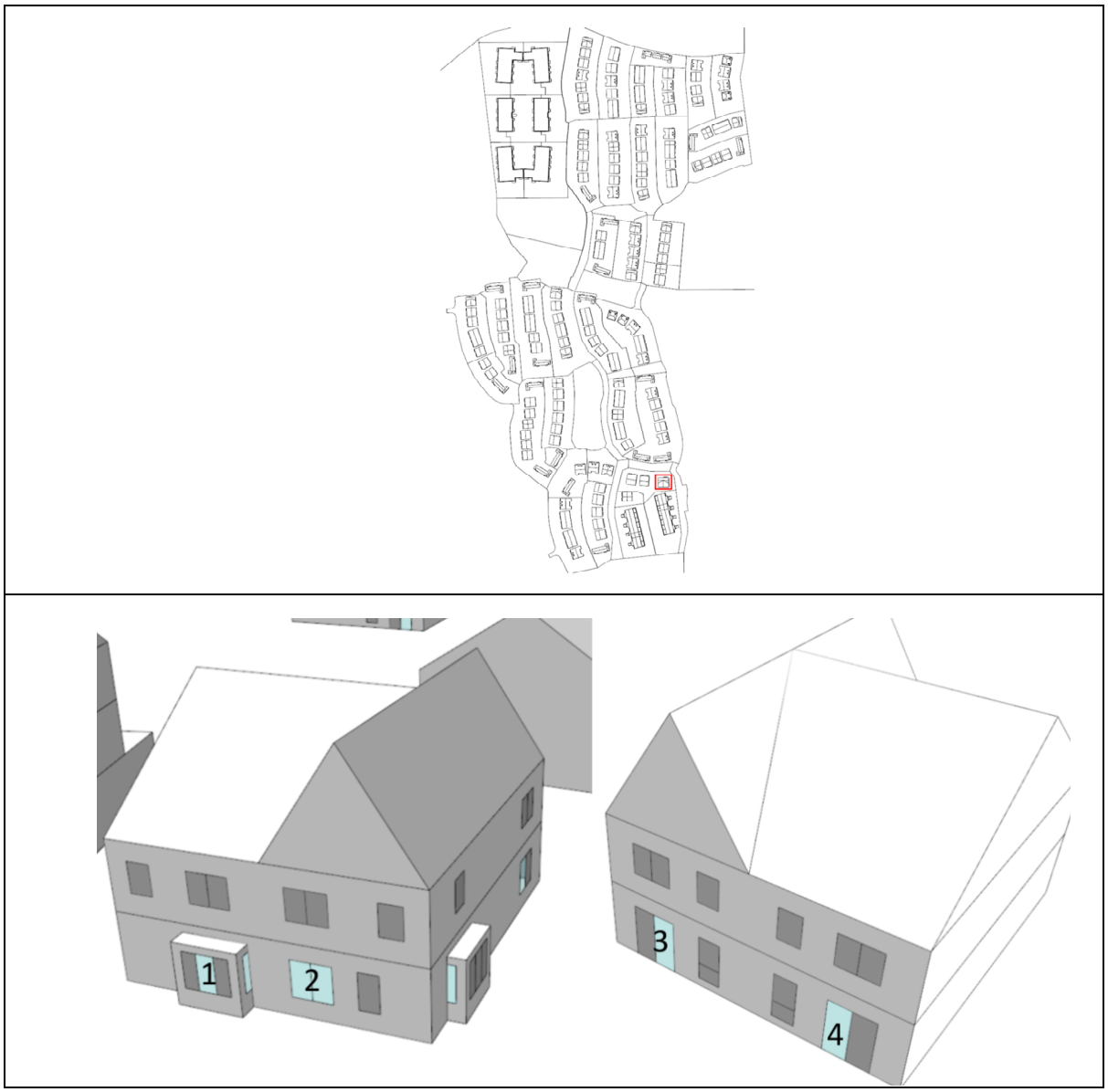
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	40.16	12.34	✓/ ✓	✓
2	25.40	8.72	✓/ ✓	✓
3	18.96	3.59	x / x	✓
4	35.90	10.11	✓/ ✓	✓
5	26.57	5.36	✓/ ✓	✓
6	20.04	1.03	x / x	x
7	27.55	2.47	✓/ x	✓
8	12.42	0.00	x / x	x
9	7.34	0.00	x / x	x

8.3.1 House Type A-A



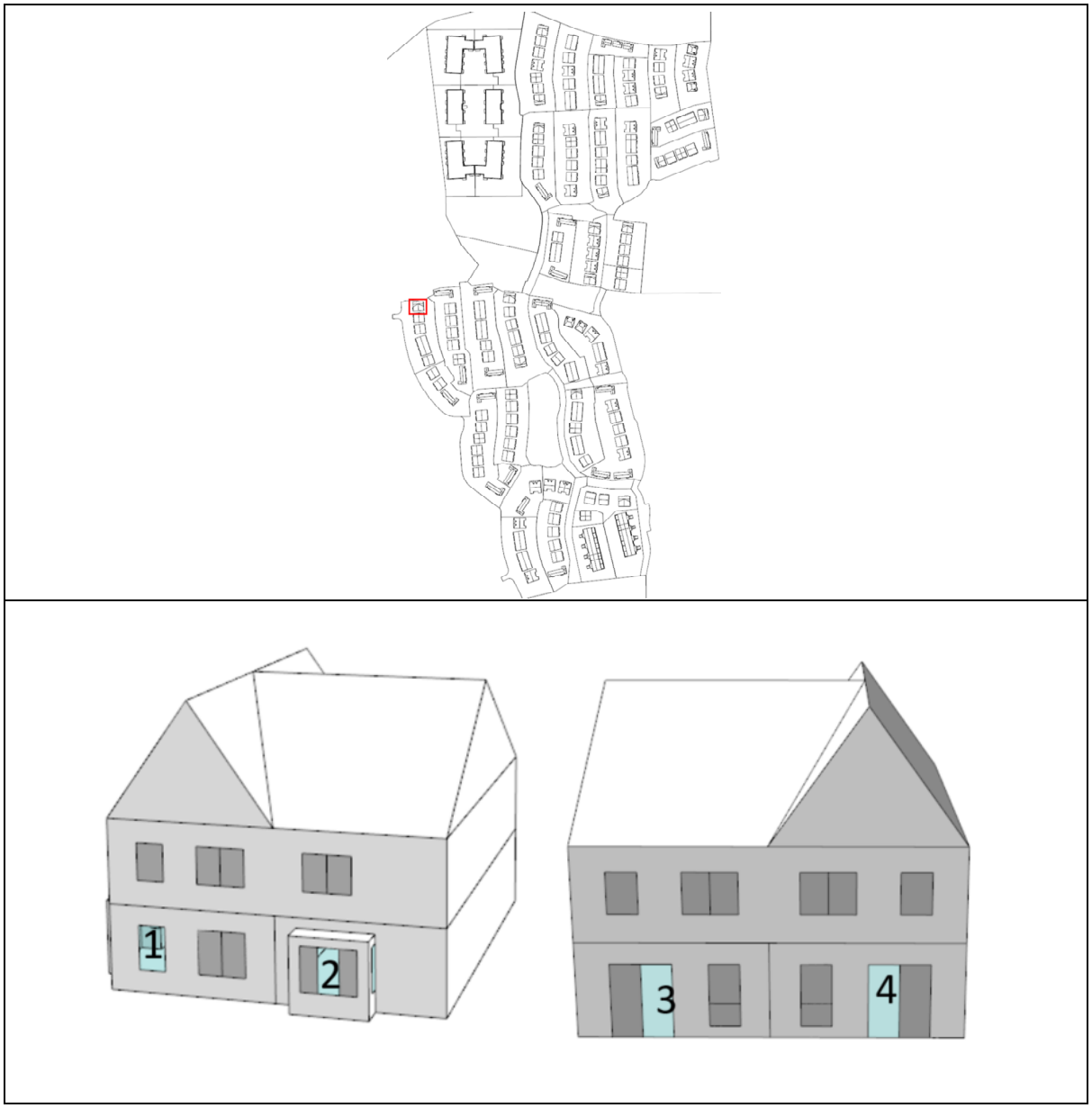
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	43.55	16.78	✓/ ✓	✓
2	36.73	8.82	✓/ ✓	✓

8.3.1 House Type A-A1



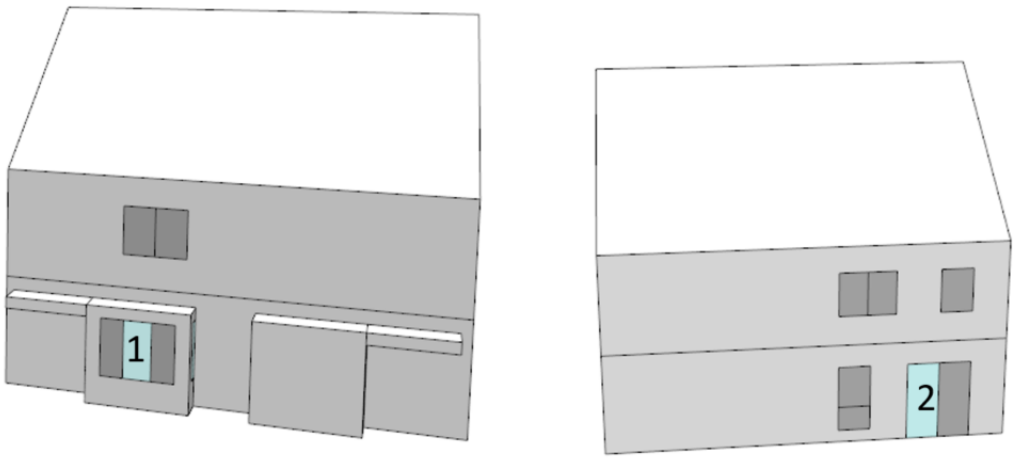
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	42.66	15.38	✓/ ✓	✓
2	41.51	14.23	✓/ ✓	✓
3	26.45	7.80	✓/ ✓	✓
4	28.68	8.22	✓/ ✓	✓

8.3.1 House Type B1-B2



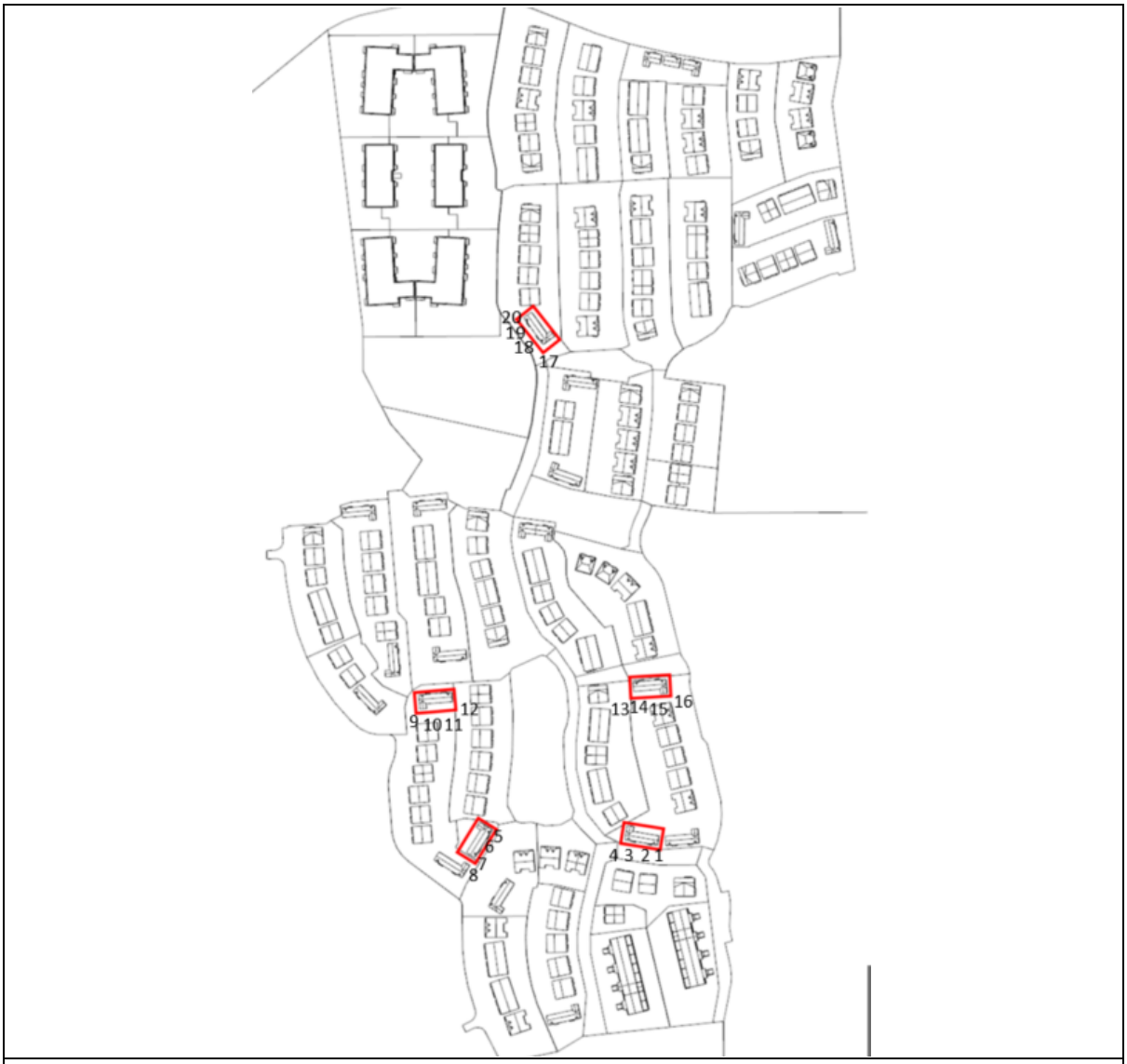
Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	52.54	21.68	✓/✓	✓
2	53.15	21.07	✓/✓	✓
3	29.92	6.76	✓/✓	✓
4	30.21	6.95	✓/✓	✓

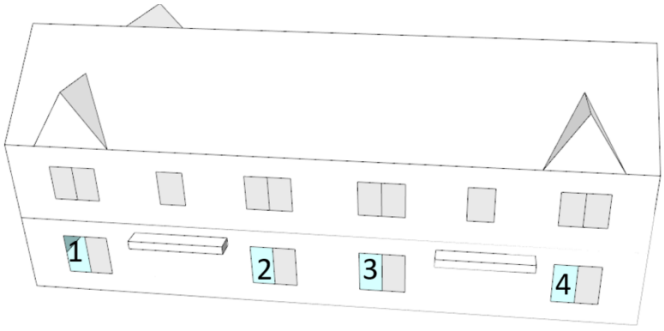
8.3.1 House Type B2



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	40.50	12.96	✓/ ✓	✓
2	33.56	8.53	✓/ ✓	✓
3	48.70	17.93	✓/ ✓	✓
4	28.76	7.06	✓/ ✓	✓
5	21.28	4.57	x / x	✓
6	31.88	6.49	✓/ ✓	✓
7	28.93	9.79	✓/ ✓	✓
8	31.60	6.51	✓/ ✓	✓
9	31.94	9.85	✓/ ✓	✓
10	25.34	6.92	✓/ ✓	✓
11	35.57	12.83	✓/ ✓	✓
12	33.08	10.27	✓/ ✓	✓
13	28.60	7.35	✓/ ✓	✓
14	32.62	12.54	✓/ ✓	✓
15	68.64	31.15	✓/ ✓	✓
16	9.16	0.24	x / x	✓
17	52.94	18.00	✓/ ✓	✓
18	8.50	0.00	x / x	✓

8.3.1 House Type C-D





Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	57.69	18.22	✓/✓	✓
2	55.49	18.71	✓/✓	✓

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
3	57.57	17.65	✓/ ✓	✓
4	56.03	18.82	✓/ ✓	✓
5	48.92	17.72	✓/ ✓	✓
6	47.61	15.98	✓/ ✓	✓
7	51.84	18.15	✓/ ✓	✓
8	51.43	16.99	✓/ ✓	✓
9	25.24	3.92	✓/ x	✓
10	42.7	12.90	✓/ ✓	✓
11	57.14	15.59	✓/ ✓	✓
12	60.50	21.77	✓/ ✓	✓
13	44.29	13.41	✓/ ✓	✓
14	50.22	14.88	✓/ ✓	✓
15	36.86	8.06	✓/ ✓	✓
16	25.29	4.46	✓/ x	✓
17	33.62	11.58	✓/ ✓	✓
18	27.32	6.55	✓/ ✓	✓
19	30.86	8.66	✓/ ✓	✓
20	22.42	1.89	x / x	✓

8.3.1 House Type E

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	36.63	14.12	✓/✓	✓
2	37.24	10.67	✓/✓	✓
3	38.46	11.89	✓/✓	✓

8.3.1 House Type F

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	56.83	18.08	✓/ ✓	✓
2	10.78	0.00	x / x	x

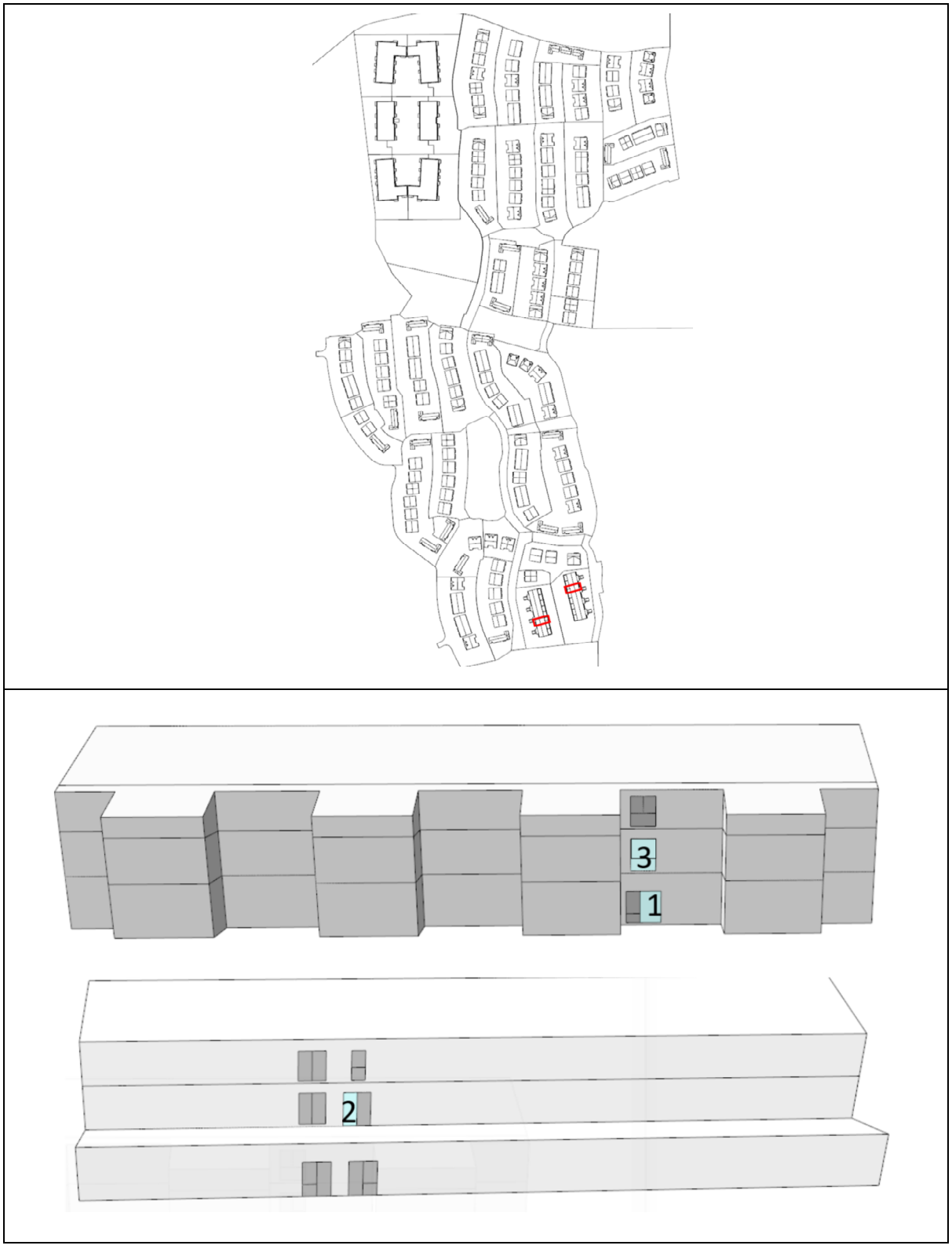
8.3.1 House Type G1

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	38.97	13.99	✓/ ✓	✓
2	34.37	14.28	✓/ ✓	✓
3	40.50	11.56	✓/ ✓	✓
4	35.36	9.26	✓/ ✓	✓

8.3.1 House Type G2

Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	36.59	11.80	✓/ ✓	✓
2	28.29	10.83	✓/ ✓	✓

8.3.1 Duplex AB



Ref.	BRE Guide / BS 8206:2008 APSH Assessment			IS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
1	17.08	0.99	x / x	x
2	39.98	10.28	✓/ ✓	✓
3	14.88	1.11	x / x	x
4	40.53	14.41	✓/ ✓	✓
5	35.53	8.02	✓/ ✓	✓
6	45.58	16.84	✓/ ✓	✓

8.4 Discussion

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 263 no. points tested, 222 no. points (84%) meet the BRE recommended values over the annual period. The compliance rate increases to 92% (242 no. points) during the winter period when sunlight is most valuable.

