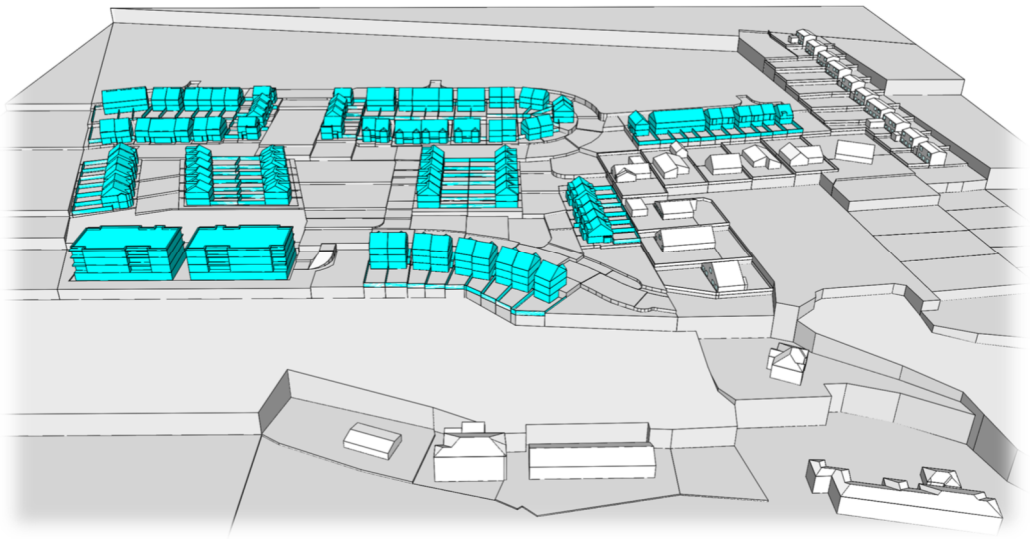
Monacnapa, Blarney, Cork

Daylight, Sunlight and Overshadowing Study



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1 Executive Summary

This report summarises the daylight, sunlight and overshadowing study undertaken for the proposed Monacnapa, Blarney, Cork development. The report focuses on measuring the daylight and sunlight impact of the proposed development when compared to the existing situation. The report also focuses on the proposed design. The following can be concluded based on the analysis undertaken.

1.1 Daylight Analysis of Existing Buildings

This study considers the proposed scheme and tests if the VSC results are greater than either 27% or 0.8 times their former value (that of the existing situation). Of the 105 points tested 100% (105 points) exceed the BRE requirements.

1.2 Shadow Analysis

The shadow analysis illustrates different shadows being cast at three key times of the year (March 21st, June 21st and December 21st) for the existing scenario and then with the proposed development in place. It should be noted that sunlight is less prevalent during the winter months and as such the impact of overshadowing will be greatly reduced. Taking this into account, the overall impact of overshadowing can be classed as a negligible adverse impact given the position of the site to the west in relation to the existing buildings and the low-rise nature of the proposed development.

1.3 Sunlight to Existing and Proposed Amenity Spaces

All existing neighbouring amenities adjacent to the development site have been analysed in both the existing and proposed scenarios. The results highlight that in the proposed context the sunlight received in the neighbouring amenities continues to be the same, for the majority of the dwellings, as the existing scenario when measured against the 2 hours of sunlight on the 21st of March. Only two gardens have a negligible difference of 1% and 3%, thus all areas complying with BRE Guidelines.

On the 21st of March, the majority of the proposed garden amenity areas situated within the development site will receive at least 2 hours of sunlight on complying with the BRE recommendations. Of those that do not comply (23 of 109) it is simply as a result of their north facing position in relation to the proposed dwellings that they belong to.

Although this is the case on the 21st of March, the proposed public amenity areas provided within the development site will receive at least 2 hours of sunlight on 98% of their combined area, thus exceeding BRE recommendations.

The results included confirm these amenity areas will be quality spaces in terms of sunlight access.

1.4 Average Daylight Factors

Across the proposed development, 100% of the tested rooms in the Apartment Buildings and the Homes are achieving Average Daylight Factors (ADF) above the BRE and BS 8206-2:2008 guidelines when Living/Kitchen/Dining or Kitchen/Dining spaces are assessed as whole rooms against a 2% target.

1.5 Observations

It should be noted that the guidance in the BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice' is not mandatory and the 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'*.

Whilst the results shown relate to the criteria as laid out in the BRE guidance targets it is important to note that the BRE targets have been drafted primarily for use in low density suburban development and should therefore be used with flexibility and caution when dealing other types of sites. Despite the above, the site performs well in relation to the metrics considered in this report.

In addition, the BS 8206-2:2008 it also notes, "*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.*"

The approach within this report is further supported by the national policy guidance noted in the Sustainable Urban Housing: Design Standards for New Apartments, Section 6.7 which states:

"*Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to 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*."

Taking all of the above information into account, overall the results demonstrate that the proposed development performs well when compared to the BRE recommendations in the BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" by Paul Littlefair, 2011 sometimes referred to as BRE Digest 209 and the "BS 8206-2:2008: Lighting for Buildings - Part 2: Code of Practice for Daylighting".

2 Introduction

This report summarises the daylight, sunlight and overshadowing study undertaken for the proposed Monacnapa, Blarney Cork development.

2.1 Analysis Performed

The focus of the study considers the following items with respect to the proposed new development:

- **Daylight Analysis of Existing Buildings** - via consideration of the Vertical Sky Component (VSC) results.
  Shadow Analysis - A visual representation analysing any potential changes that may arise to the neighbouring existing developments when comparing the existing scenario to the scenario with the proposed development in place.
- **Sunlight to Existing and Proposed Amenity Spaces** – via sunlight hours simulation.
- **Average Daylight Factors**: via consideration of the Average Daylight Factor (ADF) for the proposed development.

The analysis was completed using the IES VE software.

The assessment is based on recommendations outlined in the BRE *'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice*' guide (BRE Guide) which is also referred to as BRE 209.

2.2 Development Description

Eoin Sheehan intends to apply to An Bord Pleanála for permission for a strategic housing development at a site at Monacnapa, Blarney, Cork. The proposed development will consist of a strategic housing development of 143no. residential units (8no. 1-bed; 38no. 2-bed; 71no. 3-bed; and 26no. 4-bed units), comprising 105no. houses (3no. detached; 42no. semi-detached; and 60no. terraced units) and 38no. apartments. The proposed development will also consist of the demolition of an existing garage and southern boundary wall, to be replaced with a new southern boundary wall, as well as the lowering of the existing eastern boundary wall and pier, at no. 1 Sunberry Drive; a crèche; all associated ancillary site development and landscaping works, to include bin stores, bicycle and car parking, ground works and retaining structures, foul drainage, stormwater drainage, water supply, service ducting and cabling, public lighting, relocation of existing ESB substation, and all boundary treatments. The proposed development is to be accessed via the existing Sunberry Heights/Sunberry Drive off the Blarney Relief Road (R617). An upgrade is proposed to the existing Sunberry Heights/Sunberry Drive and the existing access to the proposed strategic housing development, including the widening of the footpath at the junction with the Blarney Relief Road (R617), raised platforms, security barriers and fencing as necessary, road markings, and road resurfacing to facilitate improved pedestrian/cycle connectivity.

3 Geometry

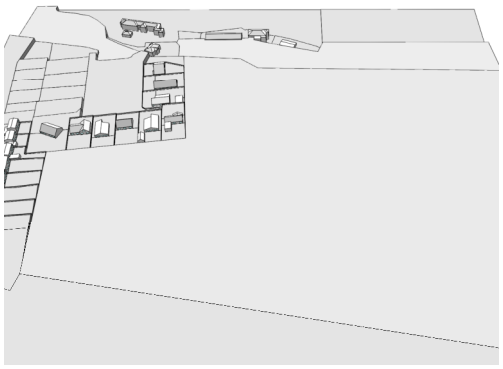
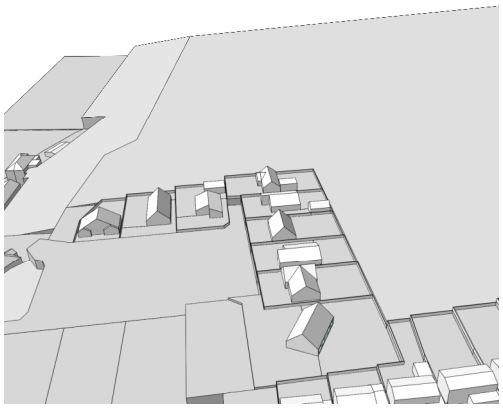
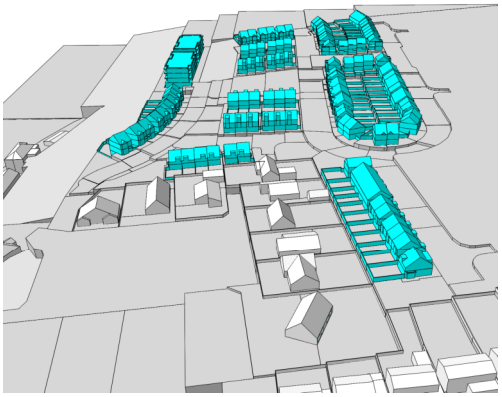
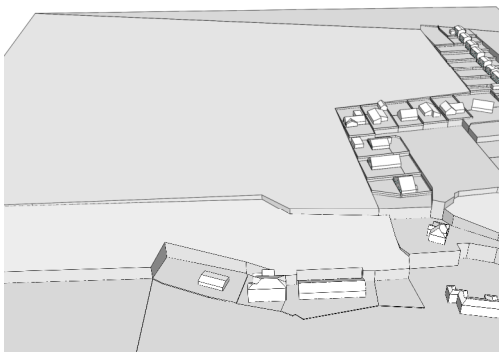
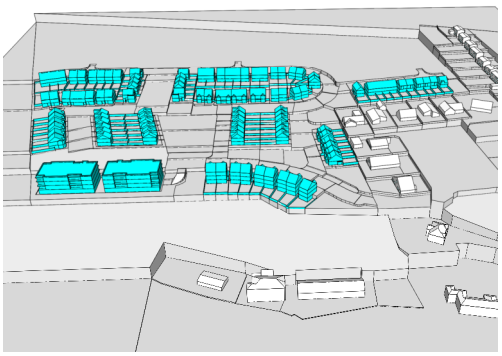
3.1 Orientation

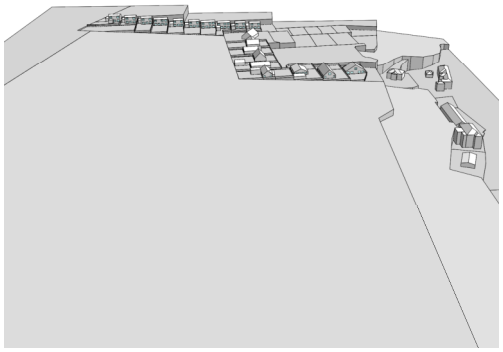
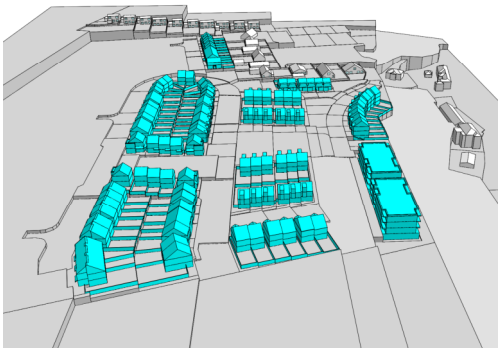
The model orientation has been taken from the drawings provided by the Architect, with the resulting angle shown below used in the analysis.