It should be noted that in the development of any housing scheme achieving in the region of 75% to 80% for this assessment would be considered very high and factors such as 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 suburban 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 263 no. points tested, 236 no. points (90%) 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 a suburban 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

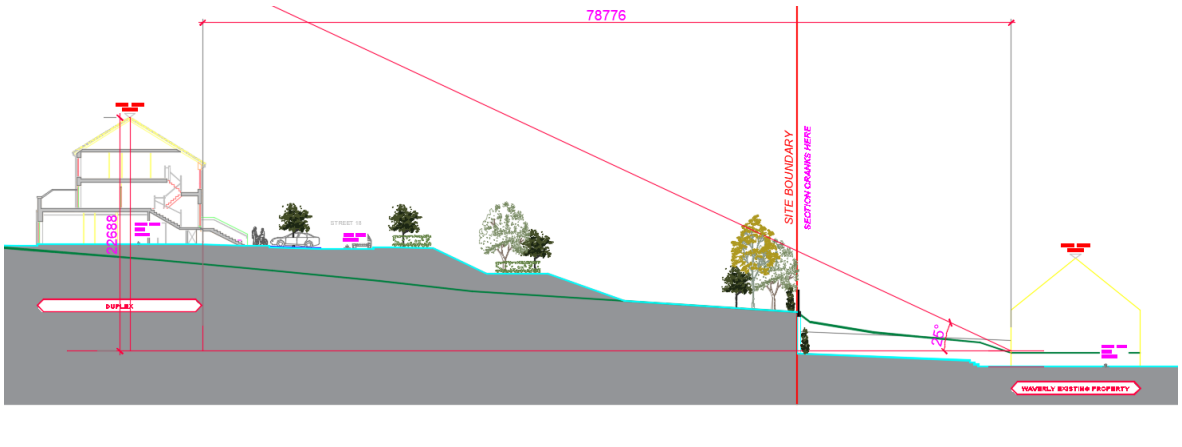
9.1 Guidance – BRE Guide / BS 8206-2:2008

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. 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. Section 2.2.4 of the BRE guidance goes on to note the following:

"Loss of light to existing windows need not be analysed 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. In these cases loss of light will be small"

9.2 Assessment & Discussion

The distance between the existing dwellings adjacent to the proposed development was verified noting that it exceeds the height, distance rule outlined above. Therefore, the existing neighbouring properties were excluded on the basis, as noted in section 2.2.4 of the BRE guidance, that these windows need not be analysed as daylight impact will be unnoticeable to the existing occupants. To note, as an added check the 25-degree check was also carried out for good measure which the proposed development passed as can be seen from the image below.



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

10 Daylight to Proposed Development

This section addresses daylight provision to the proposed apartments, Duplexes and houses. 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 and a sample of duplexes and homes within the development. The objective of the design team is to maximise the number of units which exceed the minimum recommendations.

To note, a sample of the duplexes and homes property types have been selected and not all as these property types do not face the same daylight issues that apartment property types do. As such a sample were chosen from the middle of rows or locations that were in close proximity to neighbouring proposed properties which would be seen as worst-case location as a check that there were no performance issues with regards to daylight.

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

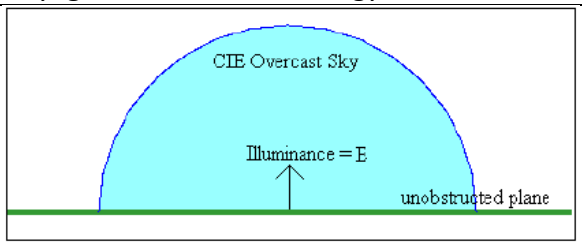
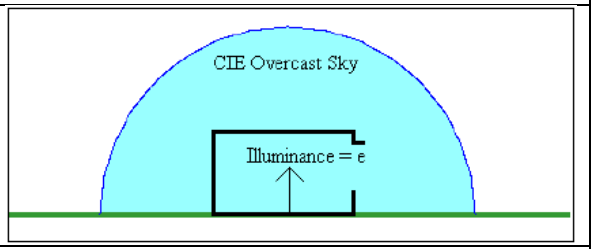
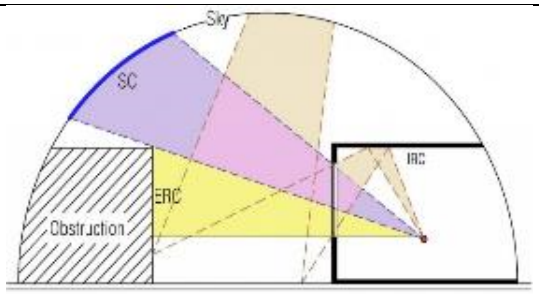
The BRE Guide states that the "*advice is not mandatory and that the guide should not be seen as an instrument of planning policy*". Although this is true, appropriate and reasonable regard has still been taken to the BRE guide. It should be further noted, when trying to achieve height and density within 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.

<table>
<tr><td colspan="2">Daylight Factor Methodology</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>E = illuminance on unobstructed plane</td><td>e = illuminance at point in interior</td></tr>
<tr><td colspan="2">Daylight Factor = e/E (often expressed as a percentage)</td></tr>
<tr><td colspan="2">SC – Sky Component
ERC – Externally Reflected Component
IRC – Internally Reflected Component
 

Sources of Daylight at a Point Within a Room</td></tr>
</table>

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	0.50
Internal Partition	0.85
Roof	0.20
Ground	0.20
Floor/Ceiling (Floor)	0.40
Floor/Ceiling (Ceiling)	0.85

10.3 Daylight Results

The following tables summarise the daylight provision results for each block 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:

Block A1

The daylight provision results for Block A1 under the various standards are summarised below. A 94% 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 100% is achieved which remains 100% under BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to Block A1 is high with the majority of rooms that are failing located on the lower floors.

Rooms Tested	Total No. Rooms
Total No. Bedrooms Tested	70
Total No. LKDs Tested	40
Total No. Spaces Tested	**110**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	70	100%	0	0%
No. LKDs	33	83%	7	17%
Total No.	**103**	**94%**	**7**	**6%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	70	100%	0	0%
No. LKDs	40	100%	0	0%
Total No.	**110**	**100%**	**0**	**0%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	70	100%	0	0%
No. LKDs	40	100%	0	0%
Total No.	**110**	**100%**	**0**	**0%**

Block A2

The daylight provision results for Block A2 under the various standards are summarised below. A 93% 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 100% is achieved which remains 100% under BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to Block A2 is high with the majority of rooms that are failing located on the lower floors.

Rooms Tested	**No. Rooms**
Total No. Bedrooms Tested	54
Total No. LKDs Tested	30
Total No. Spaces Tested	**84**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	54	100%	0	0%
No. LKDs	24	80%	6	20%
Total No.	**78**	**93%**	**6**	**7%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	54	100%	0	0%
No. LKDs	30	100%	0	0%
Total No.	**84**	**100%**	**0**	**0%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	54	100%	0	0%
No. LKDs	30	100%	0	0%
Total No.	**84**	**100%**	**0**	**0%**

Block B1

The daylight provision results for Block B1 under the various standards are summarised below. An 88% 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 100% is achieved which remains 100% under BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to Block B1 is high with the majority of rooms that are failing located on the lower floors.

Rooms Tested	No. Rooms
Total No. Bedrooms Tested	54
Total No. LKDs Tested	32
Total No. Spaces Tested	86

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	54	100%	0	0%
No. LKDs	22	69%	10	31%
Total No.	76	88%	10	12%

IS EN 17037:2018 Method 2 Assessment				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	54	100%	0	0%
No. LKDs	32	100%	0	100%
Total No.	86	100%	0	0%

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	54	100%	0	0%
No. LKDs	32	100%	0	100%
Total No.	86	100%	0	0%

Block B2

The daylight provision results for Block B2 under the various standards are summarised below. A 96% 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 100% is achieved which remains 100% under BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to Block B2 is high with the majority of rooms that are failing located on the lower floors.

Rooms Tested	No. Rooms
Total No. Bedrooms Tested	47
Total No. LKDs Tested	24
Total No. Spaces Tested	**71**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	47	100%	0	0%
No. LKDs	21	89%	3	11%
Total No.	**68**	**96%**	**3**	**4%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	47	100%	0	0%
No. LKDs	27	100%	0	0%
Total No.	**74**	**100%**	**0**	**0%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	47	100%	0	0%
No. LKDs	27	100%	0	0%
Total No.	**74**	**100%**	**0**	**0%**

Block C1

The daylight provision results for Block C1 under the various standards are summarised below. An 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 98% is achieved which increases to 100% under BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to Block C1 is high with the majority of rooms that are failing located on the lower floors.

Rooms Tested	No. Rooms
Total No. Bedrooms Tested	70
Total No. LKDs Tested	40
Total No. Spaces Tested	**110**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	70	100%	0	0%
No. LKDs	35	88%	5	12%
Total No.	**105**	**95%**	**5**	**5%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	69	99%	1	1%
No. LKDs	39	98%	1	2%
Total No.	**108**	**98%**	**2**	**2%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	70	100%	0	0%
No. LKDs	40	100%	0	0%
Total No.	**110**	**100%**	**0**	**0%**

Block C2

The daylight provision results for Block C2 under the various standards are summarised below. A 93% 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 100% is achieved which remains 100% under BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to Block C2 is high with the majority of rooms that are failing located on the lower floors.

Rooms Tested	No. Rooms
Total No. Bedrooms Tested	61
Total No. LKDs Tested	34
Total No. Spaces Tested	**95**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	61	100%	0	0%
No. LKDs	27	79%	7	21%
Total No.	**88**	**93%**	**7**	**7%**

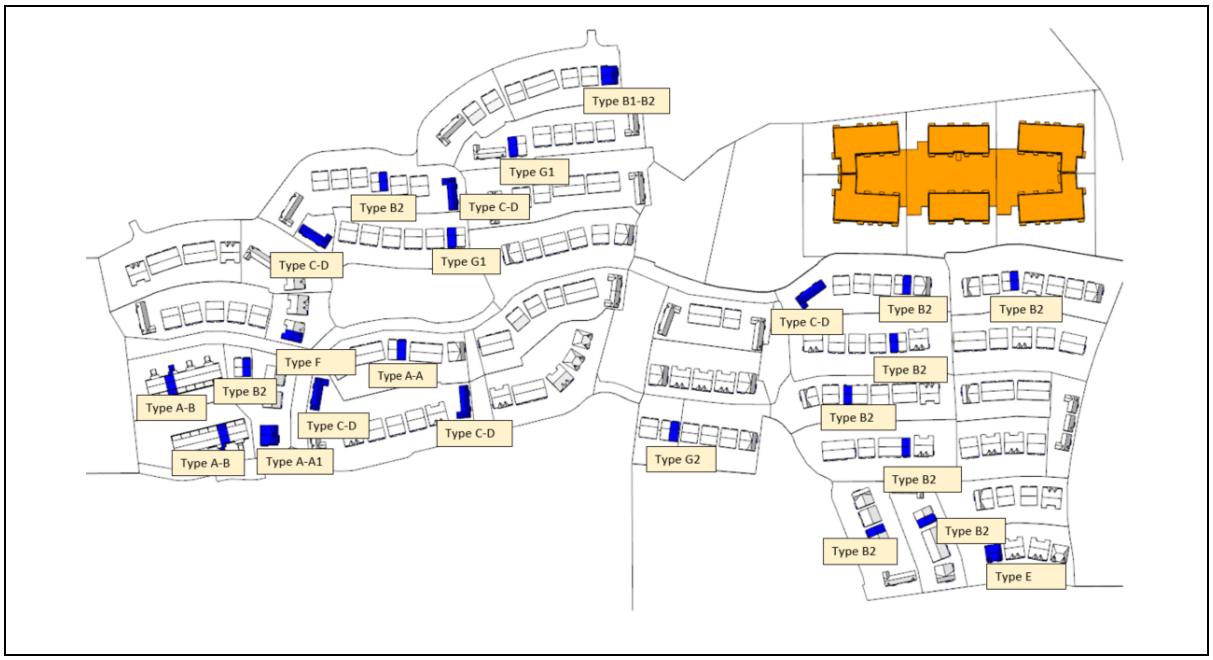
IS EN 17037:2018 Method 2 Assessment				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	61	100%	0	0%
No. LKDs	34	100%	0	0%
Total No.	**95**	**100%**	**0**	**0%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	61	100%	0	0%
No. LKDs	34	100%	0	0%
Total No.	**95**	**100%**	**0**	**0%**

Duplexes and Houses

The daylight provision results for the sampled duplexes and houses under the various standards are summarised below. A 100% compliance rate is achieved in accordance with the BRE Guide / BS 8206:2008 when LKDs are assessed against a 2% ADF target. A compliance rate of 100% is achieved in accordance with both IS EN 17037:2018 Method 2 and BS EN 17037:2018 Method 2 National Annex. Overall, the quality of daylight provision to sampled duplexes and houses is very high.

To note, a sample of the duplexes and homes property types have been selected and not all as these property types do not face the same daylight issues that apartment property types do. As such a sample were chosen from the middle of rows or locations that were in close proximity to neighbouring proposed properties which would be seen as worst-case locations as a check that there were no performance issues with regards to daylight.



Rooms Tested	No. Rooms
Total No. Bedrooms Tested	111
Total No. LKDs Tested	65
Total No. Spaces Tested	**176**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	111	100%	0	0%
No. LKDs	65	100%	0	0%
Total No.	**176**	**100%**	**0**	**0%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	111	100%	0	0%
No. LKDs	65	100%	0	0%
Total No.	**176**	**100%**	**0**	**0%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	111	100%	0	0%
No. LKDs	65	100%	0	0%
Total No.	**176**	**100%**	**0**	**0%**

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 99.7% is achieved which remains 100% 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	454
Total No. LKDs Tested	257
Total No. Spaces Tested	**711**

BRE Guide / BS 8206:2008 LKDs Assessed Against 2% ADF Target				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	454	100%	0	0%
No. LKDs	219	85%	38	15%
Total No.	**673**	**95%**	**38**	**5%**

IS EN 17037:2018 Method 2 Assessment				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	453	99.7%	1	0.3%
No. LKDs	259	99.7%	1	0.3%
Total No.	**709**	**99.7%**	**2**	**0.3%**

BS EN 17037:2018 Method 2 Assessment - National Annex				
Room Type	Pass (No.)	Pass (%)	Fail (No.)	Fail (%)
No. Bedrooms	454	100%	0	0%
No. LKDs	257	100%	0	0%
Total No.	**711**	**100%**	**0**	**0%**

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 91% 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.

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:

- All of the apartments exceed the minimum standard and the majority are more than ten percent larger than the minimum standard 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.
- 58% of the apartment & duplex 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.
- A total of 10.43 ha of open space is provided as part of the development. This includes a mix of zoned open space, zoned active open space, linear parks and residential open space.
- 5192 sqm of communal open space is provided.

The daylight results achieved are to a high standard having regard to the fact that the above referenced factors (provision of balconies and larger apartment sizes) render it more difficult to achieve target values for daylight performance.

To note, further results for an alternative design value were collated and can be found within Appendix B of this report. A 98% compliance rate is achieved when LKDs are assessed against this alternative 1.5% design value. Overall the quality of daylight provision across the development is high, with the majority of rooms that are below recommendation located on the lower floors of the apartments.

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/house/duplex 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:

Waverly Avenue

Minor additional shading observed from the proposed development on these existing residential properties during the months of March (1800) and June (2000) when the sun is lower in the sky at the end of the day and shadows cast are much longer. No additional shading is noted at any other point through the year.

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.

To note, the proposed pitch and open space situated to the east of the proposed development have not been included within this assessment as they are located too far from the proposed units for them to have any impact on these open spaces.

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.

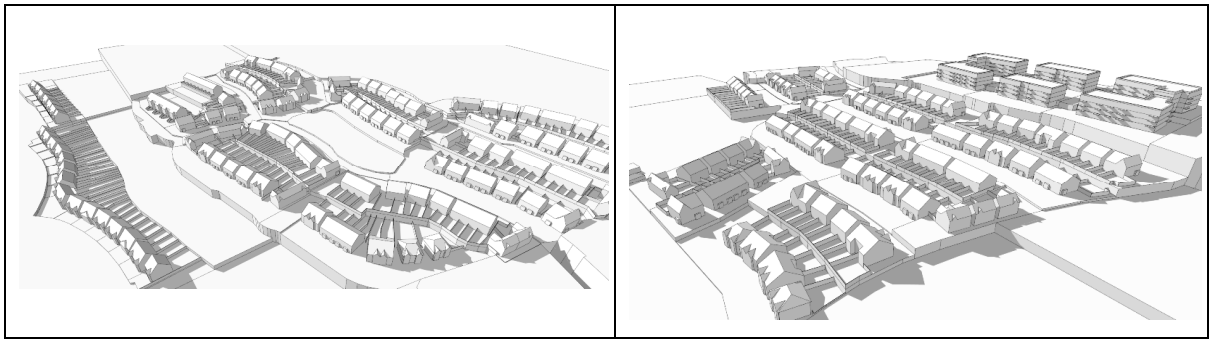
Proposed Amenity Spaces

Private Gardens

Based on the results in the tables above, of 63% of sampled private amenity spaces (41 of 65) situated within the development site will receive at least 2 hours of sunlight on March 21st in excess of 50% of their area, thus exceeding BRE recommendations.

It should be noted that sample plots have been selected from those with similar orientation. Then the private gardens situated in the middle and ends of plots have been selected including the worst-case locations as a sample from there. As such the within development as a whole we would expect this percentage to far higher.

The gardens that do fall below the recommended sunlight target are noted to be self-shaded (by the building they sit with) as they are north facing amenities or are impacted by the site constraint of the location on a hill. In March when the test is carried out and the sun is lower in the sky this will be more evident. These properties will perform better in the summer months when the azimuth of the sun is much higher in the sky.



Communal Apartment Amenity

On March 21st, 87% of the proposed communal amenity space situated within the apartments area of 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.

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
Communal	4856	4238	87%	✓

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

Duplex Amenity

On March 21st, 98 and 96% of the proposed communal amenity space situated within the Duplexes of the development will receive at least 2 hours of sunlight over the total area provided, thus complying with the 50% recommendation noted in the BRE Guide.

Ref.	Total Area (m)	Area Receiving >2h (m)	Percent Receiving >2h	Comment
33	557	548	98%	✓
34	783	753	96%	✓

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

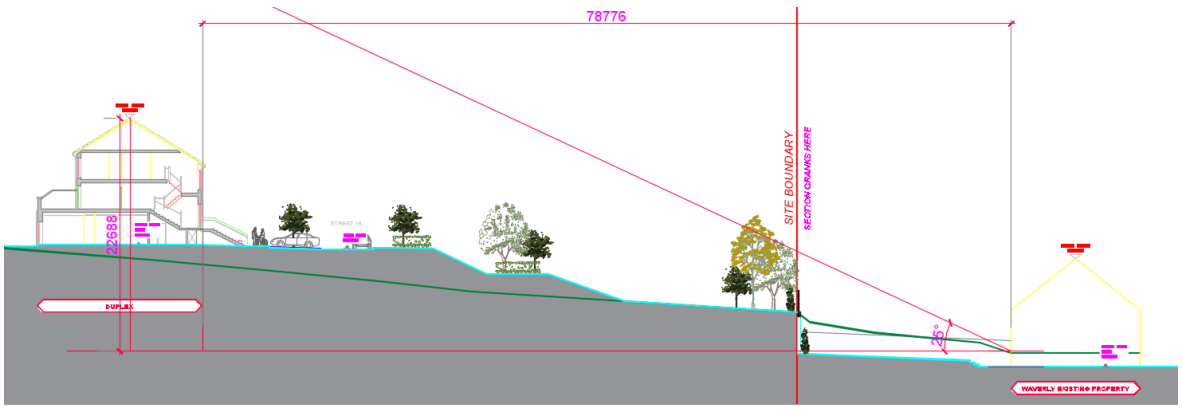
13.3 Sunlight to Existing Buildings

Based on the criteria outlined above, none of the existing neighbouring dwellings were not included within the APSH assessment as they did not meet the criterion as laid out within the BRE guide. Section 3.2.7 of the BRE guidance notes the following:

"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."

Given the statement above the distance between the existing dwellings adjacent and the proposed development was verified noting that it exceeds the height, distance rule outlined above. Therefore, the existing neighbouring 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. To note, as an added check the 25-degree check was also carried out for good measure which the proposed development passed as can be seen from the image below.



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. 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 203 no. points tested, 162 no. points (80%) meet the BRE recommended values over the annual period. The compliance rate increases to 90% (182 no. points) during the winter period when sunlight is most valuable. 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.

It should be noted that in the development of any housing scheme 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 suburban

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 203 no. points tested, 187 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.

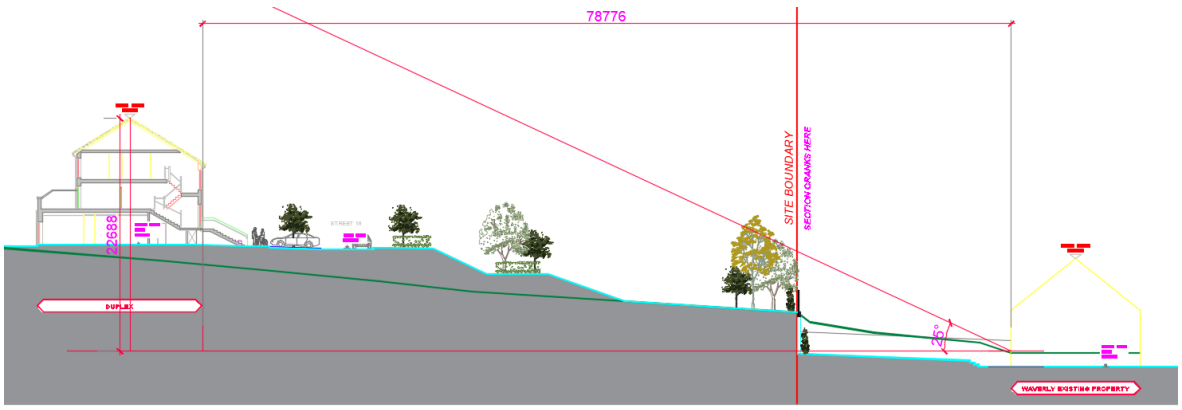
Overall, the sunlight provision results to the proposed development in accordance with IS EN 17037:23018 are considered satisfactory in the context of a suburban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

13.5 Daylight to Existing Buildings

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. 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. Section 2.2.4 of the BRE guidance goes on to note the following:

"Loss of light to existing windows need not be analysed 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. In these cases, loss of light will be small"

As noted in Section 9.1 of this report, the distance between the existing dwellings adjacent to the proposed development was verified noting that it exceeds the height, distance rule outlined above. Therefore, the existing neighbouring properties were excluded on the basis, as noted in section 2.2.4 of the BRE guidance, that these windows need not be analysed as daylight impact will be unnoticeable to the existing occupants. To note, as an added check the 25-degree check was also carried out for good measure which the proposed development passed as can be seen from the image below.