Orientation	
	
	

3.2 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 Development	Proposed Development
View looking from North of Site		
View looking from East of Site		
View looking from South of Site		

View looking from West of Site		

3.3 Potential Sensitive Receptors

To help understand the proposed development's impact on surrounding buildings, potential sensitive receptors were identified as illustrated below.

Potential Sensitive Receptors

	Site Boundary
	14-22A Castleowen Hilltop
	1-9 Sunberry Dr

4 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 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.

4.1 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)*

5 Daylight Analysis of Existing Buildings

5.1 Guidance Requirements

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. Any reduction in the total amount of skylight can be calculated by determining the vertical sky component at the centre of key reference points. The vertical sky component definition from the BRE guide is described below:

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

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

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

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

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

5.2 Assessment

Based on the methodology outlined above, the following locations have been modelled and analysed:

5.2.1 View 1: 1-3 Sunberry Dr.

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
1	28.06	27.84	99%	✓
2	23.69	23.89	100%	✓

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
3	12.41	12.36	100%	✓
4	27.86	27.93	100%	✓
5	29.78	30.04	100%	✓
6	31.56	30.98	98%	✓
7	33.86	32.79	97%	✓
8	35.36	33.65	95%	✓
9	36.22	34.07	94%	✓
10	17.52	17.66	100%	✓
11	16.88	17.06	100%	✓
12	16.38	16.76	100%	✓
13	16.48	16.22	98%	✓
14	15.75	15.69	100%	✓
15	15.00	14.96	100%	✓
16	35.23	31.98	91%	✓
17	38.53	35.50	92%	✓
18	38.86	36.45	94%	✓
19	38.83	37.90	98%	✓
20	35.08	34.35	98%	✓
21	37.22	36.49	98%	✓
22	38.32	37.30	97%	✓
23	38.57	37.61	98%	✓

The following conclusions can be made:

✓ The points tested have a VSC value greater than 27%, or their VSC value is greater than 0.8 times their former value, with the proposed development in place. Therefore, these points exceed BRE recommendations.

5.2.2 View 2: 4-6 Sunberry Dr.

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
1	36.21	30.91	85%	✓
2	36.32	31.07	86%	✓
3	36.05	31.26	87%	✓
4	33.36	28.35	85%	✓
5	34.67	29.36	85%	✓
6	35.27	29.78	84%	✓

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
7	36.07	30.02	83%	✓
8	36.38	30.41	84%	✓
9	36.69	30.90	84%	✓
10	31.69	30.39	96%	✓
11	36.84	34.35	93%	✓
12	38.91	35.99	92%	✓
13	38.97	35.70	92%	✓

The following conclusions can be made:

✓ The points tested have a VSC value greater than 27%, or their VSC value is greater than 0.8 times their former value, with the proposed development in place. Therefore, these points exceed BRE recommendations.

5.2.3 View 3: 7-9 Sunberry Dr.

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
1	34.16	33.80	99%	✓
2	34.61	34.12	99%	✓
3	35.02	34.28	98%	✓
4	35.06	34.37	98%	✓
5	36.57	33.29	91%	✓
6	36.37	32.87	90%	✓
7	36.81	32.17	87%	✓
8	36.60	32.10	88%	✓
9	37.48	34.46	92%	✓

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
10	36.95	30.05	81%	✓
11	36.97	30.07	81%	✓
12	36.86	30.12	82%	✓
13	36.84	30.02	81%	✓
14	36.86	29.81	81%	✓
15	36.95	29.84	81%	✓

The following conclusions can be made:

✓ The points tested have a VSC value greater than 27%, or their VSC value is greater than 0.8 times their former value, with the proposed development in place. Therefore, these points exceed BRE recommendations.

5.2.4 View 4: 14-22A Castleowen Hilltop

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
1	39.21	39.17	100%	✓
2	39.17	39.08	100%	✓
3	29.44	29.61	101%	✓
4	37.76	37.70	100%	✓
5	39.15	39.22	100%	✓
6	39.09	39.18	100%	✓
7	38.09	38.15	100%	✓
8	38.76	38.70	100%	✓
9	38.94	38.78	100%	✓
10	39.10	39.17	100%	✓

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
11	39.12	39.16	100%	✓
12	37.98	38.00	100%	✓
13	38.43	38.48	100%	✓
14	38.78	38.78	100%	✓
15	39.10	39.25	100%	✓
16	39.05	39.07	100%	✓
17	39.21	38.94	99%	✓
18	34.73	34.75	100%	✓
19	37.48	37.15	99%	✓
20	38.04	38.05	100%	✓
21	38.29	38.34	100%	✓
22	39.05	38.96	100%	✓
23	38.95	39.11	100%	✓
24	37.53	37.36	100%	✓
25	38.36	37.91	99%	✓
26	38.60	38.37	99%	✓
27	38.90	38.77	100%	✓
28	38.97	38.92	100%	✓
29	37.58	37.22	99%	✓
30	38.23	37.76	99%	✓
31	38.47	38.18	99%	✓
32	38.96	38.83	100%	✓
33	38.94	38.78	100%	✓
34	38.87	38.85	100%	✓
35	35.73	35.31	99%	✓
36	37.81	37.36	99%	✓
37	38.07	37.54	99%	✓
38	37.37	36.87	99%	✓
39	38.79	38.39	99%	✓
40	38.90	38.68	99%	✓
41	39.05	38.55	99%	✓
42	29.41	29.10	99%	✓
43	36.16	35.53	98%	✓
44	36.71	36.13	98%	✓
45	38.63	38.26	99%	✓
46	38.72	38.30	99%	✓
47	33.34	32.86	99%	✓
48	37.21	36.62	98%	✓
49	37.70	37.01	98%	✓

Points	Existing Situation VSC	Proposed Scheme VSC	Proposed VSC as a % of Existing Situation	Comment
50	38.62	38.15	99%	✓
51	38.56	38.53	100%	✓
52	37.26	36.88	99%	✓
53	37.77	37.39	99%	✓
54	37.93	37.42	99%	✓

The following conclusions can be made:

✓ The points tested have a VSC value greater than 27%, or their VSC value is greater than 0.8 times their former value, with the proposed development in place. Therefore, these points exceed BRE recommendations.

5.3 Discussion

This study considers the proposed scheme and tests if the VSC results are greater than either 27% or 0.8 times their former value (that of the existing situation). Of the 105 points tested all exceed the BRE requirements.

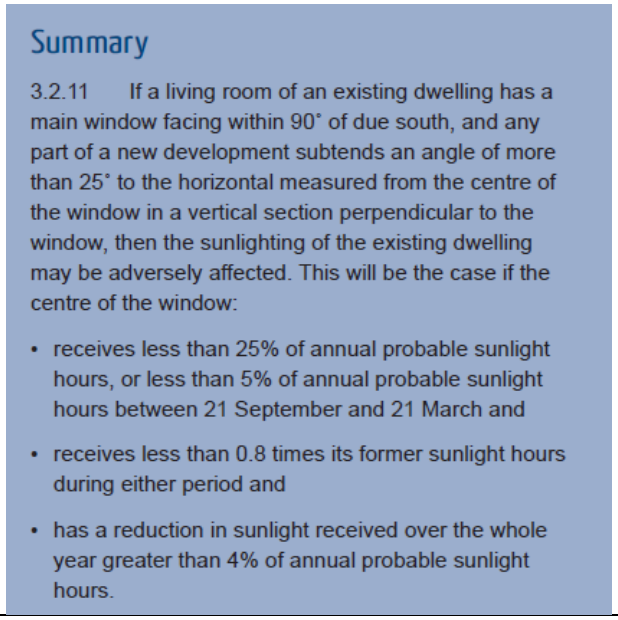
6 Annual Probable Sunlight Hours (APSH)

The British Standard BS 8206: Part 2:1992 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.

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.

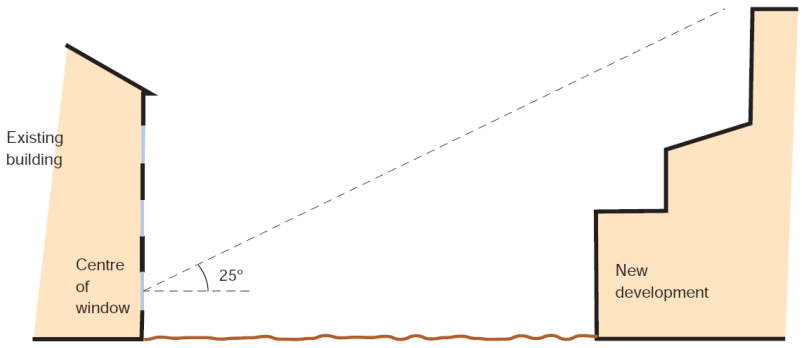
Extract from the BRE 'Site Layout Planning for Daylight and Sunlight' guide

6.1 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 'Site Layout Planning for Daylight and Sunlight' guide

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

1. The existing building has living room with a main window which faces within 90 degrees of due south.
2. Existing building is located to the North, East, or West of the Proposed Development.
3. The VSC of the existing window is less than 27%.

Based on the above, the existing buildings adjacent to the development have not been tested for the APSH since they met the exclusions as outlined within the BRE guidance.

7 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 7.4 hours sunlight each day is received (i.e. only 22% of potential sunlight hours).
- During June a mean daily duration of 6.4 hours of sunlight out of a potential 16.7 hours sunlight each day is received (i.e. only 38% 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.

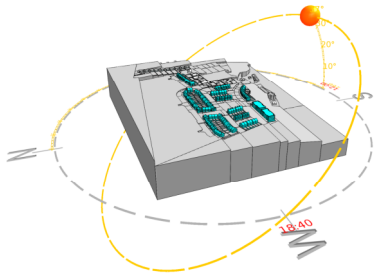
This section will consider the shadows cast by the proposed development on the following dates:

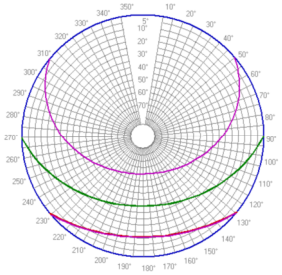
- March 21st / September 21st (Equinox)
- June 21st (Summer Solstice)
- December 21st (Winter Solstice)

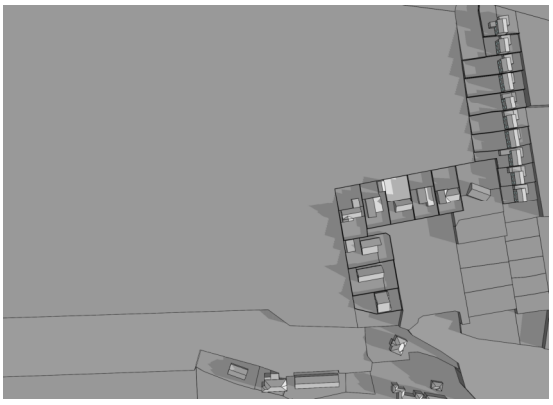
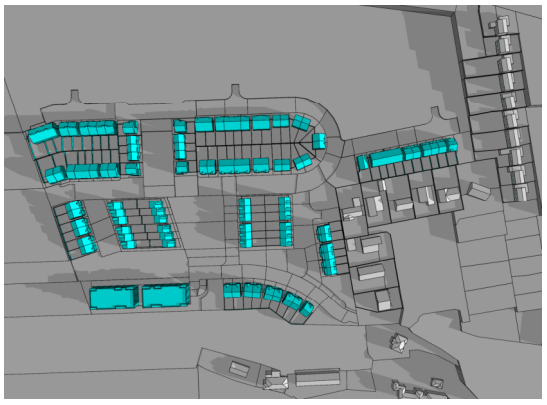
These images illustrate shadows cast for 'perfect sunny' conditions with no clouds and assumed that the sun is shining for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

7.1 Plan View

7.1.1 March 21st

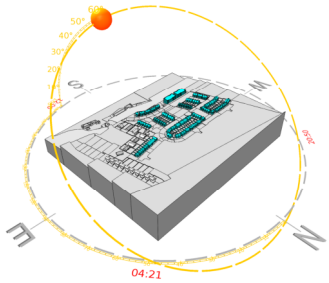


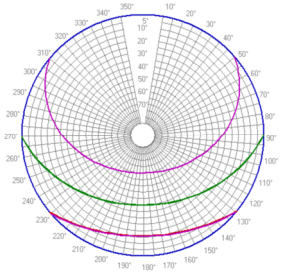


	Existing	Proposed
March 21st - 8:00		
March 21st - 10:00		

March 21st - 18:00	March 21st - 16:00	March 21st - 14:00	March 21st - 12:00
			
			

7.1.2 June 21st

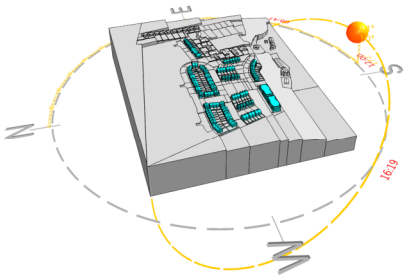


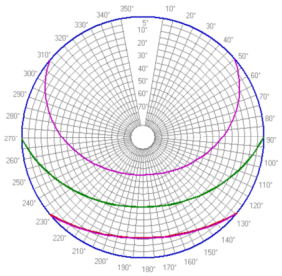


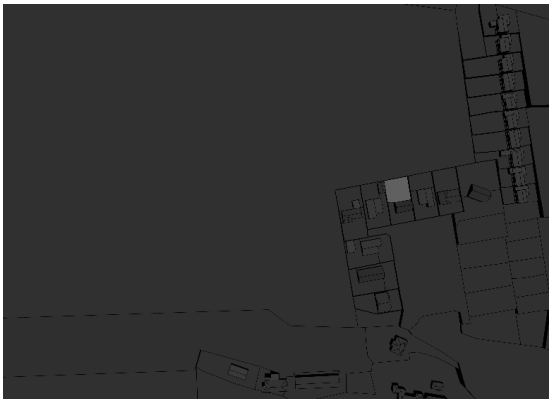
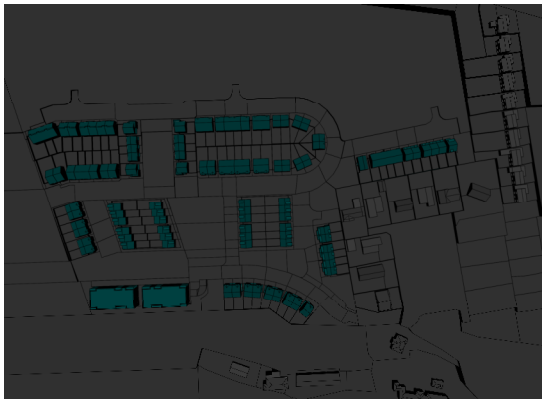
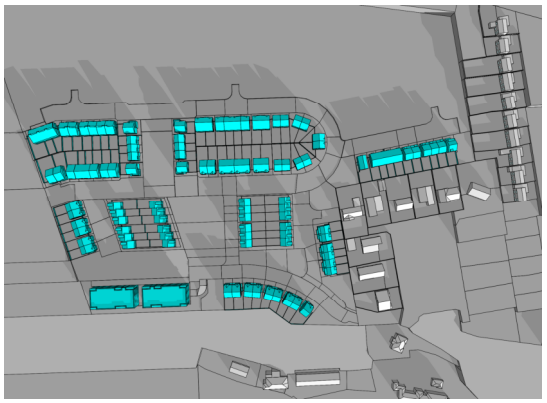
	Existing	Proposed
June 21st - 8:00		
June 21st - 10:00		

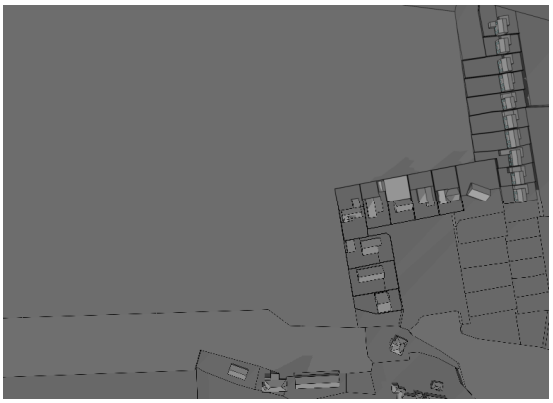
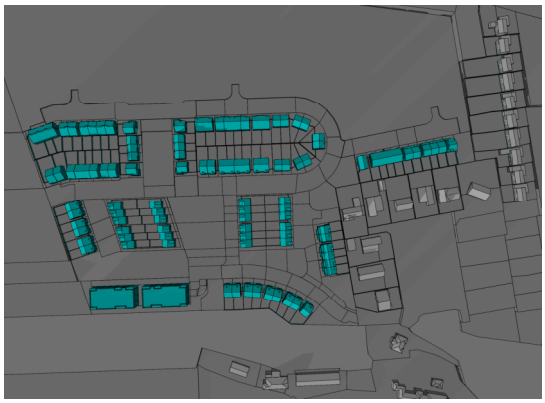
June 21st - 12:00		
June 21st - 14:00		
June 21st - 16:00		