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

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.

To note, a sample of the duplexes and homes property types have been selected and not all as these property types do not face the same daylight issues that apartment property types do. As such a sample were chosen from the middle of rows or locations that were in close proximity to neighbouring proposed properties which would be seen as worst-case location as a check that there were no performance issues with regards to daylight.

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 91% 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.

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:

- All of the apartments exceed the minimum standard and the majority are more than ten percent larger than the minimum standard 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.
- 58% of the apartment & duplex 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.
- A total of 10.43 ha of open space is provided as part of the development. This includes a mix of zoned open space, zoned active open space, linear parks and residential open space.

- 5192 sqm of communal open space is provided.

To note, further results for an alternative design value were collated and can be found within Appendix B of this report. A 98% compliance rate is achieved when LKDs are assessed against this alternative 1.5% design value. Overall the quality of daylight provision across the development is high.

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, 99.7% 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, 100% 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/house/duplex 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 target. However, the whole space complies with an alternative 1.5% ADF design value.

x The ADF in these rooms falls below the BRE recommendation for a L/K/D when the whole space is assessed against the alternative 1.5% 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 Block A1 – Level UG

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	2.28	✓	100	100	✓	100	✓
2	Bedroom	2.08	✓	100	100	✓	100	✓
3	Bedroom	1.91	✓	100	100	✓	100	✓
4	LKD	1.76	x / ✓	90	100	✓	100	✓
5	Bedroom	1.97	✓	100	100	✓	100	✓
6	LKD	2.01	✓	65	100	✓	91	✓
7	Bedroom	1.43	✓	95	100	✓	100	✓
8	LKD	1.77	x / ✓	100	100	✓	100	✓
9	Bedroom	1.60	✓	100	100	✓	100	✓
10	Bedroom	2.21	✓	100	100	✓	100	✓
11	Bedroom	1.85	✓	100	100	✓	100	✓
12	LKD	2.00	✓	100	100	✓	100	✓
13	Bedroom	2.54	✓	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
14	Bedroom	2.42	✓	100	100	✓	100	✓
15	LKD	2.79	✓	100	100	✓	100	✓
16	Bedroom	2.42	✓	100	100	✓	100	✓
17	Bedroom	2.44	✓	100	100	✓	100	✓
18	Bedroom	2.59	✓	100	100	✓	100	✓
19	LKD	2.06	✓	100	100	✓	100	✓
20	Bedroom	2.42	✓	100	100	✓	100	✓
21	LKD	2.04	✓	100	100	✓	100	✓
22	Bedroom	2.41	✓	100	100	✓	100	✓
23	LKD	2.07	✓	100	100	✓	100	✓
24	Bedroom	2.28	✓	100	100	✓	100	✓
25	Bedroom	2.53	✓	100	100	✓	100	✓
26	LKD	2.55	✓	100	100	✓	100	✓

14.1.2 Block A1 – 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	LKD	2.40	✓	100	100	✓	100	✓
2	Bedroom	2.41	✓	100	100	✓	100	✓
3	Bedroom	2.30	✓	100	100	✓	100	✓
4	LKD	1.73	x / ✓	100	100	✓	100	✓
5	Bedroom	2.38	✓	100	100	✓	100	✓
6	Bedroom	2.17	✓	95	100	✓	100	✓
7	LKD	1.24	x	65	100	✓	96	✓
8	Bedroom	1.76	✓	100	100	✓	100	✓
9	LKD	1.78	x / ✓	100	100	✓	100	✓
10	Bedroom	1.76	✓	100	100	✓	100	✓
11	Bedroom	2.47	✓	100	100	✓	100	✓
12	Bedroom	2.10	✓	100	100	✓	100	✓
13	LKD	2.03	✓	100	100	✓	100	✓
14	Bedroom	2.80	✓	100	100	✓	100	✓
15	Bedroom	2.67	✓	100	100	✓	100	✓
16	LKD	2.72	✓	100	100	✓	100	✓
17	Bedroom	2.85	✓	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
18	Bedroom	2.61	✓	100	100	✓	100	✓
19	Bedroom	2.66	✓	100	100	✓	100	✓
20	Bedroom	2.67	✓	100	100	✓	100	✓
21	LKD	2.02	✓	100	100	✓	100	✓
22	Bedroom	2.65	✓	100	100	✓	100	✓
23	LKD	2.00	✓	100	100	✓	100	✓
24	Bedroom	2.65	✓	100	100	✓	100	✓
25	LKD	2.03	✓	100	100	✓	100	✓
26	Bedroom	2.51	✓	100	100	✓	100	✓
27	Bedroom	2.75	✓	100	100	✓	100	✓
28	LKD	2.56	✓	100	100	✓	100	✓

14.1.3 Block A1 – 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	LKD	2.57	✓	100	100	✓	100	✓
2	Bedroom	2.53	✓	100	100	✓	100	✓
3	Bedroom	2.44	✓	100	100	✓	100	✓
4	LKD	1.85	✓	94	100	✓	100	✓
5	Bedroom	2.55	✓	100	100	✓	100	✓
6	Bedroom	2.33	✓	100	100	✓	100	✓
7	LKD	1.43	x	60	100	✓	86	✓
8	Bedroom	2.00	✓	100	100	✓	100	✓
9	LKD	2.02	✓	100	100	✓	100	✓
10	Bedroom	1.80	✓	100	100	✓	100	✓
11	Bedroom	2.54	✓	100	100	✓	100	✓
12	Bedroom	2.17	✓	100	100	✓	100	✓
13	LKD	2.01	✓	100	100	✓	100	✓
14	Bedroom	2.87	✓	100	100	✓	100	✓
15	Bedroom	2.72	✓	100	100	✓	100	✓
16	LKD	2.76	✓	100	100	✓	100	✓
17	Bedroom	2.90	✓	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
18	Bedroom	2.66	✓	100	100	✓	100	✓
19	Bedroom	2.71	✓	100	100	✓	100	✓
20	Bedroom	2.73	✓	100	100	✓	100	✓
21	LKD	2.02	✓	100	100	✓	100	✓
22	Bedroom	2.71	✓	100	100	✓	100	✓
23	LKD	2.01	✓	100	100	✓	100	✓
24	Bedroom	2.71	✓	100	100	✓	100	✓
25	LKD	2.03	✓	100	100	✓	100	✓
26	Bedroom	2.57	✓	100	100	✓	100	✓
27	Bedroom	2.81	✓	100	100	✓	100	✓
28	LKD	2.66	✓	100	100	✓	100	✓

14.1.4 Block A1 – 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	LKD	3.41	✓	100	100	✓	100	✓
2	Bedroom	2.79	✓	100	100	✓	100	✓
3	Bedroom	2.57	✓	100	100	✓	100	✓
4	LKD	2.01	✓	96	100	✓	100	✓
5	Bedroom	2.74	✓	100	100	✓	100	✓
6	Bedroom	2.54	✓	95	100	✓	100	✓
7	LKD	2.10	✓	89	100	✓	100	✓
8	Bedroom	2.35	✓	100	100	✓	100	✓
9	LKD	2.98	✓	100	100	✓	100	✓
10	Bedroom	2.00	✓	100	100	✓	100	✓
11	Bedroom	2.60	✓	100	100	✓	100	✓
12	Bedroom	2.27	✓	100	100	✓	100	✓
13	LKD	2.57	✓	100	100	✓	100	✓
14	Bedroom	2.94	✓	100	100	✓	100	✓
15	Bedroom	2.74	✓	100	100	✓	100	✓
16	LKD	3.48	✓	100	100	✓	100	✓
17	Bedroom	3.02	✓	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
18	Bedroom	2.68	✓	100	100	✓	100	✓
19	Bedroom	2.73	✓	100	100	✓	100	✓
20	Bedroom	2.94	✓	100	100	✓	100	✓
21	LKD	2.61	✓	100	100	✓	100	✓
22	Bedroom	2.88	✓	100	100	✓	100	✓
23	LKD	2.11	✓	100	100	✓	100	✓
24	Bedroom	2.85	✓	100	100	✓	100	✓
25	LKD	2.12	✓	100	100	✓	100	✓
26	Bedroom	2.66	✓	100	100	✓	100	✓
27	Bedroom	2.98	✓	100	100	✓	100	✓
28	LKD	3.43	✓	100	100	✓	100	✓

14.1.5 Block B1 – Level UG

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	2.36	✓	100	100	✓	100	✓
2	Bedroom	2.52	✓	100	100	✓	100	✓
3	Bedroom	2.40	✓	100	100	✓	100	✓
4	Bedroom	2.34	✓	100	100	✓	100	✓
5	LKD	1.75	x / ✓	100	100	✓	100	✓
6	LKD	1.73	x / ✓	81	100	✓	100	✓
7	Bedroom	2.33	✓	100	100	✓	100	✓
8	Bedroom	2.37	✓	100	100	✓	100	✓
9	Bedroom	2.59	✓	100	100	✓	100	✓
10	LKD	2.28	✓	100	100	✓	100	✓
11	LKD	2.54	✓	100	100	✓	100	✓
12	Bedroom	2.94	✓	100	100	✓	100	✓
13	Bedroom	2.70	✓	100	100	✓	100	✓
14	Bedroom	2.78	✓	100	100	✓	100	✓
15	LKD	2.01	✓	100	100	✓	100	✓
16	LKD	2.04	✓	100	100	✓	100	✓
17	Bedroom	2.81	✓	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
18	Bedroom	2.72	✓	100	100	✓	100	✓
19	Bedroom	2.84	✓	100	100	✓	100	✓
20	LKD	2.60	✓	100	100	✓	100	✓

14.1.6 Block B1 – 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	2.37	✓	100	100	✓	100	✓	2.37
2	2.59	✓	100	100	✓	100	✓	2.59
3	2.46	✓	100	100	✓	100	✓	2.46
4	2.47	✓	100	100	✓	100	✓	2.47
5	1.78	x / ✓	100	100	✓	100	✓	1.78
6	1.75	x / ✓	77	100	✓	100	✓	1.75
7	2.47	✓	100	100	✓	100	✓	2.47
8	2.44	✓	100	100	✓	100	✓	2.44
9	2.66	✓	100	100	✓	100	✓	2.66
10	2.31	✓	100	100	✓	100	✓	2.31
11	2.47	✓	100	100	✓	100	✓	2.47
12	2.81	✓	100	100	✓	100	✓	2.81
13	2.57	✓	100	100	✓	100	✓	2.57
14	2.46	✓	100	100	✓	100	✓	2.46
15	1.75	x / ✓	100	100	✓	100	✓	1.75
16	2.59	✓	100	100	✓	100	✓	2.59
17	2.51	✓	100	100	✓	100	✓	2.51

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
18	1.73	x / ✓	100	100	✓	100	✓	1.73
19	2.51	✓	100	100	✓	100	✓	2.51
20	2.58	✓	100	100	✓	100	✓	2.58
21	2.71	✓	100	100	✓	100	✓	2.71
22	2.52	✓	100	100	✓	100	✓	2.52

14.1.7 Block B1 – 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	LKD	2.54	✓	100	100	✓	100	✓
2	Bedroom	2.72	✓	100	100	✓	100	✓
3	Bedroom	2.59	✓	100	100	✓	100	✓
4	Bedroom	2.62	✓	100	100	✓	100	✓
5	LKD	1.89	x / ✓	97	100	✓	100	✓
6	LKD	1.86	x / ✓	86	100	✓	100	✓
7	Bedroom	2.62	✓	100	100	✓	100	✓
8	Bedroom	2.56	✓	100	100	✓	100	✓
9	Bedroom	2.80	✓	100	100	✓	100	✓
10	LKD	2.49	✓	100	100	✓	100	✓
11	LKD	2.59	✓	100	100	✓	100	✓
12	Bedroom	2.86	✓	100	100	✓	100	✓
13	Bedroom	2.62	✓	100	100	✓	100	✓
14	Bedroom	2.51	✓	100	100	✓	100	✓
15	LKD	1.78	x / ✓	100	100	✓	100	✓
16	Bedroom	2.65	✓	100	100	✓	100	✓
17	Bedroom	2.57	✓	100	100	✓	100	✓

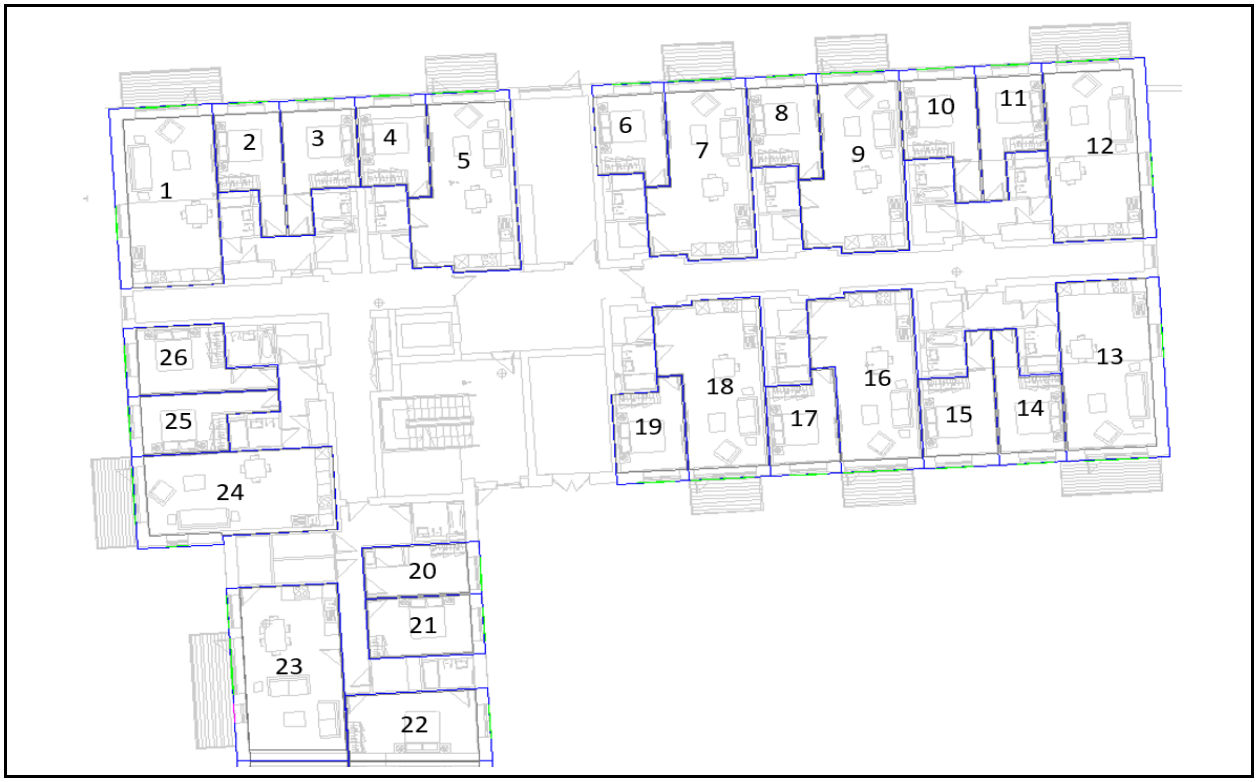
Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
18	LKD	1.76	x / ✓	100	100	✓	100	✓
19	Bedroom	2.56	✓	100	100	✓	100	✓
20	Bedroom	2.64	✓	100	100	✓	100	✓
21	Bedroom	2.76	✓	100	100	✓	100	✓
22	LKD	2.63	✓	100	100	✓	100	✓

14.1.8 Block B1 – 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	LKD	3.39	✓	100	100	✓	100	✓
2	Bedroom	2.92	✓	100	100	✓	100	✓
3	Bedroom	2.66	✓	100	100	✓	100	✓
4	Bedroom	2.77	✓	100	100	✓	100	✓
5	LKD	2.07	✓	100	100	✓	100	✓
6	LKD	2.08	✓	100	100	✓	100	✓
7	Bedroom	2.76	✓	100	100	✓	100	✓
8	Bedroom	2.65	✓	100	100	✓	100	✓
9	Bedroom	3.02	✓	100	100	✓	100	✓
10	LKD	3.38	✓	100	100	✓	100	✓
11	LKD	3.39	✓	100	100	✓	100	✓
12	Bedroom	3.01	✓	100	100	✓	100	✓
13	Bedroom	2.65	✓	100	100	✓	100	✓
14	Bedroom	2.65	✓	100	100	✓	100	✓
15	LKD	2.13	✓	100	100	✓	100	✓
16	Bedroom	2.74	✓	100	100	✓	100	✓
17	Bedroom	2.71	✓	100	100	✓	100	✓
18	LKD	2.10	✓	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
19	Bedroom	2.67	✓	100	100	✓	100	✓
20	Bedroom	2.66	✓	100	100	✓	100	✓
21	Bedroom	2.91	✓	100	100	✓	100	✓
22	LKD	3.40	✓	100	100	✓	100	✓

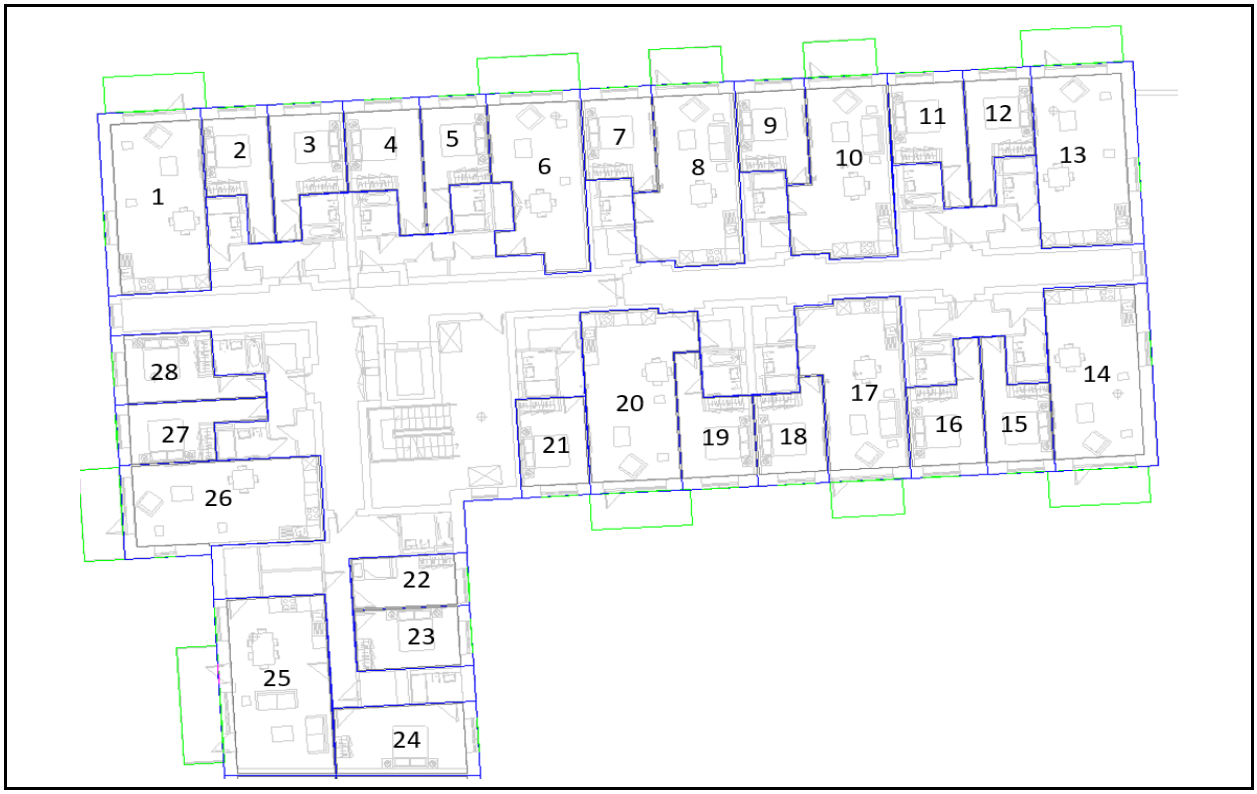
14.1.9 Block C1 – Level UG



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	2.80	✓	100	100	✓	100	✓
2	Bedroom	2.56	✓	100	100	✓	100	✓
3	Bedroom	2.41	✓	100	100	✓	100	✓
4	Bedroom	2.59	✓	100	100	✓	100	✓
5	LKD	2.05	✓	100	100	✓	100	✓
6	Bedroom	2.41	✓	100	100	✓	100	✓
7	LKD	2.05	✓	100	100	✓	100	✓
8	Bedroom	2.45	✓	100	100	✓	100	✓
9	LKD	2.06	✓	100	100	✓	100	✓
10	Bedroom	2.32	✓	100	100	✓	100	✓
11	Bedroom	2.58	✓	100	100	✓	100	✓
12	LKD	2.50	✓	100	100	✓	100	✓
13	LKD	2.16	✓	100	100	✓	100	✓
14	Bedroom	2.18	✓	100	100	✓	100	✓
15	Bedroom	1.90	✓	100	100	✓	100	✓
16	LKD	1.75	x / ✓	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
17	Bedroom	1.97	✓	100	100	✓	100	✓
18	LKD	2.01	✓	100	100	✓	100	✓
19	Bedroom	1.68	✓	45	100	x	100	✓
20	Bedroom	1.63	✓	100	100	✓	100	✓
21	Bedroom	1.65	✓	100	100	✓	100	✓
22	Bedroom	1.34	✓	100	100	✓	100	✓
23	LKD	2.19	✓	100	100	✓	100	✓
24	LKD	2.04	✓	100	100	✓	100	✓
25	Bedroom	2.61	✓	100	100	✓	100	✓
26	Bedroom	2.41	✓	100	100	✓	100	✓