7.1.3 December 21st



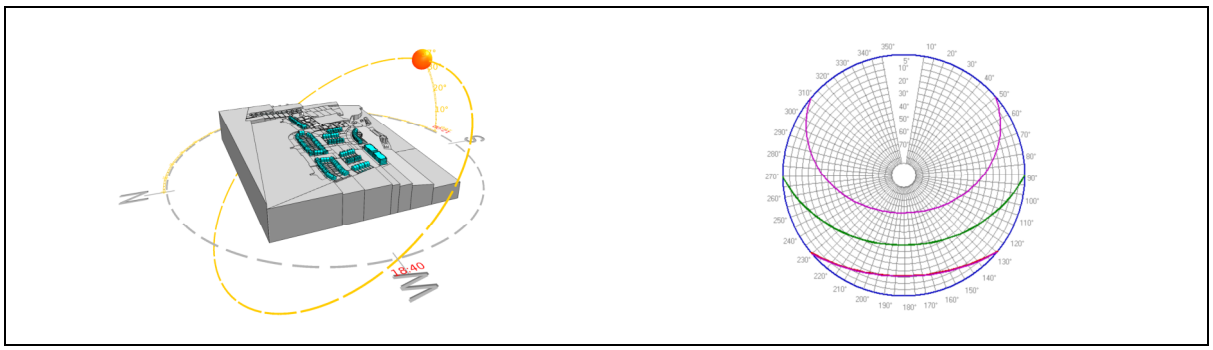


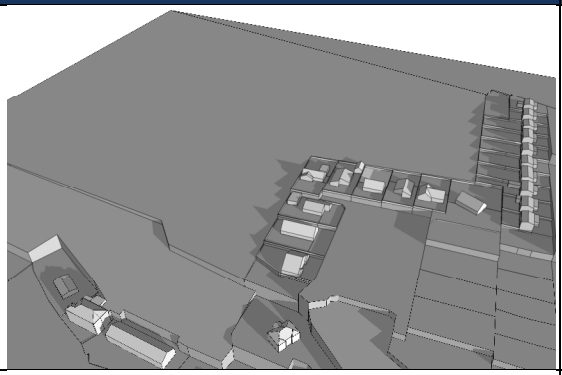
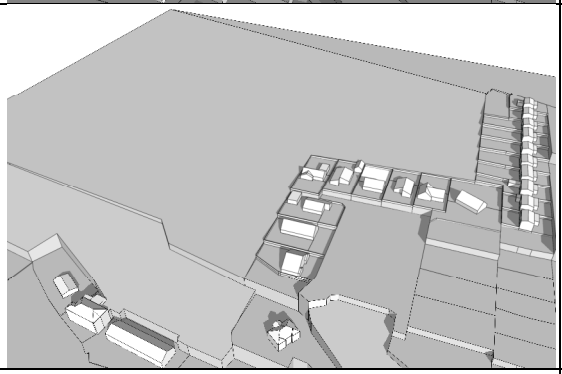
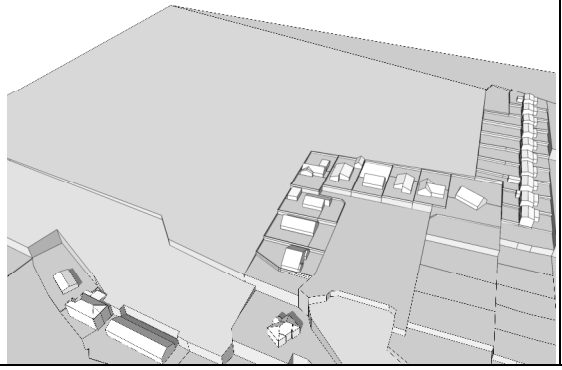
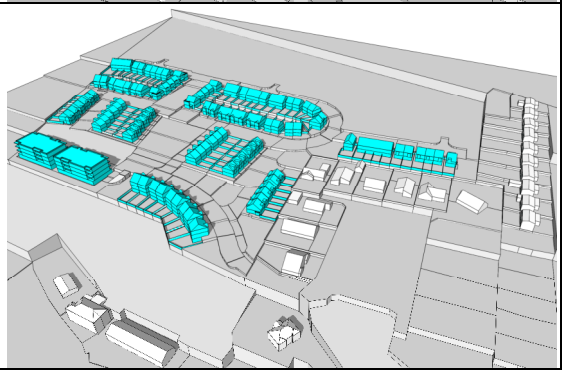
	Existing	Proposed
December 21st - 8:00		
December 21st - 10:00		

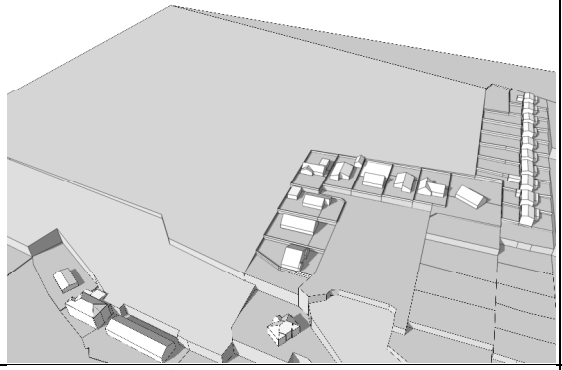
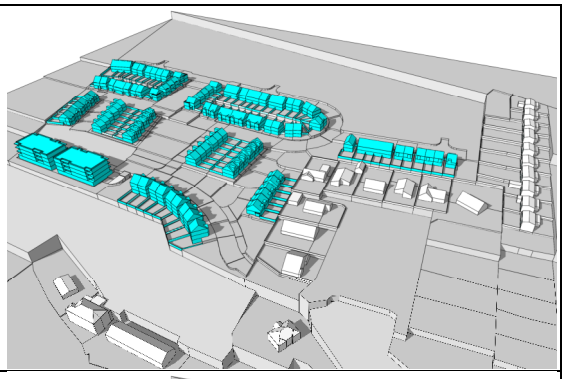
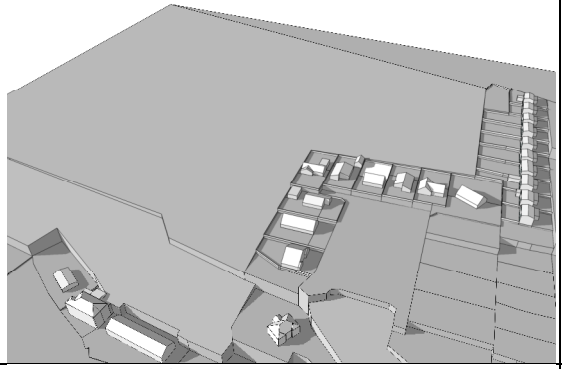
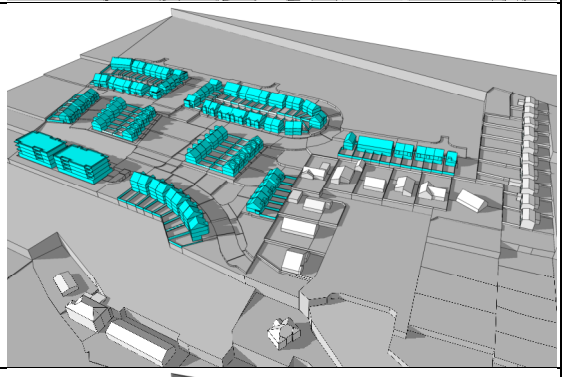
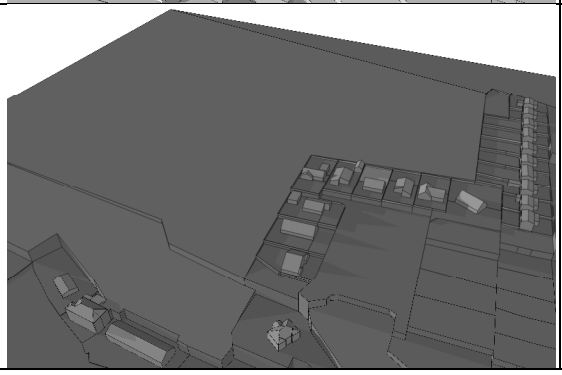
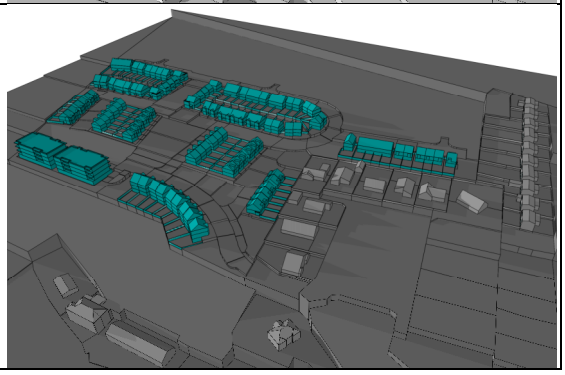
December 21st - 12:00		
December 21st - 14:00		
December 21st - 16:00		

7.2 3D View

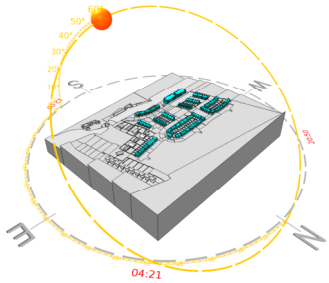
7.2.1 March 21st

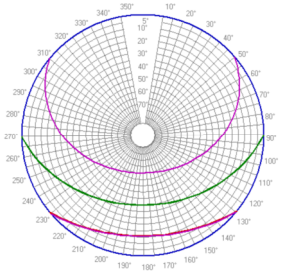


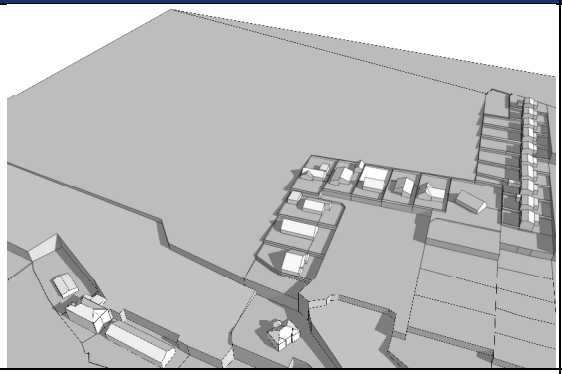
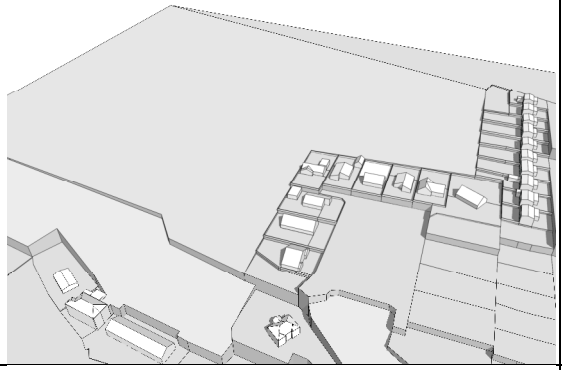
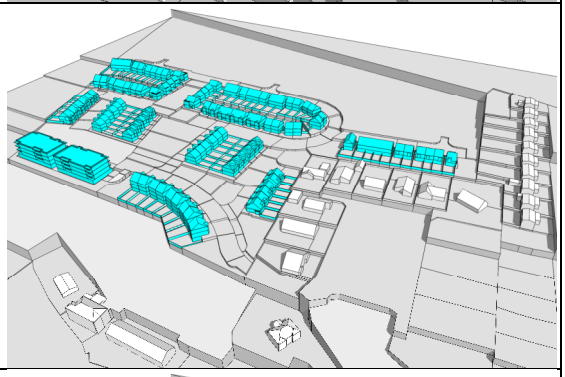
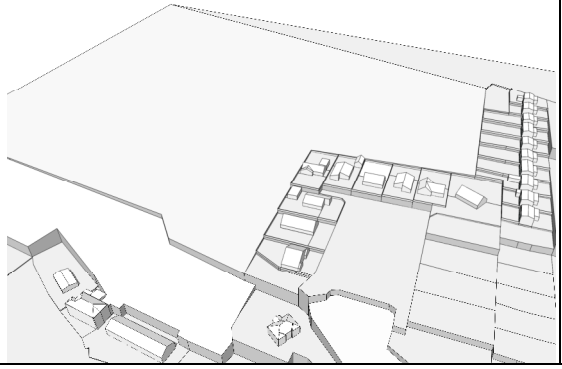
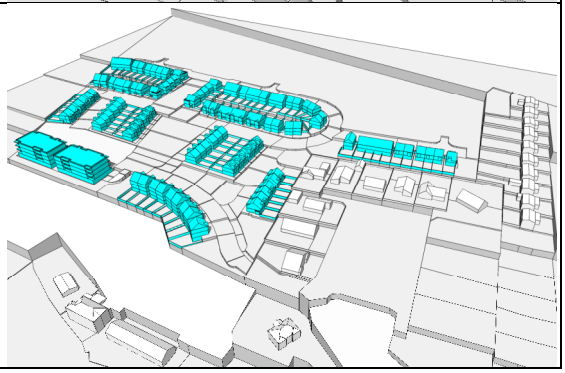
	Existing	Proposed
March 21st - 8:00		
March 21st - 10:00		
March 21st - 12:00		

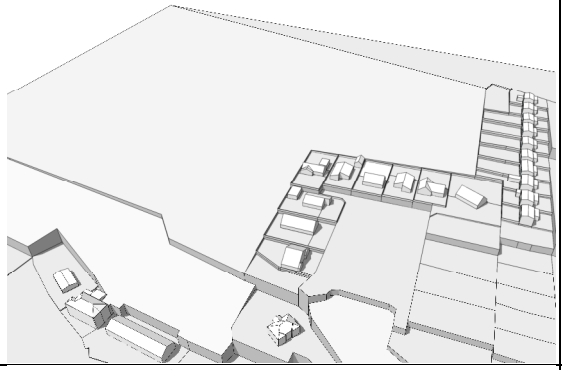
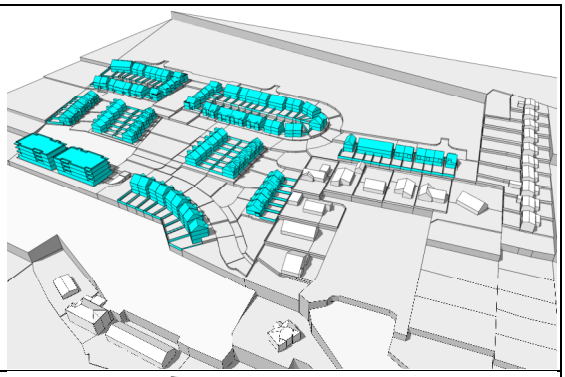
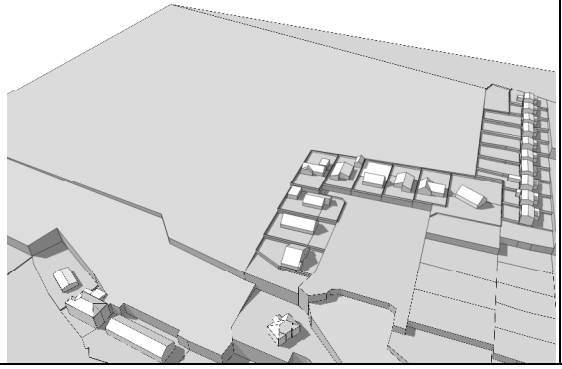
March 21st - 14:00		
March 21st - 16:00		
March 21st - 18:00		

7.2.2 June 21st

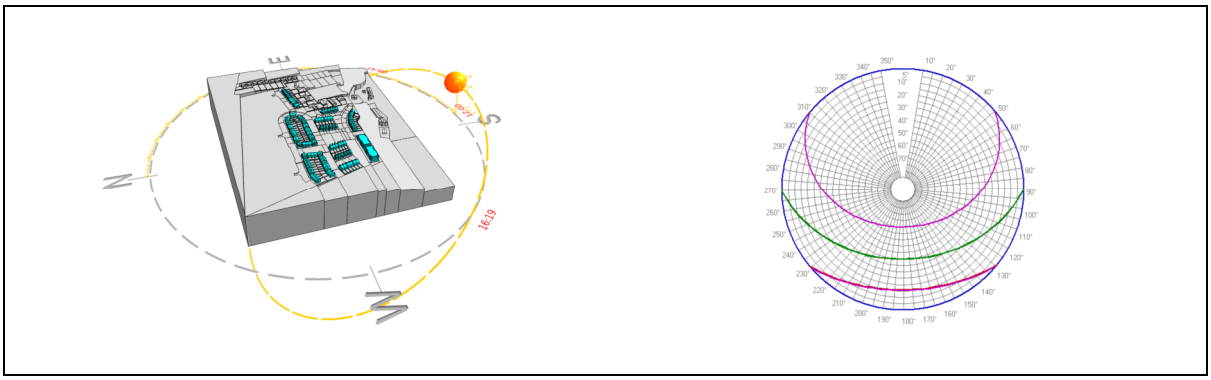


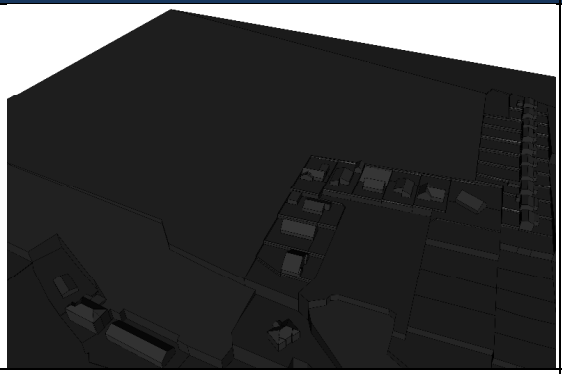
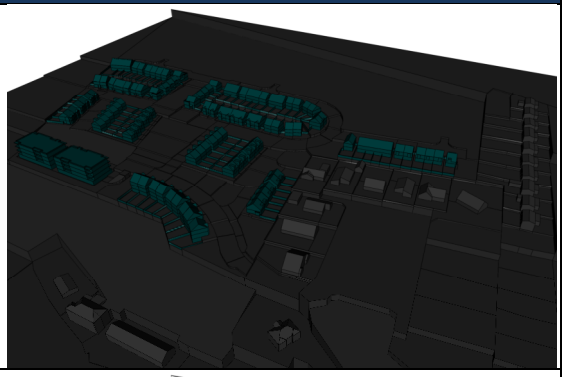
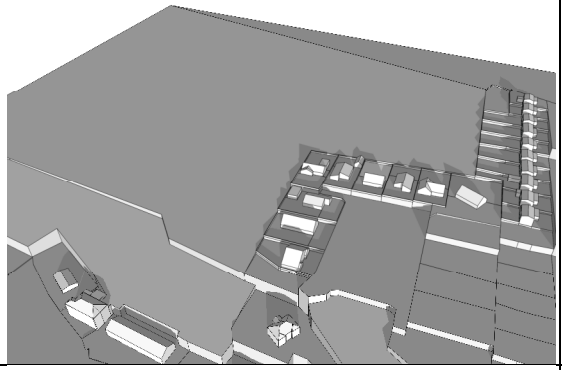
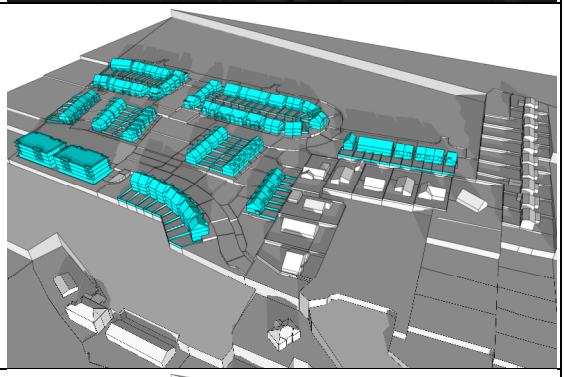
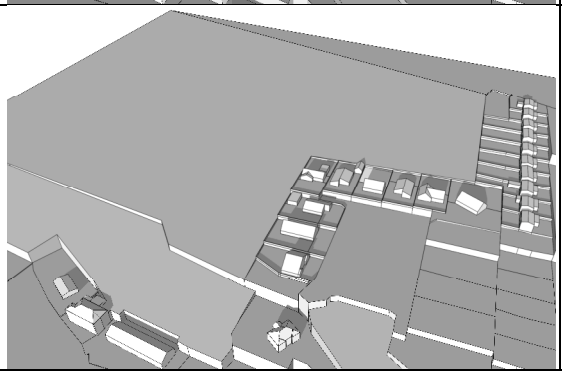
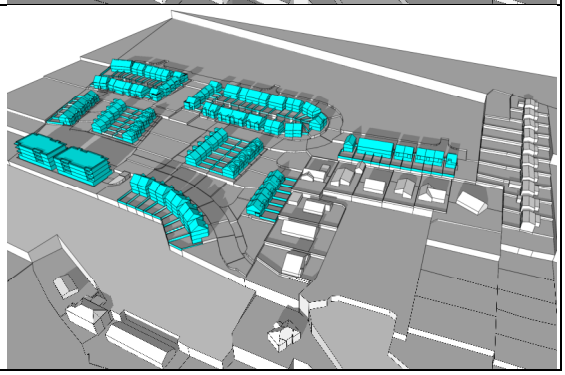