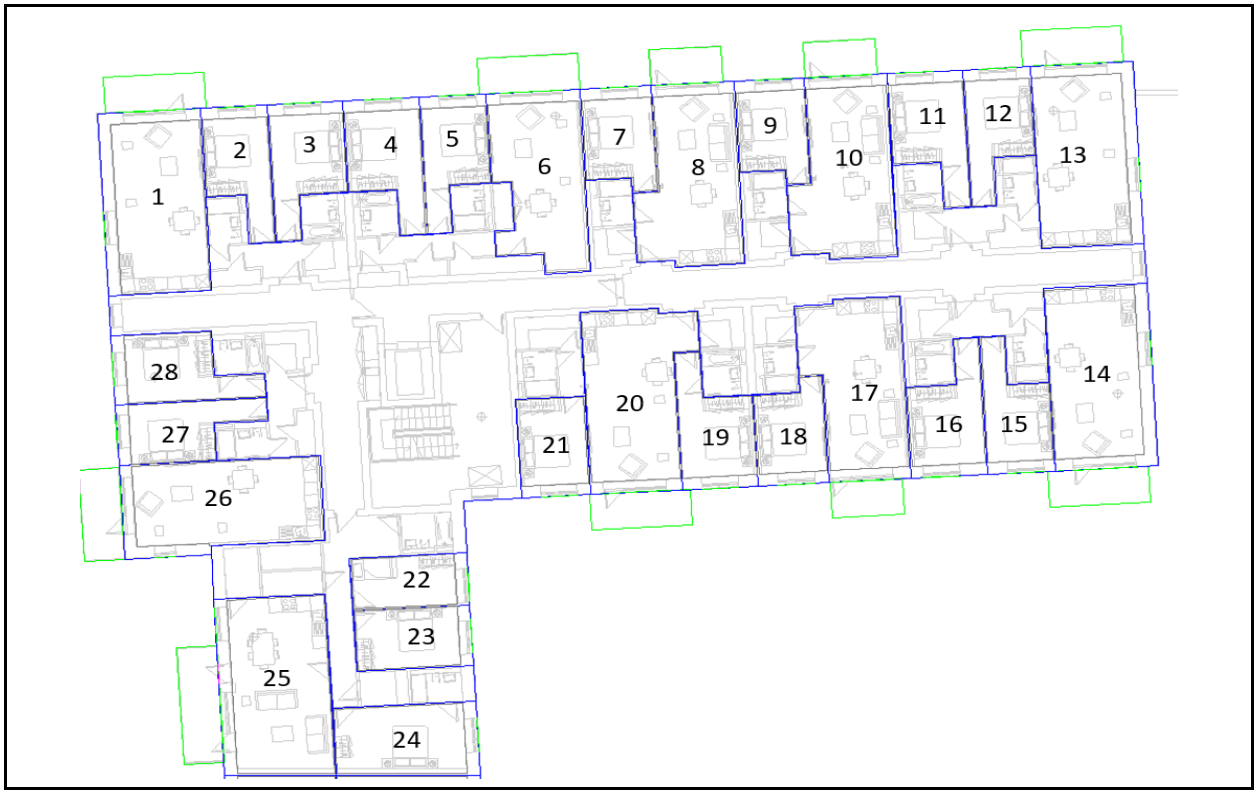
14.1.10 Block C1 – Level 1



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	LKD	2.73	✓	100	100	✓	100	✓
2	Bedroom	2.81	✓	100	100	✓	100	✓
3	Bedroom	2.67	✓	100	100	✓	100	✓
4	Bedroom	2.61	✓	100	100	✓	100	✓
5	Bedroom	2.76	✓	100	100	✓	100	✓
6	LKD	2.00	✓	100	100	✓	100	✓
7	Bedroom	2.65	✓	100	100	✓	100	✓
8	LKD	2.01	✓	100	100	✓	100	✓
9	Bedroom	2.69	✓	100	100	✓	100	✓
10	LKD	2.02	✓	100	100	✓	100	✓
11	Bedroom	2.44	✓	100	100	✓	100	✓
12	Bedroom	2.80	✓	100	100	✓	100	✓
13	LKD	2.50	✓	100	100	✓	100	✓
14	LKD	2.28	✓	100	100	✓	100	✓
15	Bedroom	2.49	✓	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
16	Bedroom	2.28	✓	100	100	✓	100	✓
17	LKD	1.72	x / ✓	100	100	✓	100	✓
18	Bedroom	2.39	✓	91	100	✓	100	✓
19	Bedroom	2.18	✓	100	100	✓	100	✓
20	LKD	1.31	x	47	100	x	68	✓
21	Bedroom	1.86	✓	83	100	✓	100	✓
22	Bedroom	1.94	✓	100	100	✓	100	✓
23	Bedroom	1.97	✓	100	100	✓	100	✓
24	Bedroom	1.59	✓	100	100	✓	100	✓
25	LKD	2.12	✓	100	100	✓	100	✓
26	LKD	2.01	✓	100	100	✓	100	✓
27	Bedroom	2.89	✓	100	100	✓	100	✓
28	Bedroom	2.66	✓	100	100	✓	100	✓

14.1.11 Block C1 – 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	LKD	2.77	✓	100	100	✓	100	✓
2	Bedroom	2.86	✓	100	100	✓	100	✓
3	Bedroom	2.72	✓	100	100	✓	100	✓
4	Bedroom	2.65	✓	100	100	✓	100	✓
5	Bedroom	2.81	✓	100	100	✓	100	✓
6	LKD	2.00	✓	100	100	✓	100	✓
7	Bedroom	2.71	✓	100	100	✓	100	✓
8	LKD	2.04	✓	100	100	✓	100	✓
9	Bedroom	2.76	✓	100	100	✓	100	✓
10	LKD	2.05	✓	100	100	✓	100	✓
11	Bedroom	2.49	✓	100	100	✓	100	✓
12	Bedroom	2.86	✓	100	100	✓	100	✓
13	LKD	2.61	✓	100	100	✓	100	✓
14	LKD	2.47	✓	100	100	✓	100	✓
15	Bedroom	2.62	✓	100	100	✓	100	✓

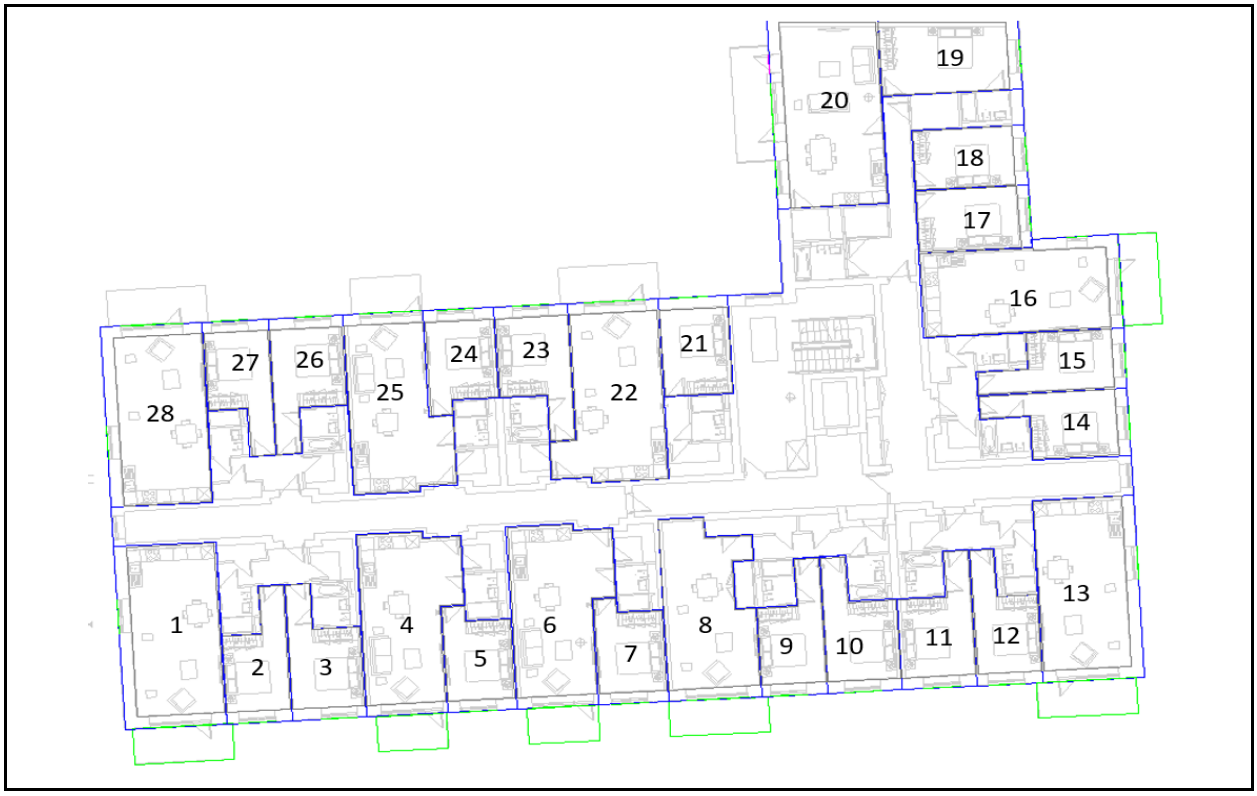
Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
16	Bedroom	2.41	✓	100	100	✓	100	✓
17	LKD	1.84	x / ✓	100	100	✓	100	✓
18	Bedroom	2.56	✓	100	100	✓	100	✓
19	Bedroom	2.34	✓	100	100	✓	100	✓
20	LKD	1.45	x	53	100	✓	79	✓
21	Bedroom	2.07	✓	100	100	✓	100	✓
22	Bedroom	2.13	✓	100	100	✓	100	✓
23	Bedroom	2.15	✓	100	100	✓	100	✓
24	Bedroom	1.70	✓	100	100	✓	100	✓
25	LKD	2.19	✓	100	100	✓	100	✓
26	LKD	2.03	✓	100	100	✓	100	✓
27	Bedroom	2.94	✓	100	100	✓	100	✓
28	Bedroom	2.70	✓	100	100	✓	100	✓

14.1.12 Block C1 – 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	LKD	3.94	✓	100	100	✓	100	✓
2	Bedroom	2.97	✓	100	100	✓	100	✓
3	Bedroom	2.73	✓	100	100	✓	100	✓
4	Bedroom	2.68	✓	100	100	✓	100	✓
5	Bedroom	3.01	✓	100	100	✓	100	✓
6	LKD	2.63	✓	100	100	✓	100	✓
7	Bedroom	2.87	✓	100	100	✓	100	✓
8	LKD	2.12	✓	100	100	✓	100	✓
9	Bedroom	2.90	✓	100	100	✓	100	✓
10	LKD	2.13	✓	100	100	✓	100	✓
11	Bedroom	2.58	✓	100	100	✓	100	✓
12	Bedroom	3.03	✓	100	100	✓	100	✓
13	LKD	3.41	✓	100	100	✓	100	✓
14	LKD	3.34	✓	100	100	✓	100	✓
15	Bedroom	2.89	✓	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
16	Bedroom	2.55	✓	100	100	✓	100	✓
17	LKD	2.02	✓	100	100	✓	100	✓
18	Bedroom	2.76	✓	100	100	✓	100	✓
19	Bedroom	2.55	✓	100	100	✓	100	✓
20	LKD	2.00	✓	60	100	✓	94	✓
21	Bedroom	2.41	✓	75	100	✓	100	✓
22	Bedroom	2.39	✓	100	100	✓	100	✓
23	Bedroom	2.35	✓	100	100	✓	100	✓
24	Bedroom	1.98	✓	92	100	✓	100	✓
25	LKD	3.25	✓	100	100	✓	100	✓
26	LKD	2.57	✓	100	100	✓	100	✓
27	Bedroom	3.02	✓	100	100	✓	100	✓
28	Bedroom	2.72	✓	100	100	✓	100	✓

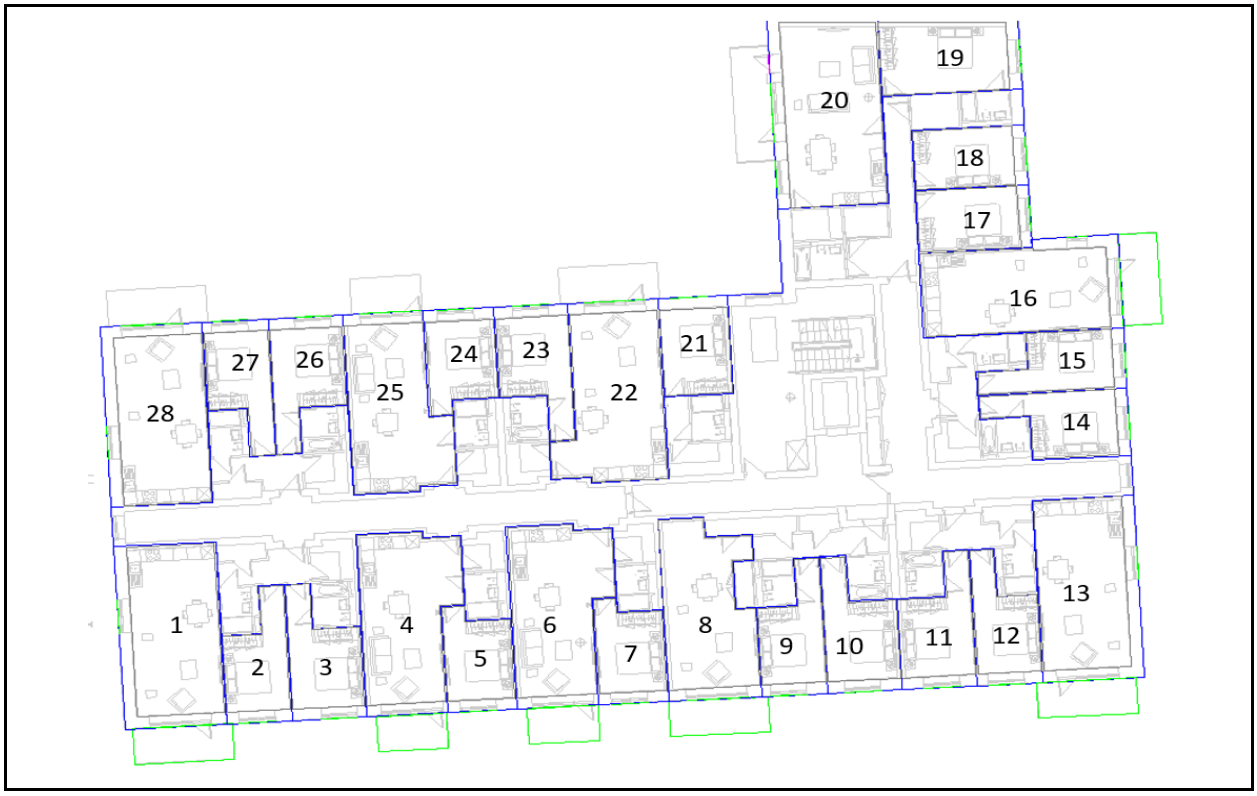
14.1.13 Block A2 – Level UGF



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	2.56	✓	100	100	✓	100	✓
2	Bedroom	2.70	✓	100	100	✓	100	✓
3	Bedroom	2.45	✓	100	100	✓	100	✓
4	LKD	2.10	✓	100	100	✓	100	✓
5	Bedroom	2.63	✓	100	100	✓	100	✓
6	LKD	2.07	✓	100	100	✓	100	✓
7	Bedroom	2.59	✓	100	100	✓	100	✓
8	LKD	2.11	✓	100	100	✓	100	✓
9	Bedroom	2.61	✓	100	100	✓	100	✓
10	Bedroom	2.59	✓	100	100	✓	100	✓
11	Bedroom	2.59	✓	100	100	✓	100	✓
12	Bedroom	2.78	✓	100	100	✓	100	✓
13	LKD	2.75	✓	100	100	✓	100	✓
14	Bedroom	2.57	✓	100	100	✓	100	✓
15	Bedroom	2.70	✓	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
16	LKD	2.01	✓	100	100	✓	100	✓
17	Bedroom	2.00	✓	100	100	✓	100	✓
18	Bedroom	2.35	✓	100	100	✓	100	✓
19	Bedroom	1.70	✓	100	100	✓	100	✓
20	LKD	1.68	x / ✓	91	100	✓	100	✓
21	Bedroom	1.26	✓	100	100	✓	100	✓
22	LKD	0.95	x	100	100	✓	100	✓
23	Bedroom	1.61	✓	100	100	✓	100	✓
24	Bedroom	1.77	✓	100	100	✓	100	✓
25	LKD	1.37	x	100	100	✓	100	✓
26	Bedroom	1.77	✓	100	100	✓	100	✓
27	Bedroom	1.94	✓	100	100	✓	100	✓
28	LKD	2.10	✓	100	100	✓	100	✓

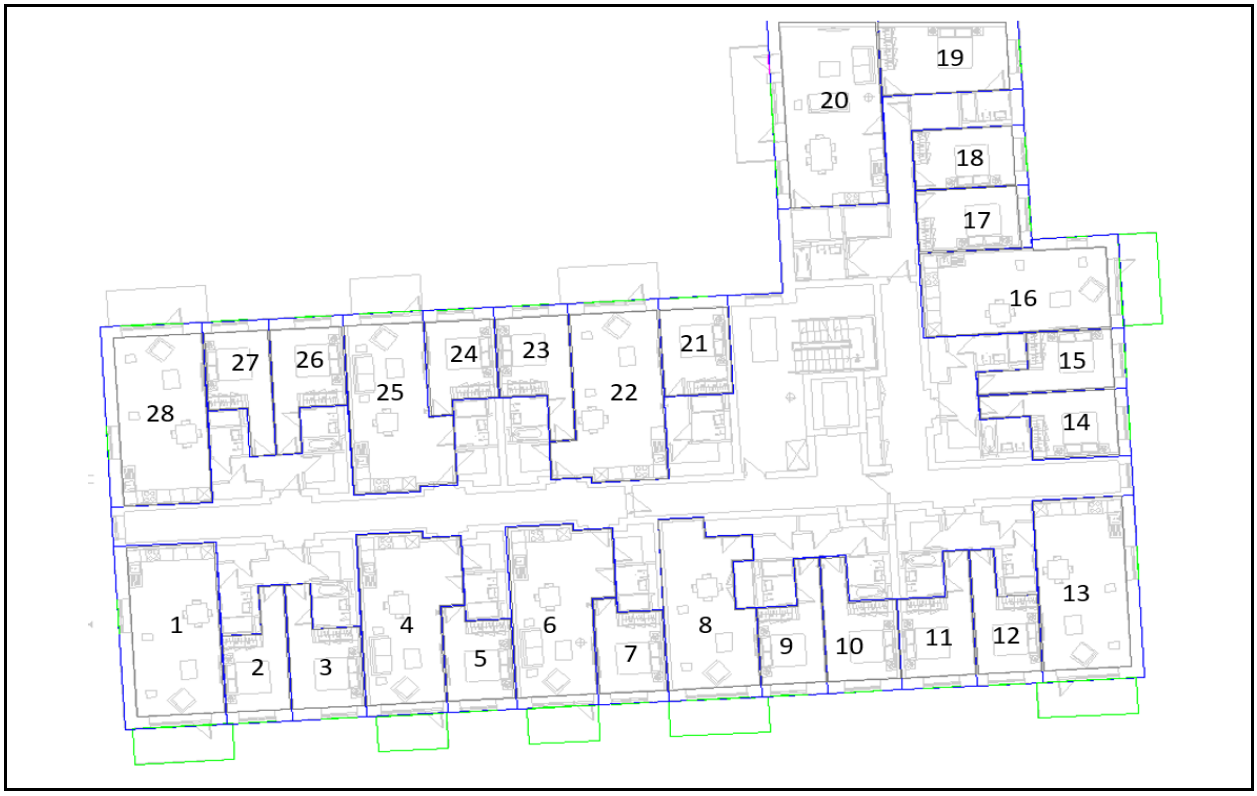
14.1.14 Block A2 – Level 1



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	LKD	2.61	✓	100	100	✓	100	✓
2	Bedroom	2.78	✓	100	100	✓	100	✓
3	Bedroom	2.54	✓	100	100	✓	100	✓
4	LKD	2.01	✓	84	100	✓	98	✓
5	Bedroom	2.73	✓	100	100	✓	100	✓
6	LKD	2.00	✓	98	100	✓	100	✓
7	Bedroom	2.68	✓	100	100	✓	100	✓
8	LKD	2.10	✓	100	100	✓	100	✓
9	Bedroom	2.69	✓	100	100	✓	100	✓
10	Bedroom	2.70	✓	100	100	✓	100	✓
11	Bedroom	2.69	✓	100	100	✓	100	✓
12	Bedroom	2.88	✓	100	100	✓	100	✓
13	LKD	2.73	✓	100	100	✓	100	✓
14	Bedroom	2.69	✓	100	100	✓	100	✓
15	Bedroom	2.83	✓	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
16	LKD	2.05	✓	100	100	✓	100	✓
17	Bedroom	2.11	✓	100	100	✓	100	✓
18	Bedroom	2.47	✓	100	100	✓	100	✓
19	Bedroom	1.80	✓	100	100	✓	100	✓
20	LKD	1.90	✓	100	100	✓	100	✓
21	Bedroom	1.62	✓	100	100	✓	100	✓
22	LKD	1.06	x	100	100	✓	100	✓
23	Bedroom	1.96	✓	100	100	✓	100	✓
24	Bedroom	2.12	✓	100	100	✓	100	✓
25	LKD	1.51	x / ✓	100	100	✓	100	✓
26	Bedroom	2.11	✓	100	100	✓	100	✓
27	Bedroom	2.24	✓	100	100	✓	100	✓
28	LKD	2.30	✓	100	100	✓	100	✓