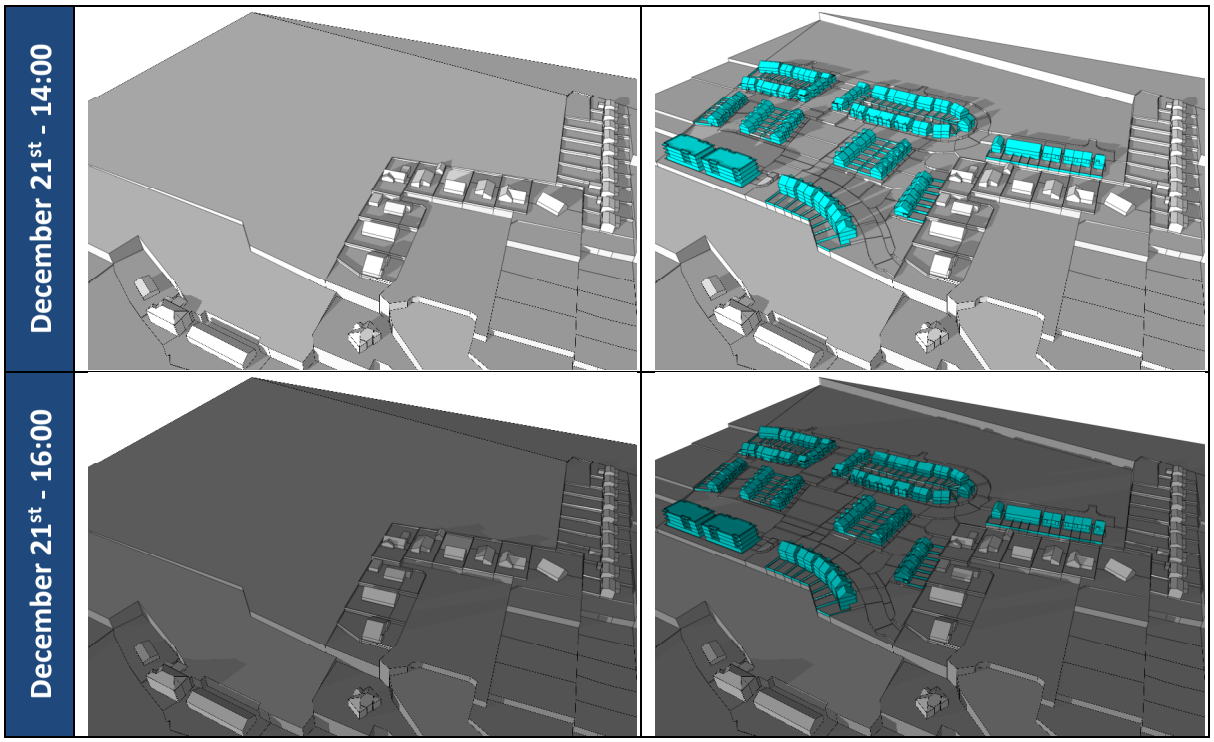
	Existing	Proposed
June 21st - 8:00		
June 21st - 10:00		
June 21st - 12:00		

June 21st - 14:00		
June 21st - 16:00		

7.2.3 December 21st



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


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

7.3 Discussion

The shadow analysis illustrates different shadows being cast at three key times of the year (March 21st, June 21st and December 21st) for the existing scenario and with the proposed development in place. The images indicate that the proposed development's overshadowing performance will provide a minor adverse impact given the position of the site to the west in relation to the existing buildings and the low-rise nature of the proposed development. The performance of the proposed development is summarised as follows:

1-9 Sunberry Dr

Minor additional shading visible from the proposed development on one of the buildings, 4 Sunberry Dr. during December and numbers 1 to 4 in March at (1600) with no additional overshadowing noted during June.

14-22A Castleowen Hilltop

No additional shading visible from the proposed development on these buildings.

It should be noted that sunlight is less prevalent during the winter months and as such the impact of overshadowing will be greatly reduced. Taking this into account the overall impact of overshadowing can be classed as a negligible adverse impact.

The proposed development's performance is further quantified within the daylight analysis to the existing buildings and sunlight to existing amenities sections of this report.

8 Sunlight to Proposed and Existing Amenity Spaces

8.1 Guidance Requirements

The impact of the proposed development on the sunlight availability to the amenity areas will be considered to determine how the amenities perform when assessed against the BRE Guidelines 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 Guidelines state that 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 21st March.

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

8.2 Amenity Areas

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 21st March. This analysis will be performed on the amenity spaces illustrated in the image below.

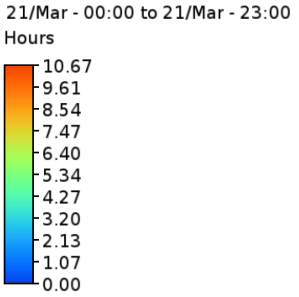
Proposed Garden Amenities

Proposed Public Amenities

Existing Amenities

8.3 Sunlight Results for Existing Neighbouring Amenities

The following images illustrate the proposed garden amenity areas that are receiving at least 2 hours of sunlight on 21st March.



Absolute Scale Illustrating all Hours of Sunlight Received Existing Amenity Areas

Absolute Scale Illustrating all Hours of Sunlight Received Existing Amenity Areas with Proposed Development in Place

■ Receives more than 2 hours of sunlight □ Receives less than 2 hours of sunlight	**Hours of Sunlight > 2 Illustrated in Red** **Existing Amenity Area**
	
	Hours of Sunlight > 2 Illustrated in Red **Existing Amenity Area with Proposed Development in Place**
	

Existing Amenity Areas	

Ref	Area (m^2)	Existing Area >2 hrs		Proposed Area >2 hrs		Proposed vs Existing (%)	Comment
		(m^2)	(%)	(m^2)	(%)		
1	272	222	82%	222	82%	100%	✓
2	141	131	93%	131	93%	100%	✓
3	389	363	93%	363	93%	100%	✓
4	374	348	93%	348	93%	100%	✓
5	380	354	93%	354	93%	100%	✓
6	388	358	92%	358	92%	100%	✓
7	367	339	92%	339	92%	100%	✓
8	216	185	86%	185	86%	100%	✓
9	129	120	93%	120	93%	100%	✓
10	139	129	93%	129	93%	100%	✓
11	660	633	96%	633	96%	100%	✓
12	319	261	82%	261	82%	100%	✓
13	228	202	89%	202	89%	100%	✓
14	345	313	91%	313	91%	100%	✓
15	167	136	81%	136	81%	100%	✓
16	317	290	91%	290	91%	100%	✓
17	292	260	89%	257	88%	99%	✓
18	318	286	90%	277	87%	97%	✓
19	342	315	92%	315	92%	100%	✓
20	259	239	92%	239	92%	100%	✓
Total	**6,042**	**5,484**	**91%**	**5,472**	**91%**	**100%**	**✓**

The following conclusion can be made:

✓ The sunlight to existing amenity gardens achieves at least 0.8 times their former value with the proposed development in place, thus complying with BRE Guidelines.

8.4 Sunlight Results for Proposed Garden Amenity Areas

The following images illustrate the proposed garden amenity areas that are receiving at least 2 hours of sunlight on 21st March.

Absolute Scale Illustrating all Hours of Sunlight Received
Proposed Building Amenity Areas

Hours of Sunlight > 2 Illustrated in Red
Proposed Building Amenity Areas

The results illustrated above are summarised in the following table.

Proposed Amenity Areas	

Amenity Ref.	Area (m^2)	Area (m^2) >2 hours on 21st March	Total % > 2 Hours 21st March
1	168	161	96%
2	72	65	90%
3	92	69	75%
4	95	79	83%
5	93	74	80%
6	96	82	85%
7	70	64	91%
8	70	64	91%
9	92	75	82%
10	58	52	90%
11	58	46	79%
12	47	39	83%
13	57	36	63%
14	60	64	100%
15	78	24	31%
16	77	18	23%
17	81	24	30%
18	62	16	26%
19	64	16	25%
20	120	31	26%
21	120	40	33%
22	185	146	79%
23	87	62	71%
24	90	62	69%
25	87	61	70%
26	87	72	83%
27	92	67	73%
28	86	66	77%
29	108	71	66%
30	105	68	65%
31	62	43	69%

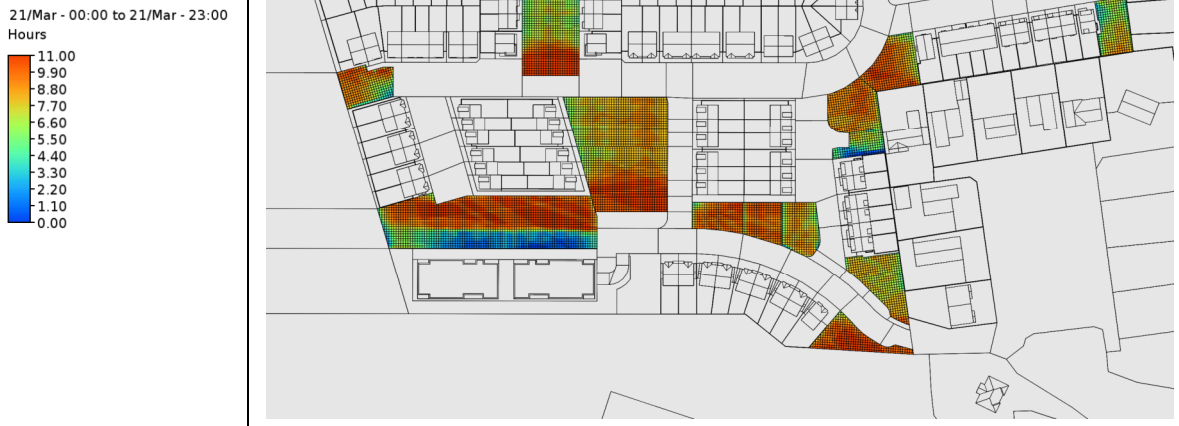
32	60	40	67%
33	82	53	65%
34	80	61	76%
35	80	51	64%
36	79	50	63%
37	61	39	64%
38	61	41	67%
39	64	34	53%
40	64	34	53%
41	64	46	72%
42	66	45	68%
43	47	35	74%
44	63	45	71%
45	67	50	75%
46	93	74	80%
47	92	72	78%
48	95	73	77%
49	71	59	83%
50	70	58	83%
51	94	72	77%
52	95	73	77%
53	94	72	77%
54	97	79	81%
55	94	76	81%
56	77	63	82%
57	82	65	79%
58	61	33	54%
59	61	47	77%
60	84	32	38%
61	74	16	22%
62	100	37	37%
63	97	30	31%
64	123	34	28%
65	92	25	27%
66	94	27	29%
67	63	21	33%
68	65	18	28%
69	96	24	25%
70	89	22	25%
71	120	31	26%
72	100	65	65%
73	102	67	66%
74	65	44	68%
75	65	44	68%
76	84	55	65%
77	85	59	69%
78	87	58	67%
79	88	64	73%
80	65	43	66%
81	66	44	67%
82	67	41	61%
83	67	41	61%
84	93	75	81%