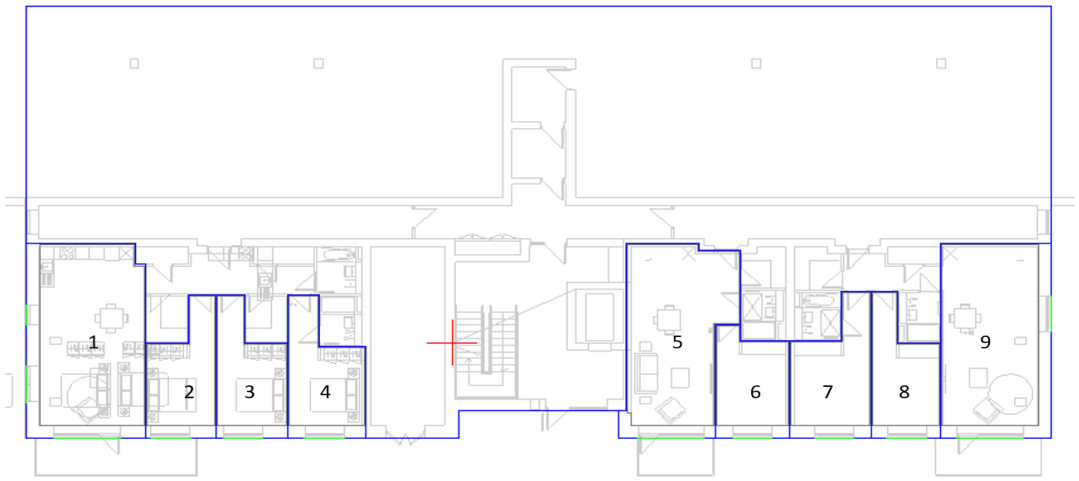
14.1.15 Block A2 – Level 2



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	LKD	3.40	✓	100	100	✓	100	✓
2	Bedroom	2.94	✓	100	100	✓	100	✓
3	Bedroom	2.62	✓	100	100	✓	100	✓
4	LKD	2.10	✓	82	100	✓	100	✓
5	Bedroom	2.86	✓	100	100	✓	100	✓
6	LKD	2.09	✓	97	100	✓	100	✓
7	Bedroom	2.83	✓	100	100	✓	100	✓
8	LKD	2.58	✓	97	100	✓	100	✓
9	Bedroom	2.88	✓	100	100	✓	100	✓
10	Bedroom	2.72	✓	100	100	✓	100	✓
11	Bedroom	2.70	✓	100	100	✓	100	✓
12	Bedroom	2.99	✓	100	100	✓	100	✓
13	LKD	3.46	✓	100	100	✓	100	✓
14	Bedroom	2.73	✓	100	100	✓	100	✓
15	Bedroom	2.93	✓	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
16	LKD	2.52	✓	100	100	✓	100	✓
17	Bedroom	2.22	✓	100	100	✓	100	✓
18	Bedroom	2.56	✓	100	100	✓	100	✓
19	Bedroom	1.83	✓	100	100	✓	100	✓
20	LKD	2.72	✓	100	100	✓	100	✓
21	Bedroom	2.07	✓	100	100	✓	100	✓
22	LKD	2.10	✓	100	100	✓	100	✓
23	Bedroom	2.29	✓	100	100	✓	100	✓
24	Bedroom	2.45	✓	100	100	✓	100	✓
25	LKD	2.05	✓	100	100	✓	100	✓
26	Bedroom	2.35	✓	100	100	✓	100	✓
27	Bedroom	2.61	✓	100	100	✓	100	✓
28	LKD	3.22	✓	100	100	✓	100	✓

14.1.16 Block B2 – Level LG



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	2.31	✓	100	100	✓	100	✓
2	Bedroom	2.15	✓	100	100	✓	100	✓
3	Bedroom	2.22	✓	100	100	✓	100	✓
4	Bedroom	2.16	✓	100	100	✓	100	✓
5	LKD	2.01	✓	100	100	✓	100	✓
6	Bedroom	2.31	✓	100	100	✓	100	✓
7	Bedroom	2.14	✓	91	100	✓	100	✓
8	Bedroom	2.43	✓	100	100	✓	100	✓
9	LKD	2.05	✓	100	100	✓	100	✓

14.1.17 Block B2 – Level UG

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	2.68	✓	100	100	✓	100	✓
2	Bedroom	3.12	✓	100	100	✓	100	✓
3	Bedroom	2.99	✓	100	100	✓	100	✓
4	Bedroom	3.11	✓	100	100	✓	100	✓
5	LKD	2.17	✓	100	100	✓	100	✓
6	LKD	2.15	✓	100	100	✓	100	✓
7	Bedroom	3.09	✓	100	100	✓	100	✓
8	Bedroom	2.97	✓	100	100	✓	100	✓
9	Bedroom	3.24	✓	100	100	✓	100	✓
10	LKD	2.58	✓	100	100	✓	100	✓
11	LKD	2.05	✓	100	100	✓	100	✓
12	Bedroom	2.20	✓	100	100	✓	100	✓
13	Bedroom	2.04	✓	100	100	✓	100	✓
14	Bedroom	1.88	✓	100	100	✓	100	✓
15	LKD	1.20	x	100	100	✓	100	✓
16	Bedroom	1.90	✓	100	100	✓	100	✓
17	Bedroom	1.38	✓	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
18	LKD	2.05	✓	100	100	✓	100	✓
19	Bedroom	2.06	✓	100	100	✓	100	✓
20	Bedroom	2.15	✓	100	100	✓	100	✓
21	LKD	2.14	✓	100	100	✓	100	✓

14.1.18 Block B2 – 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	LKD	2.62	✓	100	100	✓	100	✓
2	Bedroom	2.85	✓	100	100	✓	100	✓
3	Bedroom	2.72	✓	100	100	✓	100	✓
4	Bedroom	2.87	✓	100	100	✓	100	✓
5	LKD	2.10	✓	100	100	✓	100	✓
6	LKD	2.07	✓	100	100	✓	100	✓
7	Bedroom	2.85	✓	100	100	✓	100	✓
8	Bedroom	2.69	✓	100	100	✓	100	✓
9	Bedroom	2.96	✓	100	100	✓	100	✓
10	LKD	2.53	✓	100	100	✓	100	✓
11	LKD	2.19	✓	100	100	✓	100	✓
12	Bedroom	2.33	✓	100	100	✓	100	✓
13	Bedroom	2.15	✓	100	100	✓	100	✓
14	Bedroom	2.00	✓	100	100	✓	100	✓
15	LKD	1.32	x	100	100	✓	100	✓
16	Bedroom	2.09	✓	100	100	✓	100	✓
17	Bedroom	2.00	✓	100	100	✓	100	✓

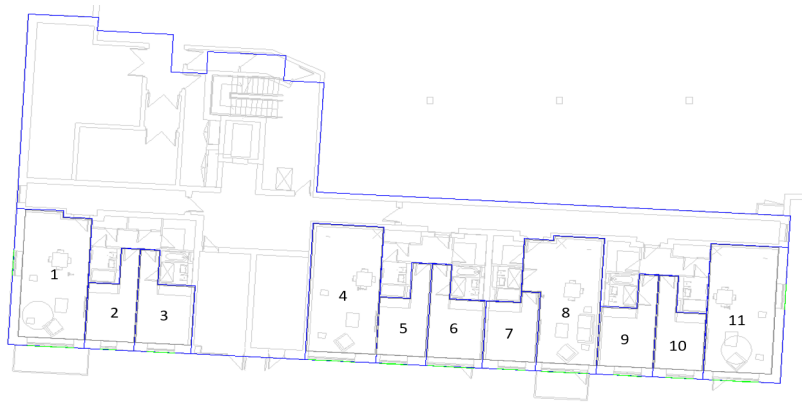
Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
18	LKD	1.30	x	100	100	✓	100	✓
19	Bedroom	2.07	✓	100	100	✓	100	✓
20	Bedroom	2.16	✓	100	100	✓	100	✓
21	Bedroom	2.26	✓	100	100	✓	100	✓
22	LKD	2.25	✓	100	100	✓	100	✓

14.1.19 Block B2 – 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	LKD	3.41	✓	100	100	✓	100	✓
2	Bedroom	2.98	✓	100	100	✓	100	✓
3	Bedroom	2.73	✓	100	100	✓	100	✓
4	Bedroom	2.95	✓	100	100	✓	100	✓
5	LKD	2.09	✓	98	100	✓	100	✓
6	LKD	2.10	✓	93	100	✓	100	✓
7	Bedroom	2.94	✓	100	100	✓	100	✓
8	Bedroom	2.71	✓	100	100	✓	100	✓
9	Bedroom	3.11	✓	100	100	✓	100	✓
10	LKD	3.35	✓	100	100	✓	100	✓
11	LKD	3.12	✓	100	100	✓	100	✓
12	Bedroom	2.67	✓	100	100	✓	100	✓
13	Bedroom	2.34	✓	100	100	✓	100	✓
14	Bedroom	2.33	✓	100	100	✓	100	✓
15	LKD	2.09	✓	100	100	✓	100	✓
16	Bedroom	2.37	✓	100	100	✓	100	✓

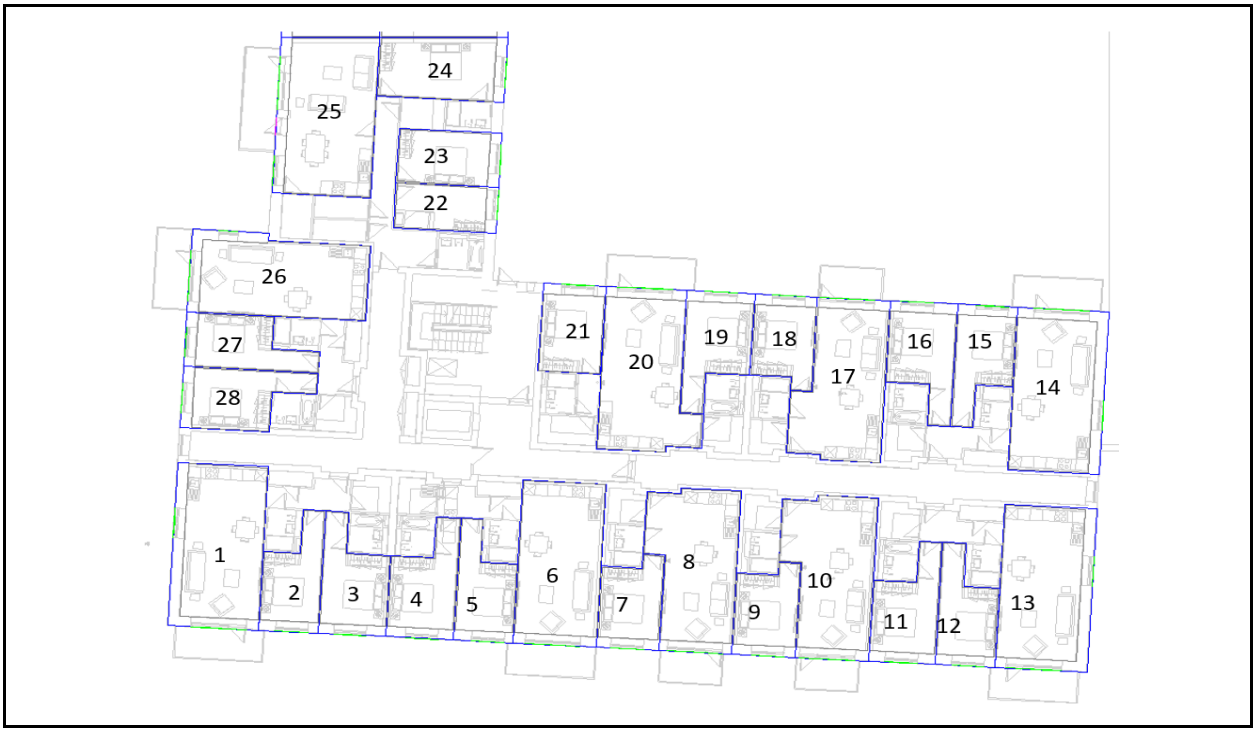
Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
17	Bedroom	2.36		100	100	✓	100	✓
18	LKD	2.04	✓	100	100	✓	100	✓
19	Bedroom	2.37	✓	100	100	✓	100	✓
20	Bedroom	2.36	✓	100	100	✓	100	✓
21	Bedroom	2.59	✓	100	100	✓	100	✓
22	LKD	3.16	✓	100	100	✓	100	✓

14.1.20 Block C2 – Level LG



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	2.55	✓	100	100	✓	100	✓
2	Bedroom	1.34	✓	100	100	✓	100	✓
3	Bedroom	2.11	✓	100	100	✓	100	✓
4	LKD	1.73	x / ✓	100	100	✓	100	✓
5	Bedroom	2.15	✓	100	100	✓	100	✓
6	Bedroom	3.44	✓	100	100	✓	100	✓
7	Bedroom	2.18	✓	100	100	✓	100	✓
8	LKD	2.09	✓	100	100	✓	100	✓
9	Bedroom	2.08	✓	95	100	✓	100	✓
10	Bedroom	2.26	✓	100	100	✓	100	✓
11	LKD	2.11	✓	100	100	✓	100	✓

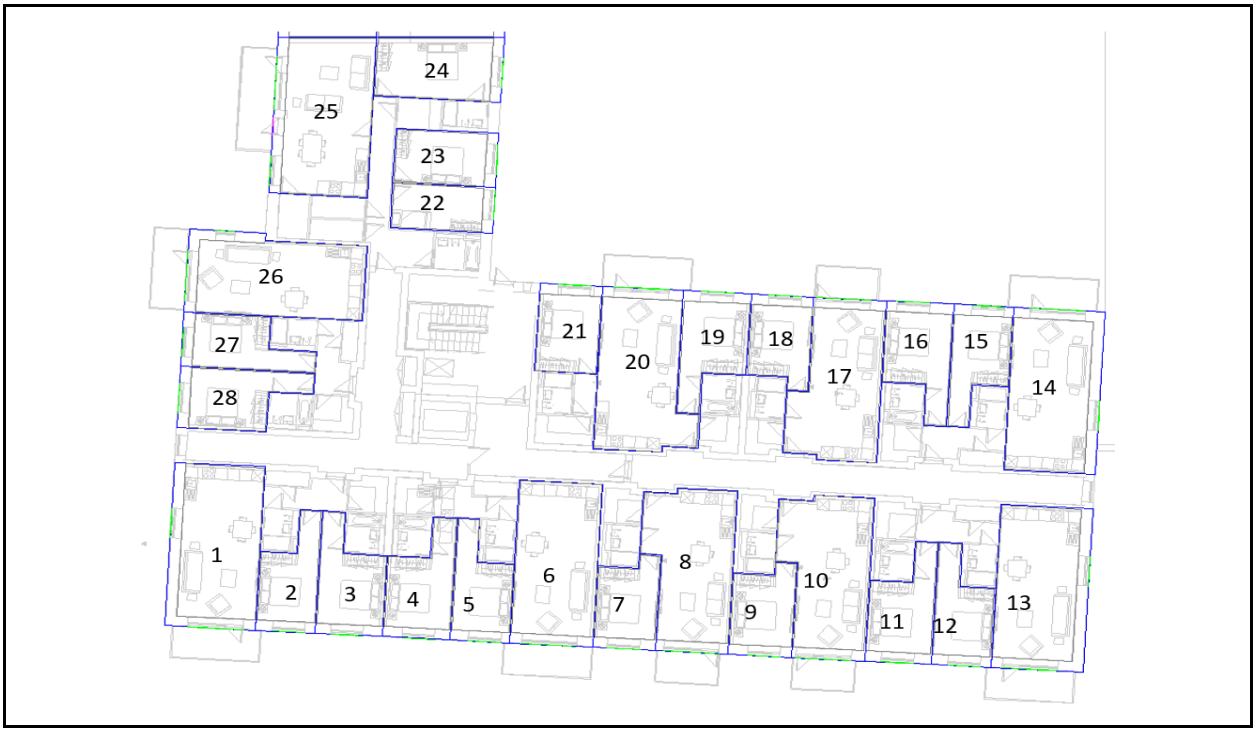
14.1.21 Block C2 – Level UG



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	2.79	✓	100	100	✓	100	✓
2	Bedroom	2.78	✓	100	100	✓	100	✓
3	Bedroom	2.57	✓	100	100	✓	100	✓
4	Bedroom	2.54	✓	91	100	✓	100	✓
5	Bedroom	2.70	✓	100	100	✓	100	✓
6	LKD	1.81	x / ✓	100	100	✓	100	✓
7	Bedroom	2.64	✓	100	100	✓	100	✓
8	LKD	2.12	✓	100	100	✓	100	✓
9	Bedroom	2.60	✓	100	100	✓	100	✓
10	LKD	2.10	✓	100	100	✓	100	✓
11	Bedroom	2.55	✓	100	100	✓	100	✓
12	Bedroom	2.66	✓	100	100	✓	100	✓
13	LKD	2.48	✓	100	100	✓	100	✓
14	LKD	2.00	✓	100	100	✓	100	✓
15	Bedroom	1.98	✓	100	100	✓	100	✓
16	Bedroom	1.74	✓	100	100	✓	100	✓
17	LKD	1.39	x	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
18	Bedroom	1.79	✓	100	100	✓	100	✓
19	Bedroom	1.62	✓	100	100	✓	100	✓
20	LKD	1.01	x	100	100	✓	100	✓
21	Bedroom	1.32	✓	100	100	✓	100	✓
22	Bedroom	1.81	✓	83	100	✓	100	✓
23	Bedroom	1.82	✓	100	100	✓	100	✓
24	Bedroom	1.44	✓	100	100	✓	100	✓
25	LKD	2.17	✓	100	100	✓	100	✓
26	LKD	2.00	✓	100	100	✓	100	✓
27	Bedroom	2.77	✓	100	100	✓	100	✓
28	Bedroom	2.58	✓	100	100	✓	100	✓

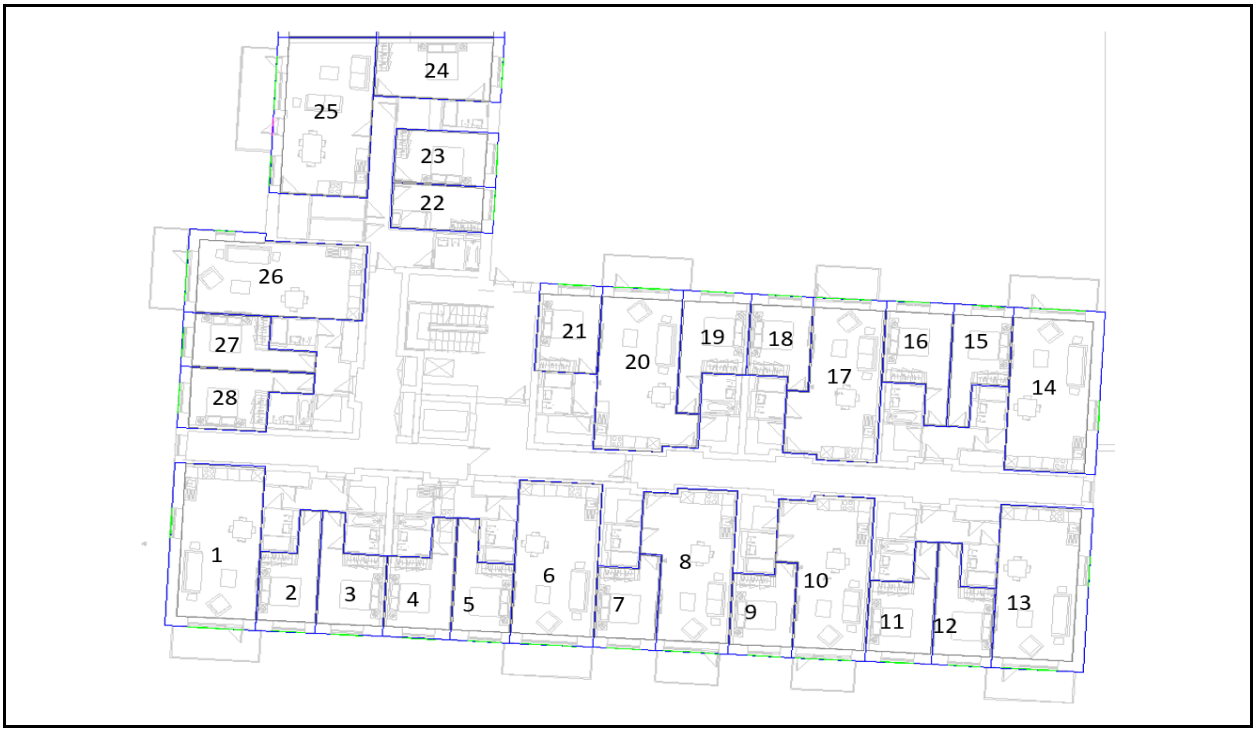
14.1.22 Block C2 – Level 1



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	LKD	2.76	✓	100	100	✓	100	✓
2	Bedroom	2.88	✓	100	100	✓	100	✓
3	Bedroom	2.66	✓	100	100	✓	100	✓
4	Bedroom	2.63	✓	91	100	✓	100	✓
5	Bedroom	2.78	✓	100	100	✓	100	✓
6	LKD	1.71	x / ✓	95	100	✓	100	✓
7	Bedroom	2.74	✓	100	100	✓	100	✓
8	LKD	2.04	✓	100	100	✓	100	✓
9	Bedroom	2.71	✓	100	100	✓	100	✓
10	LKD	2.01	✓	100	100	✓	100	✓
11	Bedroom	2.65	✓	95	100	✓	100	✓
12	Bedroom	2.75	✓	100	100	✓	100	✓
13	LKD	2.54	✓	100	100	✓	100	✓
14	LKD	2.21	✓	100	100	✓	100	✓
15	Bedroom	2.30	✓	100	100	✓	100	✓
16	Bedroom	2.07	✓	100	100	✓	100	✓
17	LKD	1.51	x / ✓	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
18	Bedroom	2.15	✓	100	100	✓	100	✓
19	Bedroom	1.95	✓	100	100	✓	100	✓
20	LKD	1.11	x	100	100	✓	100	✓
21	Bedroom	1.66	✓	100	100	✓	100	✓
22	Bedroom	2.10	✓	100	100	✓	100	✓
23	Bedroom	2.08	✓	100	100	✓	100	✓
24	Bedroom	1.62	✓	100	100	✓	100	✓
25	LKD	2.16	✓	100	100	✓	100	✓
26	LKD	2.01	✓	100	100	✓	100	✓
27	Bedroom	2.89	✓	100	100	✓	100	✓
28	Bedroom	2.69	✓	100	100	✓	100	✓