85	96	76	79%
86	86	67	78%
87	86	68	79%
88	72	52	72%
89	73	61	84%
90	82	67	82%
91	93	81	87%
92	133	100	75%
93	77	43	56%
94	79	34	43%
95	79	35	44%
96	61	29	48%
97	61	25	41%
98	79	51	65%
99	114	80	70%
100	83	61	73%
101	60	46	77%
102	61	47	77%
103	81	61	75%
104	85	63	74%
105	84	65	77%
106	86	65	76%
107	63	49	78%
108	86	67	78%
109	89	65	73%
Total	**9,013**	**5,872**	**65%**

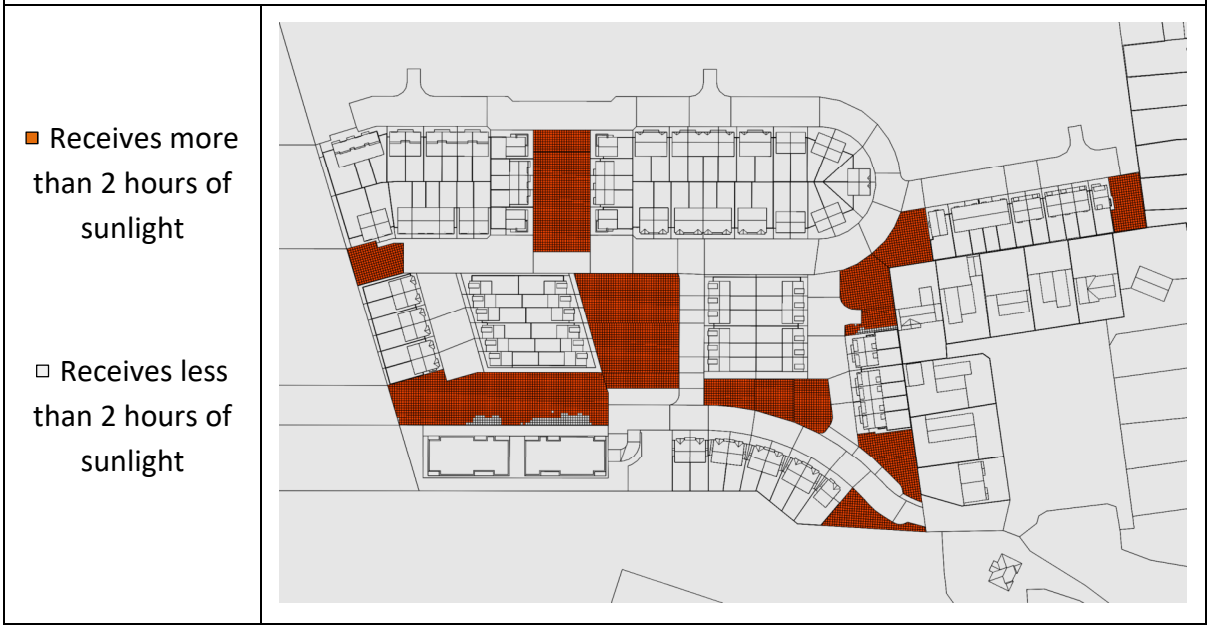
8.5 Sunlight Results for Proposed Public Amenity Areas

The following images illustrate the proposed public amenity areas that are receiving at least 2 hours of sunlight on 21st March.

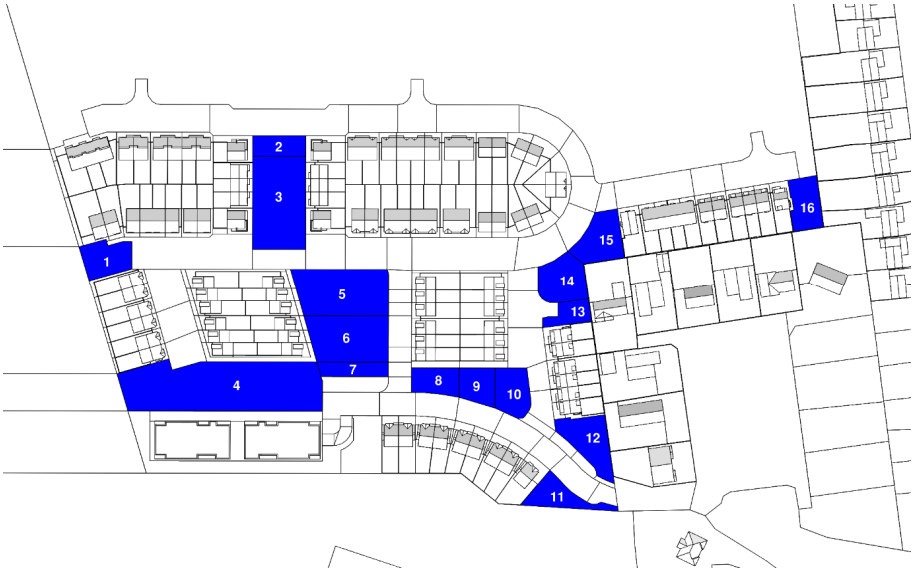
Absolute Scale Illustrating all Hours of Sunlight Received
Proposed Building Amenity Areas



Hours of Sunlight > 2 Illustrated in Red
Proposed Building Amenity Areas



The results illustrated above are summarised in the following table.

Proposed Amenity Areas	

Amenity Ref.	Area (m^2)	Area (m^2) >2 hours on 21st March	Total % > 2 Hours 21st March
1	325	325	100%
2	223	223	100%
3	1011	1011	100%
4	1932	1787	92%
5	876	876	100%
6	737	737	100%
7	205	205	100%
8	253	253	100%
9	255	255	100%
10	322	322	100%
11	304	304	100%
12	435	435	100%
13	182	151	83%
14	408	408	100%
15	403	403	100%
16	311	311	100%
Total	**8,182**	**8,006**	**98%**

8.6 Solar Amenity Discussion

As outlined in Section 3.3.17 of the BRE Guide, for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.

Existing Neighbouring Amenities

All existing neighbouring amenities adjacent to the development site have been analysed in both the existing and proposed scenarios. The results highlight that in the proposed context the sunlight received in the neighbouring amenities continues to be the same, for the majority of the dwellings, as the existing scenario when measured against the 2 hours of sunlight on the 21st of March. Only two gardens have a negligible difference of 1% and 3%, thus all areas complying with BRE Guidelines.

Proposed Amenities

On the 21st of March, the majority of the proposed garden amenity areas situated within the development site will receive at least 2 hours of sunlight on complying with the BRE recommendations. Of those that do not comply (23 of 109) it is simply as a result of their north facing position in relation to the proposed dwellings that they belong to.

Although this is the case on the 21st of March, the proposed public amenity areas provided within the development site will receive at least 2 hours of sunlight on 98% of their combined area, thus exceeding BRE recommendations.

The results included confirm these amenity areas will be quality spaces in terms of sunlight access.

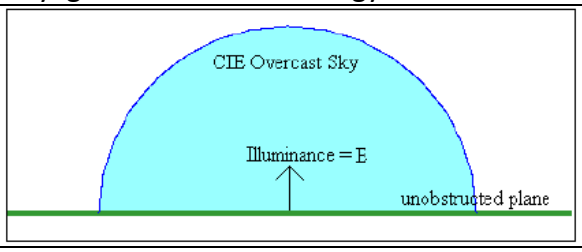
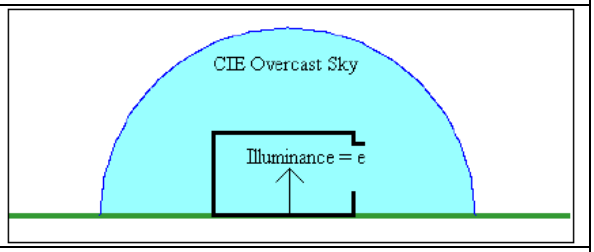
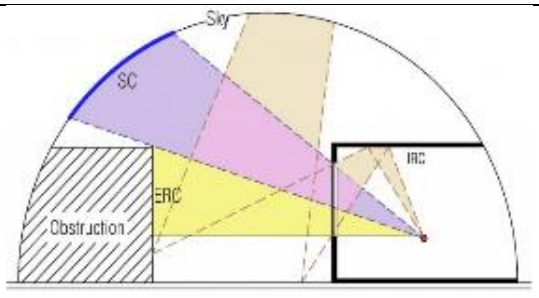
9 Average Daylight Factors (ADF)

This section addresses daylight to the proposed apartments. The purpose of the ADF calculations is to quantify an overall percentage of units which exceeds the BRE recommendations. Our proposed methodology is to complete the ADF calculations for ground, level one and level three as a representative sample. The objective of the design team was to maximise the number of units which exceed the BRE recommendations.

9.1 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.

9.2 Reference and Metrics

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%

9.3 Combined Function Spaces – Living / Kitchen / Dining

Note the BRE guide does not provide explicit guidance for an open space that is a combination of Living/Kitchen/Dining (L/K/D) functions.

In addition, a separate document the "*BS 8206-2:2008: Lighting for Buildings - Part 2: Code of Practice for Daylighting*" focuses on internal daylighting performance and 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 this reason, it should be noted where there are open plan spaces within the development the initial target value will be 2%. In addition to this 2% target there will also be the provision of results based on a 1.5% target.

In line with the national policy guidance noted in the Sustainable Urban Housing: Design Standards for New Apartments, Section 6.7 which states:

"*Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to 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*."

In this context, the living area has been treated as the main activity, with the design constraint of the kitchen being placed at the back of the space. This design decision is understandable as the kitchen area is classed as a "non-habitable transient space" because their functional significant purpose is only to serve as food preparation and not as a long-term sitting 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. This is strong evidence that the 1.5% average daylight factor is the appropriate target on this basis.

In addition to complying with further Irish Design Standards for New Apartments, such as the provision of balconies (which reduce daylight within apartments as noted within the BRE guidelines), the 1.5% ADF target is noted as the more appropriate method again in this instance. Although the design target value is lower, this is compensated with a much higher

valued outdoor private amenity provision which is noted to be a very desirable commodity for occupants to benefit their connection to the outdoors.

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".*

Ireland is currently in the midst of a widely recognised housing crisis with a need for quality domestic dwellings. This puts a premium on the number of properties to help overcome the national issue. 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 kitchens 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 kitchens will be classed as a "non-habitable transient spaces", the daylight benefit is primary to the habitable spaces of the Living and Dining areas.