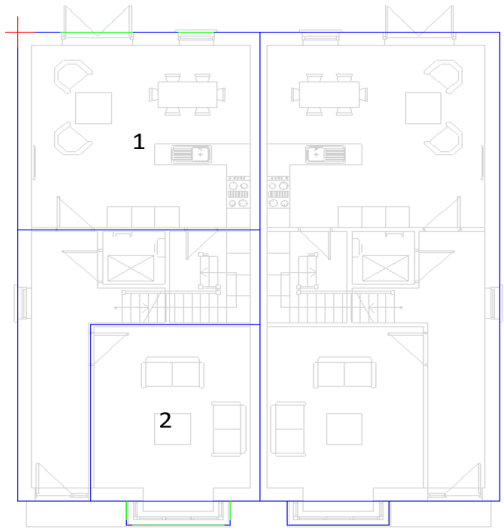
14.1.23 Block C2 – Level 2



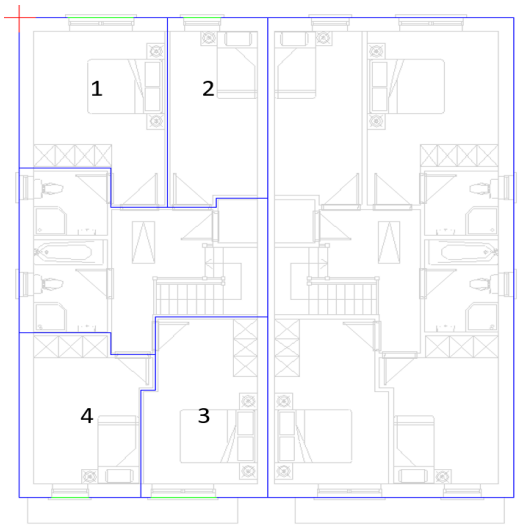
Ref.	Room Activity	BRE Guide / BS 8206:2008		IS EN 17037:2018 Method 2			BS EN 17037:2018 Method 2 National Annex	
		ADF (%)	Comment	Floor Area > E_T (%)	Floor Area > E_{TM} (%)	Comment	Floor Area > E_T (%)	Comment
1	LKD	3.48	✓	100	100	✓	100	✓
2	Bedroom	2.99	✓	100	100	✓	100	✓
3	Bedroom	2.67	✓	100	100	✓	100	✓
4	Bedroom	2.64	✓	91	100	✓	100	✓
5	Bedroom	2.97	✓	100	100	✓	100	✓
6	LKD	2.17	✓	96	100	✓	100	✓
7	Bedroom	2.89	✓	100	100	✓	100	✓
8	LKD	2.11	✓	91	100	✓	100	✓
9	Bedroom	2.83	✓	100	100	✓	100	✓
10	LKD	2.08	✓	91	100	✓	100	✓
11	Bedroom	2.70	✓	95	100	✓	100	✓
12	Bedroom	2.91	✓	100	100	✓	100	✓
13	LKD	3.34	✓	100	100	✓	100	✓
14	LKD	3.15	✓	100	100	✓	100	✓
15	Bedroom	2.67	✓	100	100	✓	100	✓
16	Bedroom	2.33	✓	100	100	✓	100	✓
17	LKD	2.17	✓	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
18	Bedroom	2.47	✓	100	100	✓	100	✓
19	Bedroom	2.29	✓	100	100	✓	100	✓
20	LKD	2.10	✓	82	100	✓	100	✓
21	Bedroom	2.09	✓	100	100	✓	100	✓
22	Bedroom	2.38	✓	100	100	✓	100	✓
23	Bedroom	2.30	✓	100	100	✓	100	✓
24	Bedroom	1.74	✓	100	100	✓	100	✓
25	LKD	3.08	x / ✓	100	100	✓	100	✓
26	LKD	2.51	✓	100	100	✓	100	✓
27	Bedroom	2.97	✓	100	100	✓	100	✓
28	Bedroom	2.71	✓	100	100	✓	100	✓

14.1.24 House Type A-A



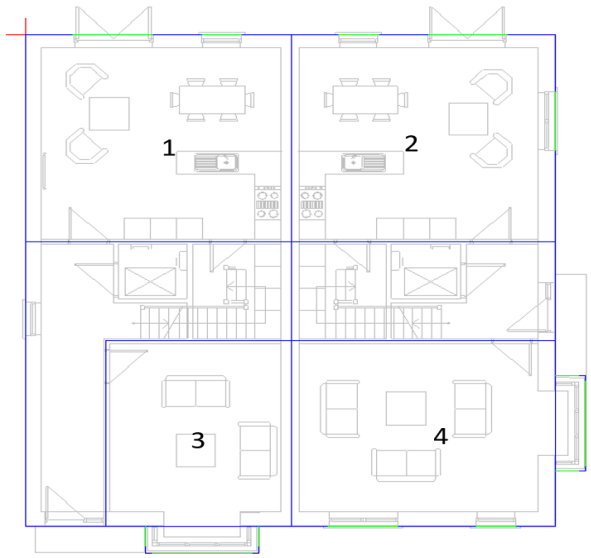
L00



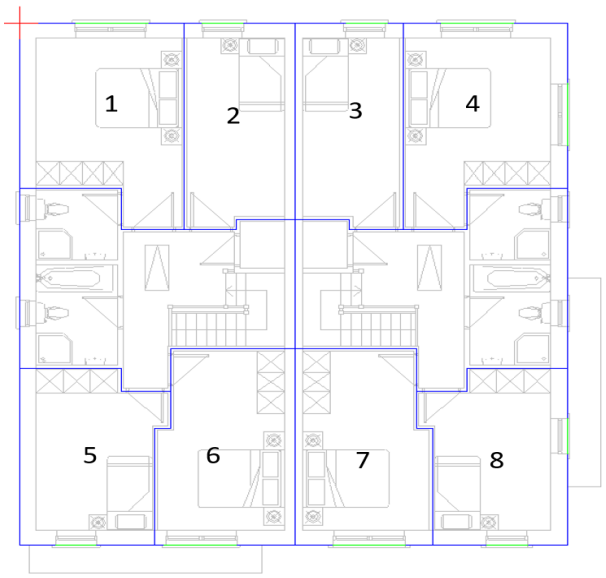
L01

Floor	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
L00	1	LKD	2.29	✓	100	100	✓	100	✓
	2	LKD	2.00	✓	100	100	✓	100	✓
L01	1	Bedroom	2.60	✓	100	100	✓	100	✓
	2	Bedroom	1.50	✓	100	100	✓	100	✓
	3	Bedroom	2.26	✓	100	100	✓	100	✓
	4	Bedroom	1.59	✓	100	100	✓	100	✓

14.1.25 House Type A-A1



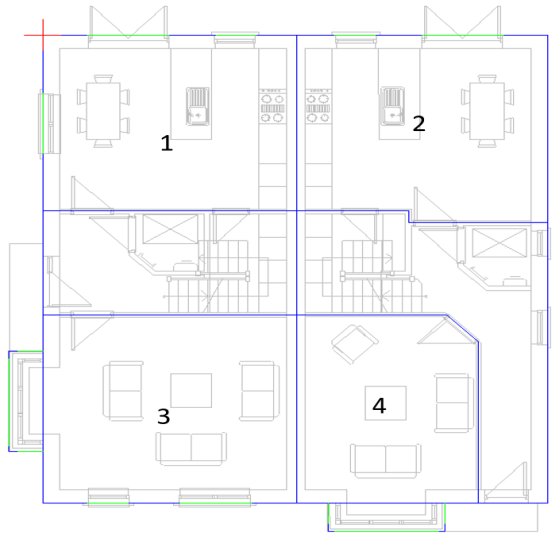
L00



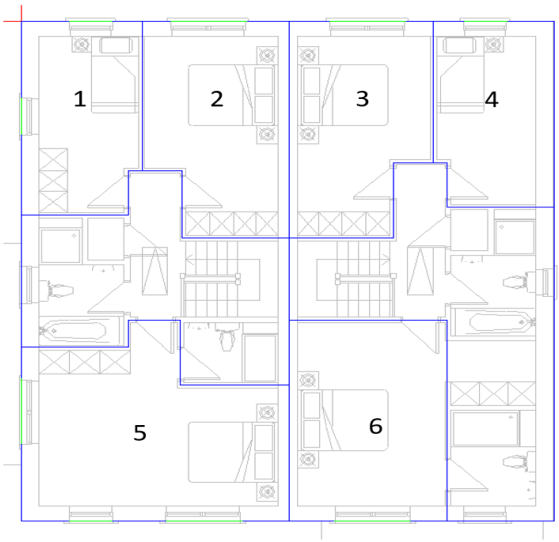
L01

Floor	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
L00	1	KD	2.00	✓	100	100	✓	100	✓
	2	KD	3.03	✓	100	100	✓	100	✓
	3	Living	2.08	✓	100	100	✓	100	✓
	4	Living	3.22	✓	100	100	✓	100	✓
L01	1	Bedroom	2.35	✓	100	100	✓	100	✓
	2	Bedroom	1.35	✓	100	100	✓	100	✓
	3	Bedroom	1.31	✓	87	100	✓	100	✓
	4	Bedroom	4.82	✓	100	100	✓	100	✓
	5	Bedroom	1.65	✓	100	100	✓	100	✓
	6	Bedroom	2.33	✓	100	100	✓	100	✓
	7	Bedroom	2.50	✓	100	100	✓	100	✓
	8	Bedroom	3.43	✓	100	100	✓	100	✓

14.1.26 House Type B1-B2



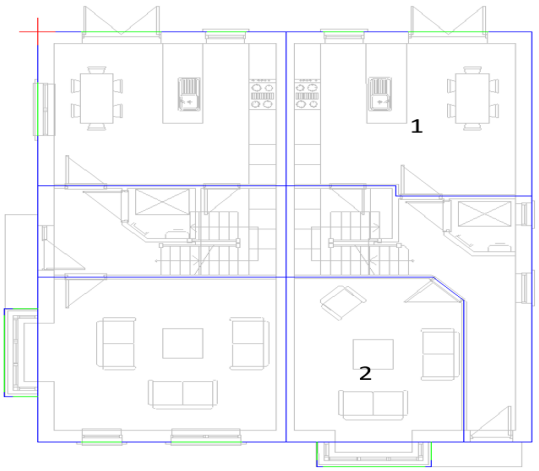
L00



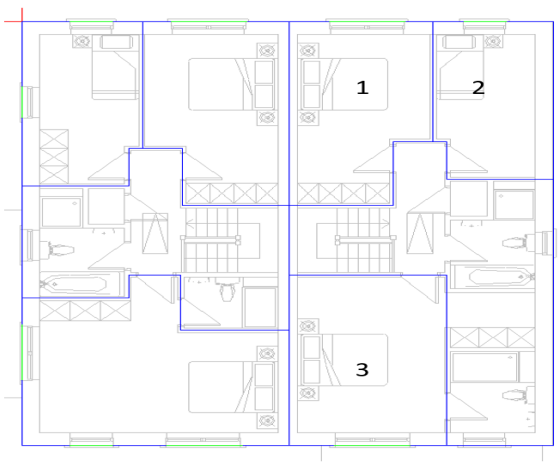
L01

Floor	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
L00	1	KD	4.60	✓	100	100	✓	100	✓
	2	KD	2.86	✓	100	100	✓	100	✓
	3	Living	3.79	✓	100	100	✓	100	✓
	4	Living	2.08	✓	100	100	✓	100	✓
L01	1	Bedroom	4.05	✓	100	100	✓	100	✓
	2	Bedroom	2.37	✓	100	100	✓	100	✓
	3	Bedroom	2.56	✓	100	100	✓	100	✓
	4	Bedroom	1.95	✓	100	100	✓	100	✓
	5	Bedroom	4.77	✓	100	100	✓	100	✓
	6	Bedroom	2.32	✓	100	100	✓	100	✓

14.1.27 House Type B2



L00



L01

Floor	Dup. No.	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
L00	B2-01	1	KD	2.93	✓	100	100	✓	100	✓
		2	Living	2.07	✓	100	100	✓	100	✓
L01	B2-01	1	Bedroom	2.42	✓	100	100	✓	100	✓
		2	Bedroom	1.99	✓	100	100	✓	100	✓
		3	Bedroom	2.13	✓	100	100	✓	100	✓
L00	B2-02	1	KD	2.64	✓	100	100	✓	100	✓
		2	Living	2.05	✓	100	100	✓	100	✓
L01	B2-02	1	Bedroom	2.46	✓	100	100	✓	100	✓
		2	Bedroom	1.92	✓	100	100	✓	100	✓
		3	Bedroom	2.18	✓	100	100	✓	100	✓
L00	B2-03	1	KD	2.49	✓	100	100	✓	100	✓
		2	Living	2.03	✓	100	100	✓	100	✓
L01	B2-03	1	Bedroom	2.27	✓	100	100	✓	100	✓
		2	Bedroom	1.74	✓	93	100	✓	100	✓
		3	Bedroom	2.14	✓	100	100	✓	100	✓

Floor	Dup. No.	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
L00	B2-04	1	KD	2.23	✓	100	100	✓	100	✓
		2	Living	2.04	✓	100	100	✓	100	✓
L01	B2-04	1	Bedroom	2.39	✓	100	100	✓	100	✓
		2	Bedroom	1.88	✓	100	100	✓	100	✓
		3	Bedroom	2.21	✓	100	100	✓	100	✓
L00	B2-05	1	KD	2.38	✓	100	100	✓	100	✓
		2	Living	2.03	✓	100	100	✓	100	✓
L01	B2-05	1	Bedroom	2.21	✓	100	100	✓	100	✓
		2	Bedroom	1.77	✓	100	100	✓	100	✓
		3	Bedroom	2.15	✓	100	100	✓	100	✓
L00	B2-06	1	KD	2.55	✓	100	100	✓	100	✓
		2	Living	2.05	✓	100	100	✓	100	✓
L01	B2-06	1	Bedroom	2.35	✓	100	100	✓	100	✓
		2	Bedroom	1.83	✓	100	100	✓	100	✓
		3	Bedroom	2.29	✓	100	100	✓	100	✓
L00	B2-07	1	KD	2.72	✓	100	100	✓	100	✓
		2	Living	2.04	✓	63	100	✓	100	✓
L01	B2-07	1	Bedroom	2.44	✓	100	100	✓	100	✓
		2	Bedroom	1.92	✓	100	100	✓	100	✓
		3	Bedroom	2.16	✓	100	100	✓	100	✓
L00	B2-08	1	KD	2.85	✓	100	100	✓	100	✓
		2	Living	2.14	✓	100	100	✓	100	✓
L01	B2-08	1	Bedroom	2.49	✓	100	100	✓	100	✓
		2	Bedroom	1.94	✓	100	100	✓	100	✓
		3	Bedroom	1.85	✓	96	100	✓	100	✓

Floor	Dup. No.	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
L00	B2-09	1	KD	2.81	✓	100	100	✓	100	✓
		2	Living	2.11	✓	100	100	✓	100	✓
L01	B2-09	1	Bedroom	2.51	✓	100	100	✓	100	✓
		2	Bedroom	2	✓	100	100	✓	100	✓
		3	Bedroom	1.79	✓	100	100	✓	100	✓

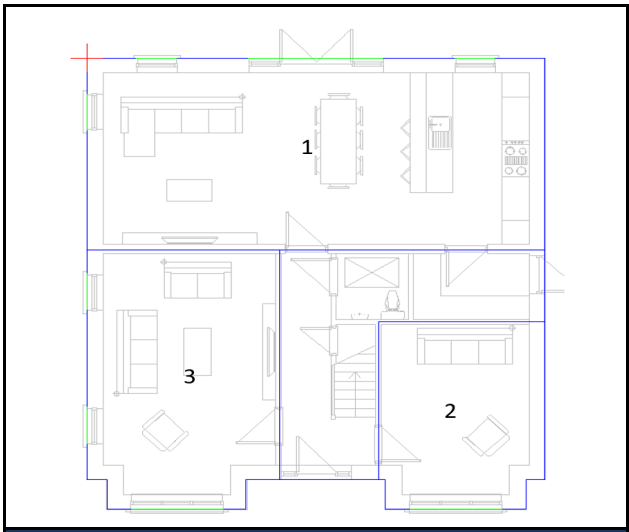
14.1.28 House Type CD

Floor	Dup. No.	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
L00	D-01	1	LKD	4.11	✓	100	100	✓	100	✓
		2	Living	3.36	✓	100	100	✓	100	✓
	C-01	3	KD	3.92	✓	100	100	✓	100	✓
		4	Living	3.48	✓	100	100	✓	100	✓
L01	D-01	1	Bedroom	2.42	✓	100	100	✓	100	✓
		2	Bedroom	1.99	✓	100	100	✓	100	✓
		3	Bedroom	2.13	✓	100	100	✓	100	✓
		4	Bedroom	2.49	✓	100	100	✓	100	✓

Floor	Dup. No.	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
	C-01	5	Bedroom	4.13	✓	100	100	✓	100	✓
		6	Bedroom	2.35	✓	100	100	✓	100	✓
		7	Bedroom	2.42	✓	100	100	✓	100	✓
L00	D-02	1	LKD	3.47	✓	100	100	✓	100	✓
		2	Living	3.21	✓	100	100	✓	100	✓
	C-02	3	KD	3.82	✓	100	100	✓	100	✓
		4	Living	3.47	✓	100	100	✓	100	✓
L01	D-02	1	Bedroom	1.64	✓	95	100	✓	100	✓
		2	Bedroom	3.83	✓	100	100	✓	100	✓
		3	Bedroom	2.24	✓	100	100	✓	100	✓
		4	Bedroom	2.28	✓	100	100	✓	100	✓
	C-02	5	Bedroom	2.52	✓	100	100	✓	100	✓
		6	Bedroom	2.25	✓	100	100	✓	100	✓
		7	Bedroom	2.45	✓	100	100	✓	100	✓
L00	D-03	1	LKD	4.22	✓	100	100	✓	100	✓
		2	Living	2.97	✓	100	100	✓	100	✓
	C-03	3	KD	3.69	✓	100	100	✓	100	✓
		4	Living	3.52	✓	100	100	✓	100	✓
L01	D-03	1	Bedroom	2.64	✓	100	100	✓	100	✓
		2	Bedroom	4.17	✓	100	100	✓	100	✓
		3	Bedroom	2.35	✓	100	100	✓	100	✓
		4	Bedroom	2.38	✓	100	100	✓	100	✓
	C-03	5	Bedroom	2.61	✓	100	100	✓	100	✓
		6	Bedroom	2.34	✓	100	100	✓	100	✓
		7	Bedroom	2.53	✓	100	100	✓	100	✓
L00	D-04	1	LKD	3.81	✓	100	100	✓	100	✓
		2	Living	2.93	✓	100	100	✓	100	✓
	C-04	3	KD	3.50	✓	100	100	✓	100	✓
		4	Living	2.85	✓	100	100	✓	100	✓

Floor	Dup. No.	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
L01	D-04	1	Bedroom	2.58	✓	100	100	✓	100	✓
		2	Bedroom	3.52	✓	100	100	✓	100	✓
		3	Bedroom	1.85	✓	100	100	✓	100	✓
		4	Bedroom	1.87	✓	100	100	✓	100	✓
	C-04	5	Bedroom	2.05	✓	100	100	✓	100	✓
		6	Bedroom	1.86	✓	90	100	✓	100	✓
		7	Bedroom	1.99	✓	100	100	✓	100	✓
L00	D-05	1	LKD	4.11	✓	100	100	✓	100	✓
		2	Living	3.28	✓	100	100	✓	100	✓
	C-05	3	KD	3.97	✓	100	100	✓	100	✓
		4	Living	3.65	✓	100	100	✓	100	✓
L01	D-05	1	Bedroom	2.53	✓	100	100	✓	100	✓
		2	Bedroom	4.07	✓	94	100	✓	100	✓
		3	Bedroom	2.39	✓	96	100	✓	100	✓
		4	Bedroom	2.43	✓	100	100	✓	100	✓
	C-05	5	Bedroom	2.68	✓	100	100	✓	100	✓
		6	Bedroom	2.38	✓	90	100	✓	100	✓
		7	Bedroom	2.56	✓	100	100	✓	100	✓

14.1.29 House Type E

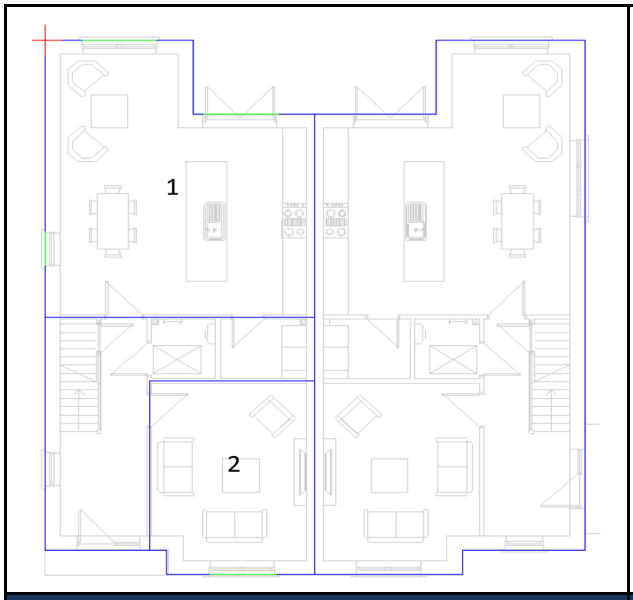


L00

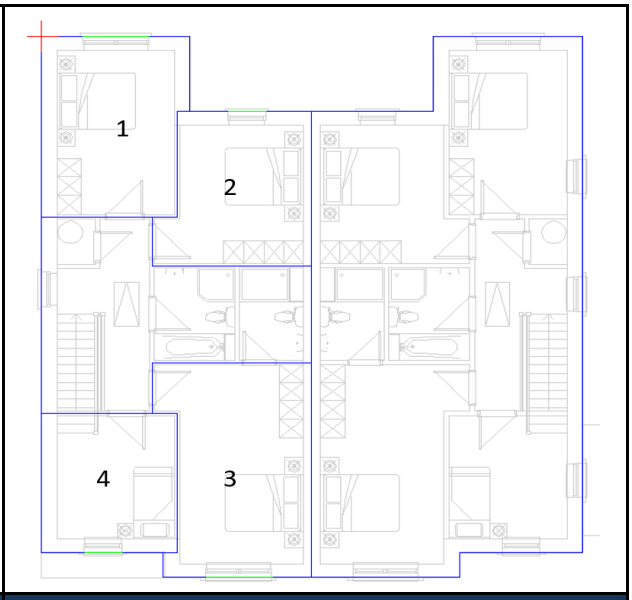
L01

Floor	Dup. No.	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
L00	E	1	LKD	2.83	✓	100	100	✓	100	✓
		2	Living	3.07	✓	100	100	✓	100	✓
		3	Living	3.25	✓	100	100	✓	100	✓
L01	E	1	Bedroom	2.01	✓	100	100	✓	100	✓
		2	Bedroom	2.11	✓	100	100	✓	100	✓
		3	Bedroom	2.58	✓	100	100	✓	100	✓
		4	Bedroom	2.05	✓	100	100	✓	100	✓
		5	Bedroom	2.01	✓	100	100	✓	100	✓

14.1.30 House Type F



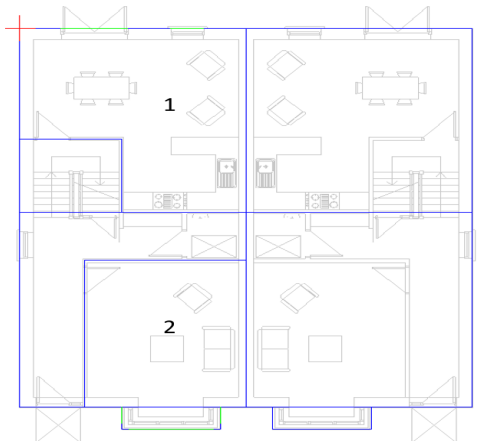
L00



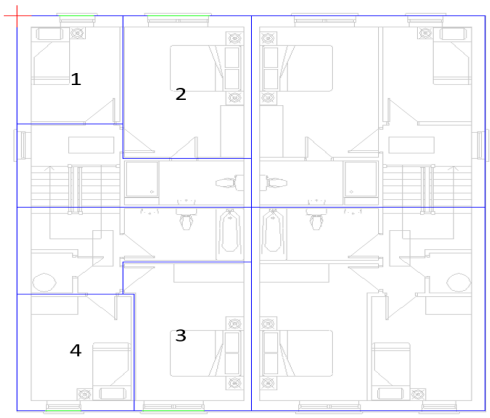
L01

Floor	Dup. No.	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
L00	F	1	LKD	2.29	✓	100	100	✓	100	✓
		2	Living	2.10	✓	100	100	✓	100	✓
L01	F	1	Bedroom	2.39	✓	100	100	✓	100	✓
		2	Bedroom	1.39	✓	100	100	✓	100	✓
		3	Bedroom	1.93	✓	100	100	✓	100	✓
		4	Bedroom	1.93	✓	100	100	✓	100	✓

14.1.31 House Type G1



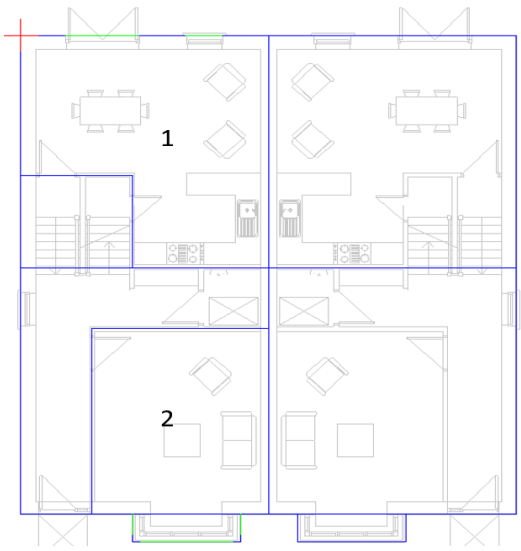
L00



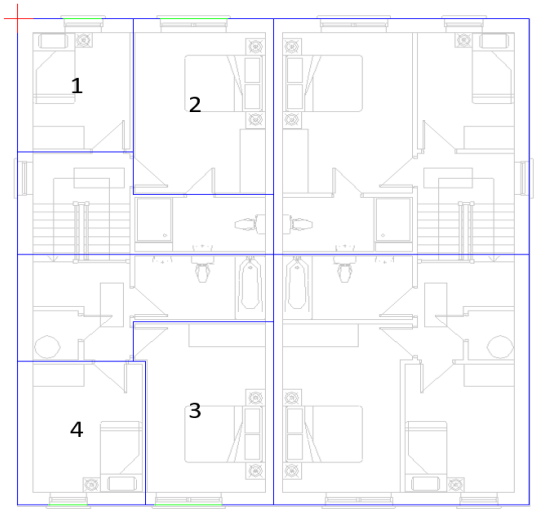
L01

Floor	Dup. No.	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
L00	G1-01	1	KD	2.11	✓	100	100	✓	100	✓
		2	Living	2.13	✓	100	100	✓	100	✓
L01	G1-01	1	Bedroom	2.18	✓	100	100	✓	100	✓
		2	Bedroom	2.14	✓	100	100	✓	100	✓
		3	Bedroom	2.29	✓	100	100	✓	100	✓
L00	G1-02	1	KD	2.18	✓	100	100	✓	100	✓
		2	Living	2.02	✓	100	100	✓	100	✓
L01	G1-02	1	Bedroom	2.22	✓	100	100	✓	100	✓
		2	Bedroom	2.20	✓	100	100	✓	100	✓
		3	Bedroom	2.22	✓	100	100	✓	100	✓

14.1.32 House Type G2



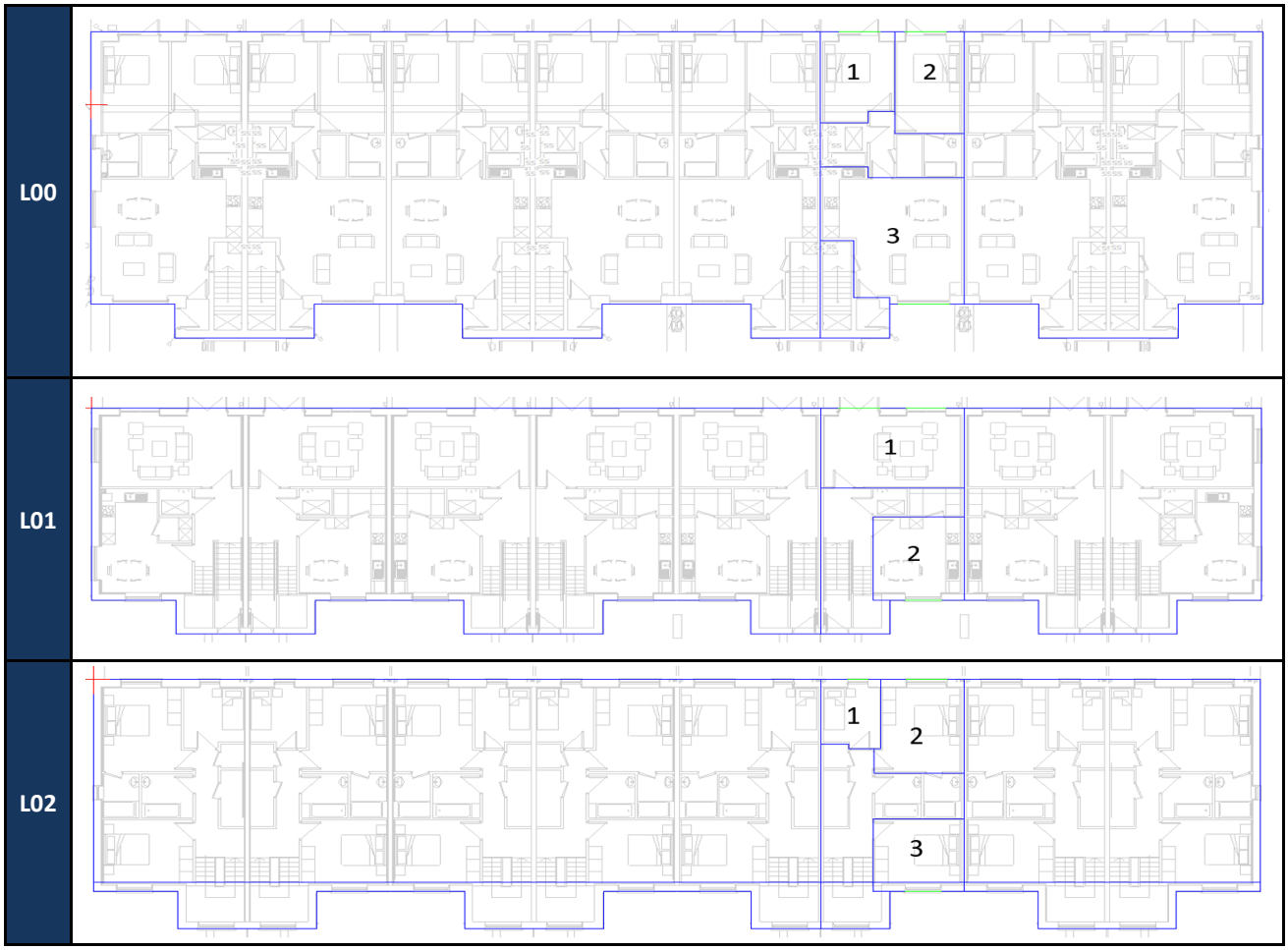
L00



L01

Floor	Dup. No.	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
L00	G2	1	KD	2.86	✓	100	100	✓	100	✓
		2	Living	2.00	✓	100	100	✓	100	✓
L01	G2	1	Bedroom	2.44	✓	100	100	✓	100	✓
		2	Bedroom	2.45	✓	100	100	✓	100	✓
		3	Bedroom	2.15	✓	100	100	✓	100	✓
		4	Bedroom	1.76	✓	86	100	✓	100	✓

14.1.33 Duplex AB



Floor	Dup. No.	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
L00	AB-01	1	Bedroom	3.19	✓	100	100	✓	100	✓
		2	Bedroom	2.75	✓	100	100	✓	100	✓
		3	LKD	2.14	✓	86	100	✓	100	✓
L01	AB-01	1	Living	3.95	✓	100	100	✓	100	✓
		2	KD	2.68	✓	100	100	✓	100	✓
L02	AB-01	1	Bedroom	2.66	✓	100	100	✓	100	✓
		2	Bedroom	3.14	✓	100	100	✓	100	✓
		3	Bedroom	3.32	✓	100	100	✓	100	✓

Floor	Dup. No.	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
L00	AB-02	1	Bedroom	2.61	✓	100	100	✓	100	✓
		2	Bedroom	2.24	✓	100	100	✓	100	✓
		3	LKD	2.23	✓	100	100	✓	100	✓
L01	AB-02	1	Living	3.58	✓	100	100	✓	100	✓
		2	KD	2.75	✓	100	100	✓	100	✓
L02	AB-02	1	Bedroom	2.47	✓	100	100	✓	100	✓
		2	Bedroom	2.91	✓	100	100	✓	100	✓
		3	Bedroom	3.37	✓	100	100	✓	100	✓

15 Appendix B - Alternative ADF Design Value for Combined Living, Kitchen and Dining Spaces

In addition to the compensatory measures outlined above there is also the discussion that centres around the space activity itself with regards to Living/Kitchen/Dining areas.

For combined Living/Kitchen/Dining areas, the living area is typically treated as the main area of activity, with the kitchen being placed at the back of the space. This design decision is understandable as the kitchen area is typically a transient space as its primary functional purpose is to serve as a food preparation area. Additionally, not every space within a commercially viable apartment development can be in direct connection with an exterior elevation, making the kitchen the obvious choice for this position given that it is a transient space that will require supplementary electric lighting.

As stated in Section 2.1.14 of the BRE Guide: *"Non-daylit internal kitchens should be avoided wherever possible, especially if the kitchen is used as a dining area too. If the layout means that a small internal galley-type kitchen is inevitable, it should be directly linked to a well daylit living room".*

Modern architectural design maximises the space function by creating open Living/Dining/Kitchen areas. Where previously solid partition walls may have existed to separate these functions, they are now removed to help maximise an open space that creates a more flexible and larger feeling habitable environment.

Therefore, where a kitchen may have been closed off into a cellular space with no access to daylight, the kitchen can now take advantage of daylight distribution from the adjoining living/dining area. Kitchen environments will still typically rely on artificial light, primarily for detail and safety precautions whilst preparing meals, but with this open layout form they will capture daylight that previously would not be available and which will help reduce artificial lighting needs at suitable times. This in turn helps to reduce electrical energy consumption. With the kitchen positioned at the back of the space where artificial lighting will typically be required, then aspiring to achieve daylight contribution should be seen as the goal and not measuring it to fixed requirements. As the kitchen is typically a transient space, the daylight benefit is primarily to the Living and Dining areas which are more frequently occupied.

Having regard for the need to comply with additional requirements of the Design Standards for New Apartments (Dec 2020) such as the provision of balconies (which reduce daylight within apartments as noted within the BRE Guide) as well as the layout of the apartments with respect to Kitchens as discussed above, achieving a 1.5% ADF design value can be considered reasonable for Living/Kitchen/Dining areas. Although the design value is lower, this is compensated by the provision of a valued outdoor private amenity for occupants.

Based on all the above justification, the Living/Kitchen/Dining spaces as noted were also assessed against an alternative 1.5% ADF design value with the results outlined in the following section in detail.

15.1 Alternative 1.5% Design Value Results

The overall daylight provision results for the total development against an alternative 1.5% are summarised in the tables below. The duplexes and housing property types were already exceeding the minimum requirements at the 2% target. As such the tables for these properties have not been included within this section as they will be the same, but have been accounted for in the overall totals.

A1

BRE Guide / BS 8206:2008 LKDs Assessed Against Alternative 1.5% ADF Design Value				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	70	100%	0	0%
No. LKDs	38	95%	2	5%
Total No.	**108**	**98%**	**2**	**2%**

A2

BRE Guide / BS 8206:2008 LKDs Assessed Against Alternative 1.5% ADF Design Value				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	54	100%	0	0%
No. LKDs	27	90%	3	10%
Total No.	**81**	**96%**	**3**	**4%**

B1

BRE Guide / BS 8206:2008 LKDs Assessed Against Alternative 1.5% ADF Design Value				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	54	100%	0	0%
No. LKDs	32	100%	0	100%
Total No.	**86**	**100%**	**0**	**0%**

B2

BRE Guide / BS 8206:2008 LKDs Assessed Against Alternative 1.5% ADF Design Value				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	47	100%	0	0%
No. LKDs	24	89%	1	11%
Total No.	**71**	**96%**	**1**	**4%**

C1

BRE Guide / BS 8206:2008 LKDs Assessed Against Alternative 1.5% ADF Design Value				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	69	100%	1	0%
No. LKDs	38	95%	2	5%
Total No.	**108**	**98%**	**2**	**2%**

C2

BRE Guide / BS 8206:2008 LKDs Assessed Against Alternative 1.5% ADF Design Value				
Room Type	**Pass (No.)**	**Pass (%)**	**Fail (No.)**	**Fail (%)**
No. Bedrooms	61	100%	0	0%
No. LKDs	31	91%	3	9%
Total No.	**92**	**97%**	**3**	**3%**

Total for The Development

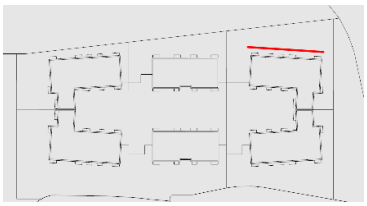
As noted previously, the duplexes and housing property types were already exceeding the minimum requirements at the 2% target. As such the tables for these properties have not been included within this section as they will be the same, but have been accounted for in the overall totals.

The overall daylight provision results for the total development against an alternative 1.5% design value are summarised as follows. A 98% compliance rate is achieved when LKDs are assessed against this alternative 1.5% design value. Overall the quality of daylight provision across the development is high, with the majority of rooms that are below recommendation located on the lower floors of the apartments.

16 Appendix C – 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.

16.1.1 Block A1 – View 1

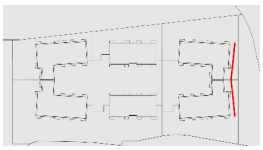


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

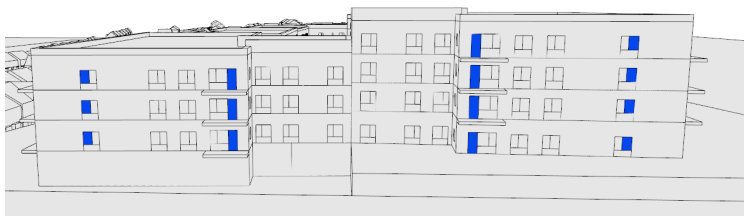
20 out of 20 windows passing

16.1.2 Blocks A1/A2 – View 2



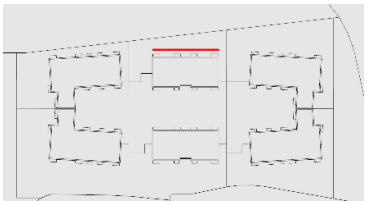
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



0 out of 7 windows passing

16.1.3 Block B1 – View 3

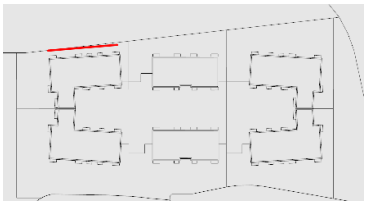


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

16 out of 16 windows passing

16.1.4 Block C1 – View 4

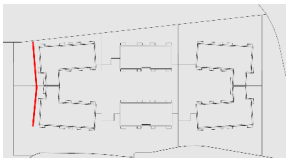


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

20 out of 20 windows passing

16.1.5 Blocks C1/C2 – View 5

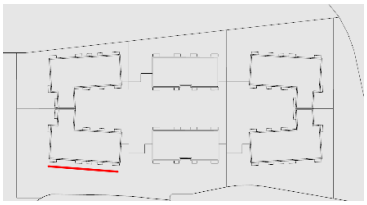


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

14 out of 14 windows passing

16.1.6 Block C2 – View 6

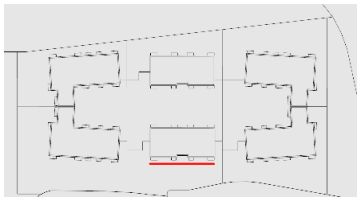


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

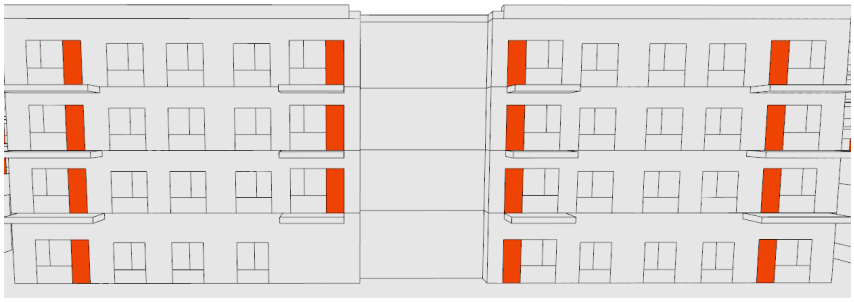
19 out of 19 windows passing

16.1.1 Block B2 – View 7



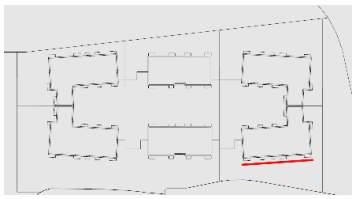
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



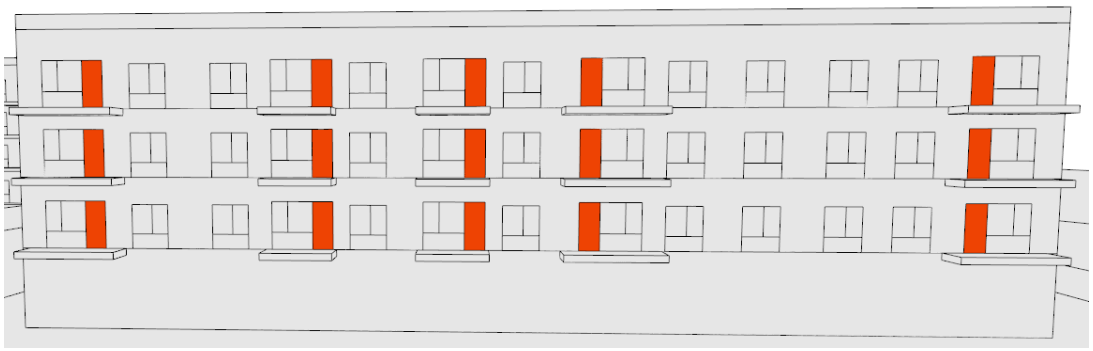
15 out of 15 windows passing

16.1.2 Block A2 – View 8



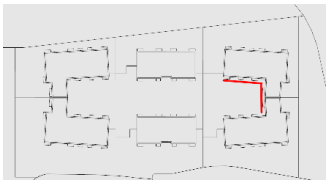
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



15 out of 15 windows passing

16.1.3 Block A1/A2 – View 9

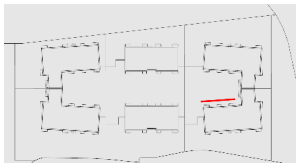


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

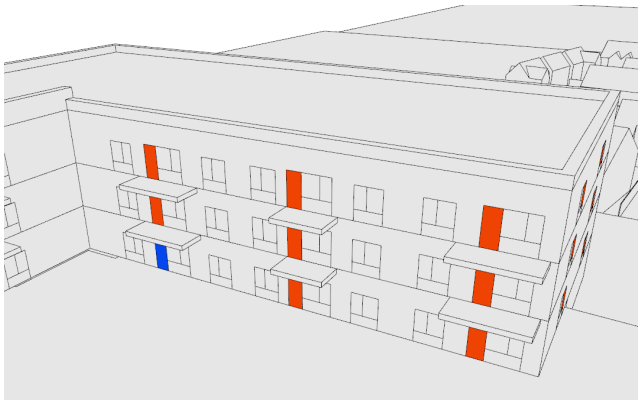
19 out of 19 windows passing

16.1.4 Block A2 – View 10



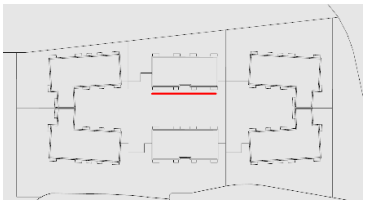
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



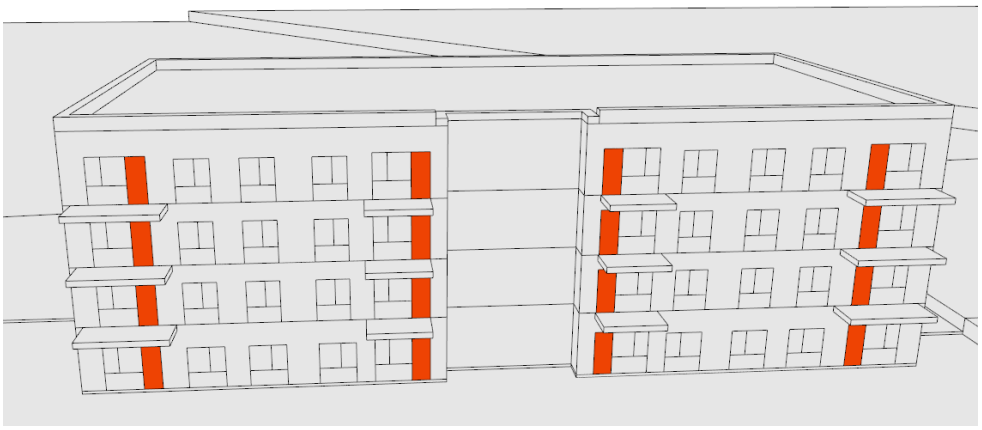
8 out of 9 windows passing

16.1.5 Block B1 – View 11



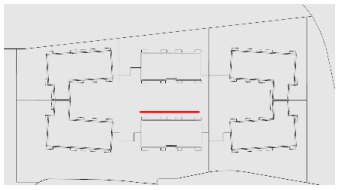
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



16 out of 16 windows passing

16.1.6 Block B2 – View 12

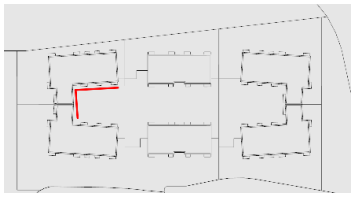


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

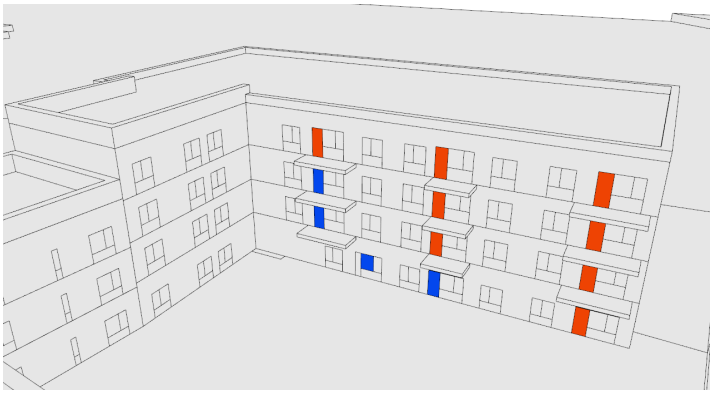
11 out of 12 windows passing

16.1.7 Block C1/C2 – View 13



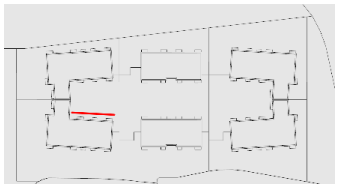
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



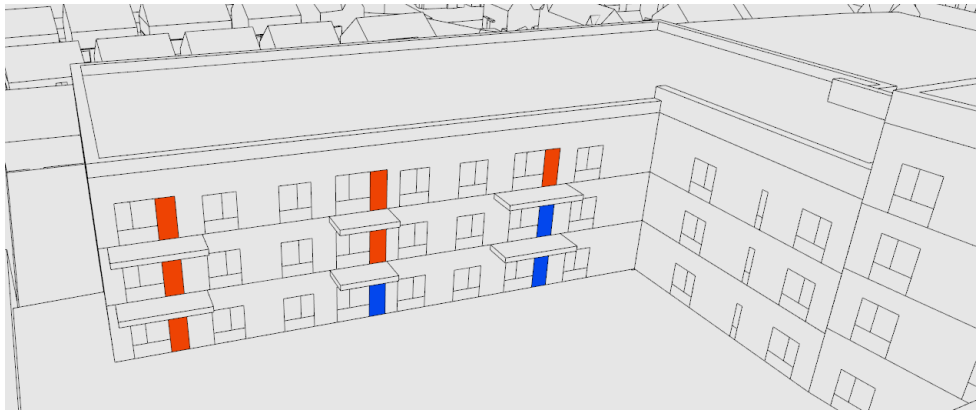
8 out of 12 windows passing

16.1.8 Block C2 – View 14



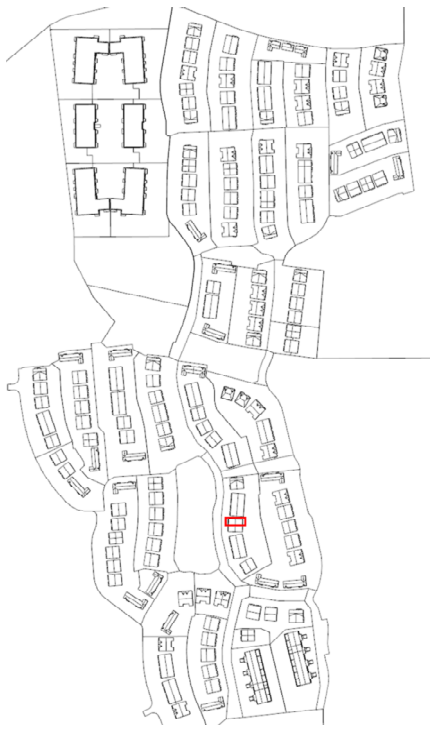
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



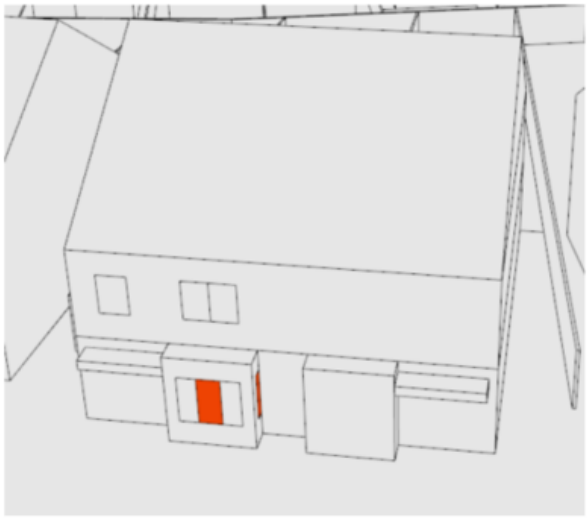
6 out of 9 windows passing

16.1.1 Type A-A



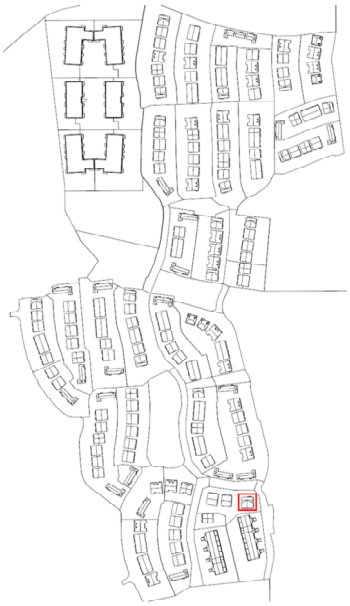
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



2 out of 2 windows passing

16.1.1 Type A-A1

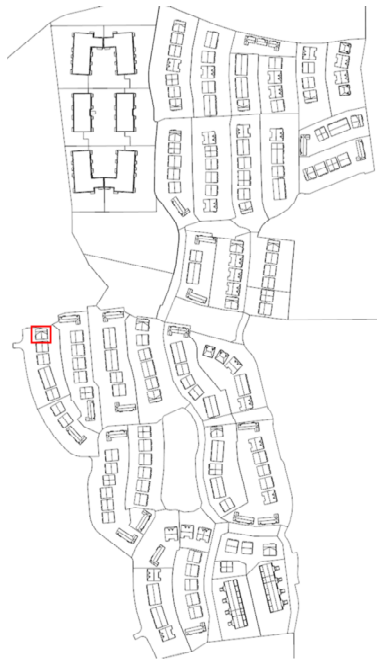


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

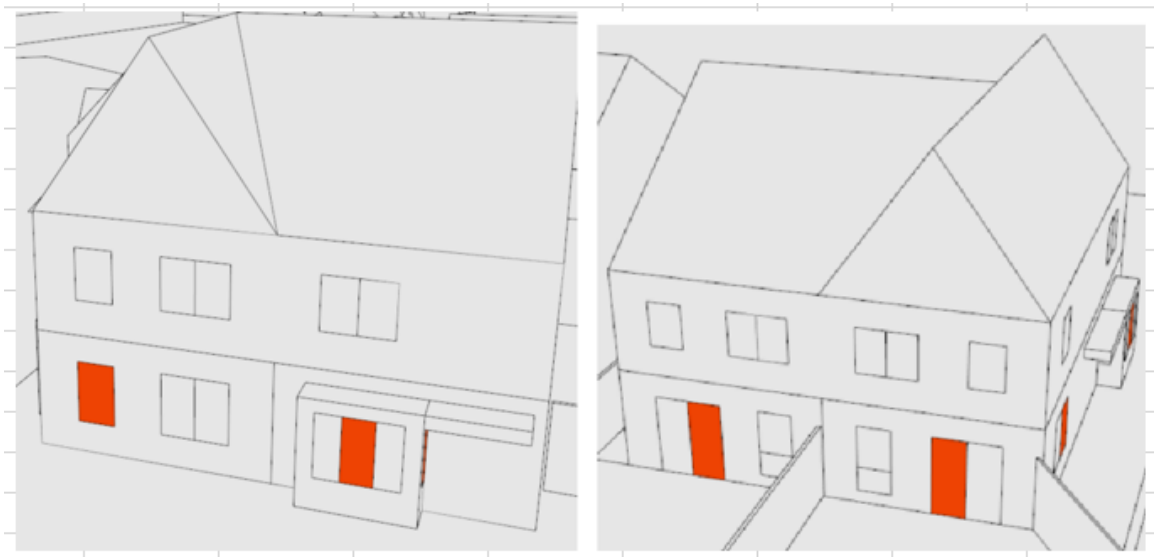
2 out of 2 windows passing

16.1.1 Type B1-B2



Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

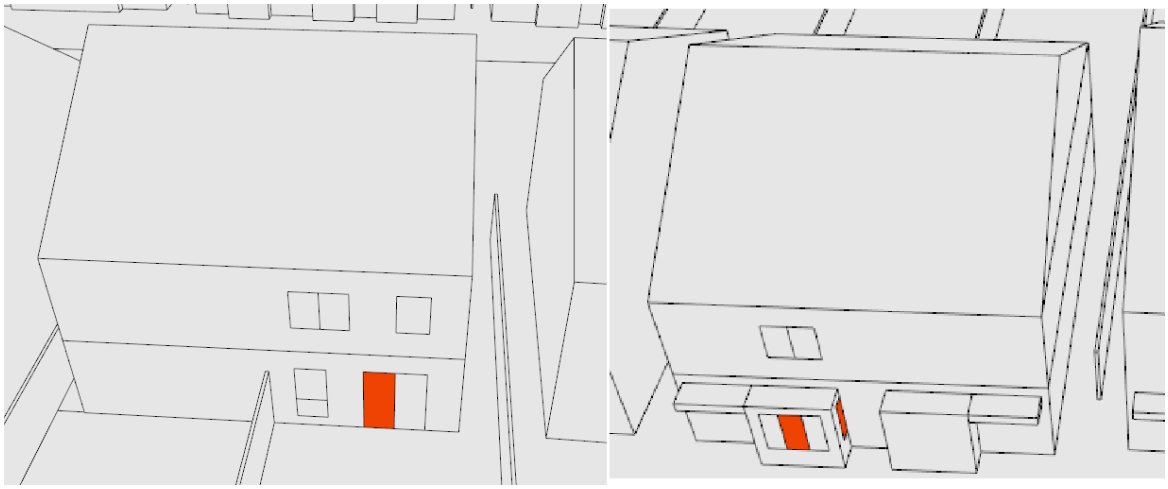


4 out of 4 windows passing

16.1.1 Type B2

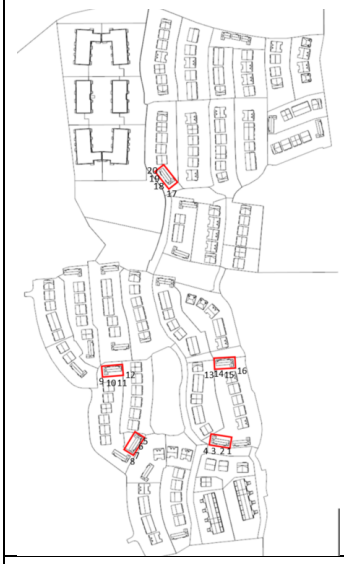
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



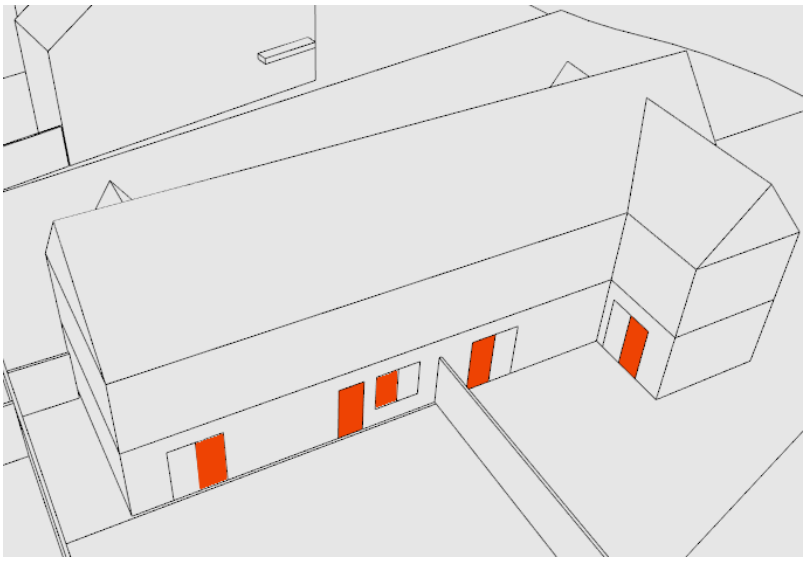
18 out of 18 windows passing

16.1.1 Type CD



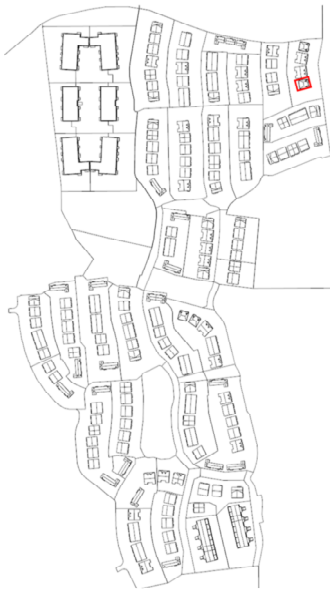
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



20 out of 20 windows passing

16.1.1 Type E

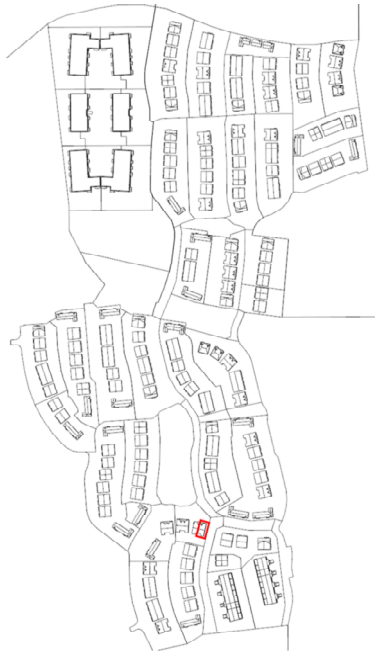


Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

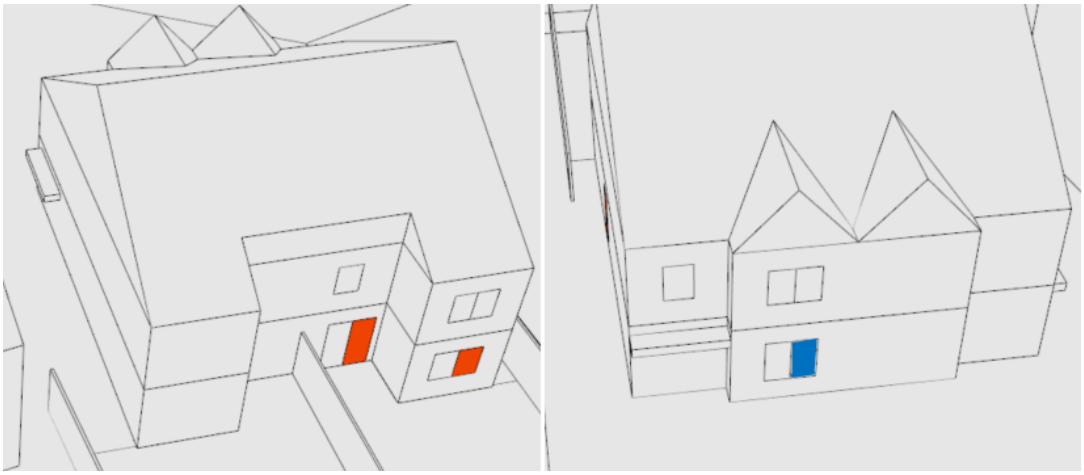
3 out of 3 windows passing

16.1.1 Type F



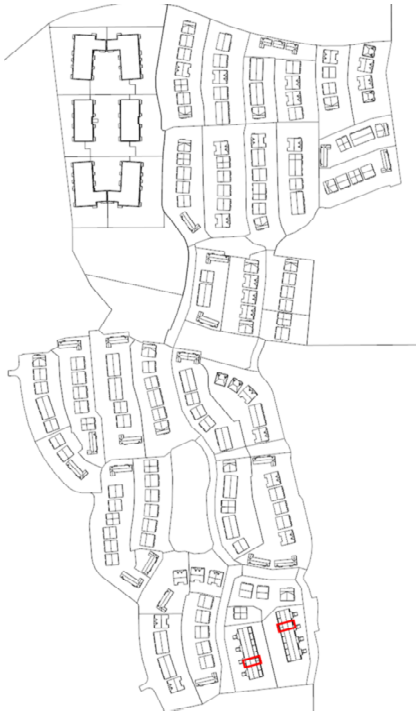
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



2out of 3 windows passing

16.1.2 Duplex AB



Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

4out of 6 windows passing


IES