9.4 Planning Authority Guidelines

The BRE guide notes that the "*advice is not mandatory and that the guide should not be seen as an instrument of planning policy*". It should be noted when trying to achieve height and density within a development (Urban Development and Building Heights, Guidelines for Planning Authorities 2018), where deep plan single aspect combine modern flexible living 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."*

It should be noted for completeness, that there is a new standard for the assessment of daylight access within buildings entitled "IS EN 17037:2018: Daylight in Buildings". This new standard is not currently directly referred within the 'Urban Development and Building Heights', guidelines for Planning Authorities 2018.

Whereas the BRE 209 or *BS 8206-2:2008* are currently referred within the Urban Development and Building Heights, guidelines for Planning Authorities 2018 and have been noted to be accepted by An Bord Pleanala.

9.5 Assumptions

The following assumptions are to be used in the study:

- Sky Conditions: Standard CIE overcast sky
- Time (24hr): 12:00
- Date: 21 September
- Working Plane: 0.85m
- Floor to Floor Height: For apartment buildings: 3.15m
  For Houses: 2.80m

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

Glazing Transmittance:

- Light Transmittance: 70%
- Window Frame thickness: 50 mm

9.6 Average Daylight Factor Results

The following floor plan illustrate the rooms that were simulated to ascertain the Average Daylight Factor results.

9.6.1 Level 00 – Apartment Buildings

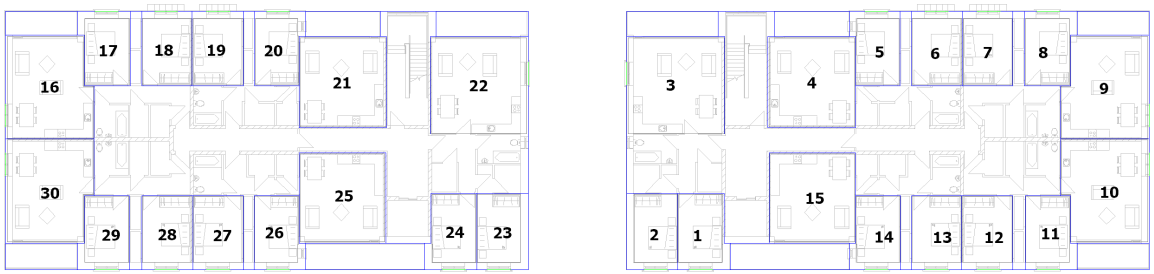
Ref.	Room Reference	Room Activity	External Window Area (m^2)	Whole Space ADF (%)	Comment
1	L00: A1-01_Bedroom 01	Bedroom	2.8	2.20	✓
2	L00: A1-01_Bedroom 02	Bedroom	2.8	2.23	✓
3	L00: A1-01_Living room	LKD	14.7	2.75	✓
4	L00: A1-02_Living room	LKD	10.5	2.03	✓
5	L00: A1-02_Bedroom 01	Bedroom	3.9	2.16	✓
6	L00: A1-02_Bedroom 02	Bedroom	2.8	1.86	✓
7	L00: A1-03_Bedroom 02	Bedroom	2.8	1.89	✓
8	L00: A1-03_Bedroom 01	Bedroom	2.8	1.95	✓
9	L00: A1-03_Living Room	LKD	11.9	3.06	✓
10	L00: A1-04_Living room	LKD	11.9	3.21	✓
11	L00: A1-04_Bedroom 01	Bedroom	2.8	2.39	✓
12	L00: A1-04_Bedroom 02	Bedroom	2.8	2.06	✓
13	L00: A1-05_Bedroom 02	Bedroom	2.8	2.09	✓
14	L00: A1-05_Bedroom 01	Bedroom	3.9	2.37	✓
15	L00: A1-05_Living room	LKD	10.5	2.65	✓
16	L00: A2-18_Living Room	LKD	11.9	3.05	✓
17	L00: A2-18_Bedroom 01	Bedroom	2.8	2.10	✓
18	L00: A2-18_Bedroom 02	Bedroom	2.8	1.86	✓
19	L00: A2-17_Bedroom 02	Bedroom	2.8	1.84	✓
20	L00: A2-17_Bedroom 01	Bedroom	3.9	2.13	✓
21	L00: A2-17_Living room	LKD	10.5	2.00	✓
22	L00: A2-21_Living room	LKD	14.7	2.73	✓

23	L00: A2-21_Bedroom 02	Bedroom	2.8	2.25	✓
24	L00: A2-21_Bedroom 01	Bedroom	2.8	2.20	✓
25	L00: A2-20_Living room	LKD	10.5	2.65	✓
26	L00: A2-20_Bedroom 01	Bedroom	3.9	2.36	✓
27	L00: A2-20_Bedroom 02	Bedroom	2.8	2.09	✓
28	L00: A2-19_Bedroom 02	Bedroom	2.8	2.06	✓
29	L00: A2-19_Bedroom 01	Bedroom	2.8	2.19	✓
30	L00: A2-19_Living room	LKD	11.9	3.25	✓

The following conclusion can be made:

✓ 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.

9.6.2 Level 01 – Apartment Buildings



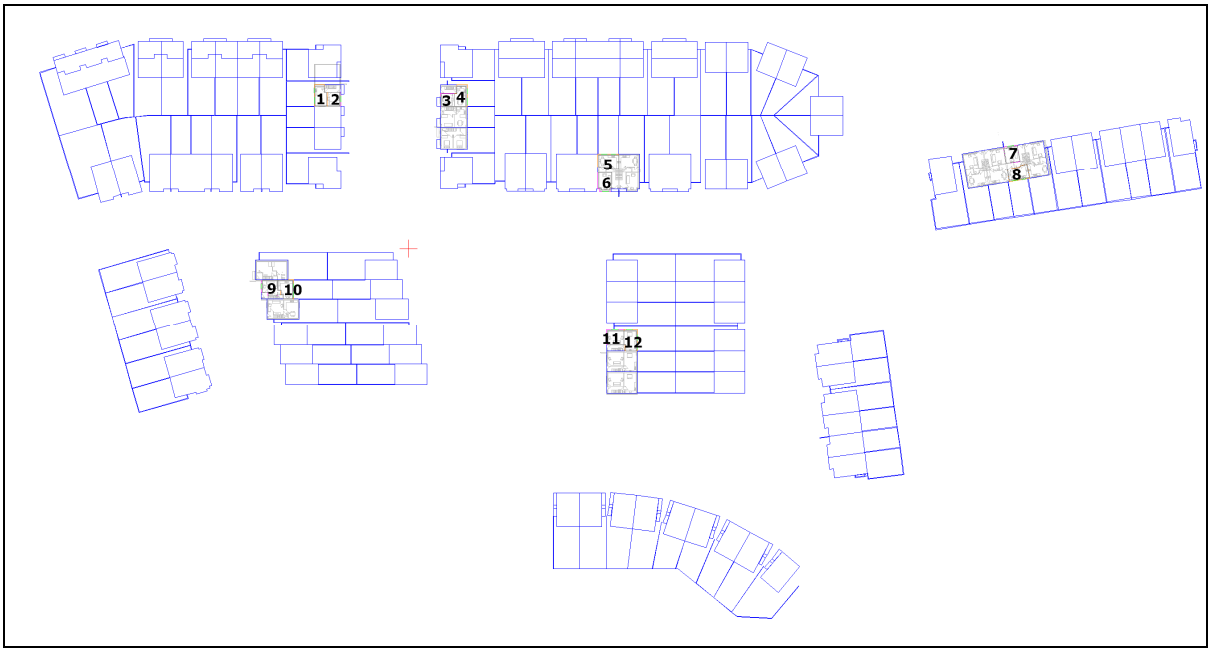
Ref.	Room Reference	Room Activity	External Window Area (m^2)	Whole Space ADF (%)	Comment
1	L01: A1-06_Bedroom 01	Bedroom	2.8	2.23	✓
2	L01: A1-06_Bedroom 02	Bedroom	2.8	2.25	✓
3	L01: A1-06_Living room	LKD	14.7	3.17	✓
4	L01: A1-07_Living room	LKD	10.5	2.28	✓
5	L01: A1-07_Bedroom 01	Bedroom	3.9	2.32	✓
6	L01: A1-07_Bedroom 02	Bedroom	2.8	1.98	✓
7	L01: A1-08_Bedroom 02	Bedroom	2.8	2.01	✓
8	L01: A1-08_Bedroom 01	Bedroom	2.8	2.07	✓
9	L01: A1-08_Living Room	LKD	11.9	3.23	✓
10	L01: A1-09_Living room	LKD	11.9	3.25	✓
11	L01: A1-09_Bedroom 01	Bedroom	2.8	2.41	✓
12	L01: A1-09_Bedroom 02	Bedroom	2.8	2.08	✓
13	L01: A1-10_Bedroom 02	Bedroom	2.8	2.41	✓
14	L01: A1-10_Bedroom 01	Bedroom	3.9	2.11	✓
15	L01: A1-10_Living room	LKD	10.5	2.67	✓
16	L01: A2-23_Living Room	LKD	11.9	3.24	✓
17	L01: A2-23_Bedroom 01	Bedroom	2.8	2.26	✓
18	L01: A2-23_Bedroom 02	Bedroom	2.8	2.00	✓
19	L01: A2-22_Bedroom 02	Bedroom	2.8	1.97	✓
20	L01: A2-22_Bedroom 01	Bedroom	3.9	2.30	✓
21	L01: A2-22_Living room	LKD	10.5	2.26	✓
22	L01: A2-26_Living room	LKD	14.7	3.16	✓
23	L01: A2-26_Bedroom 02	Bedroom	2.8	2.27	✓
24	L01: A2-26_Bedroom 01	Bedroom	2.8	2.23	✓
25	L01: A2-25_Living room	LKD	10.5	2.67	✓
26	L01: A2-25_Bedroom 01	Bedroom	3.9	2.38	✓
27	L01: A2-25_Bedroom 02	Bedroom	2.8	2.11	✓
28	L01: A2-24_Bedroom 02	Bedroom	2.8	2.08	✓

Ref.	Room Reference	Room Activity	External Window Area (m^2)	Whole Space ADF (%)	Comment
29	L01: A2-24_Bedroom 01	Bedroom	2.8	2.21	✓
30	L01: A2-24_Living room	LKD	11.9	3.28	✓

The following conclusion can be made:

✓ 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.

9.6.3 Level 00 – Houses

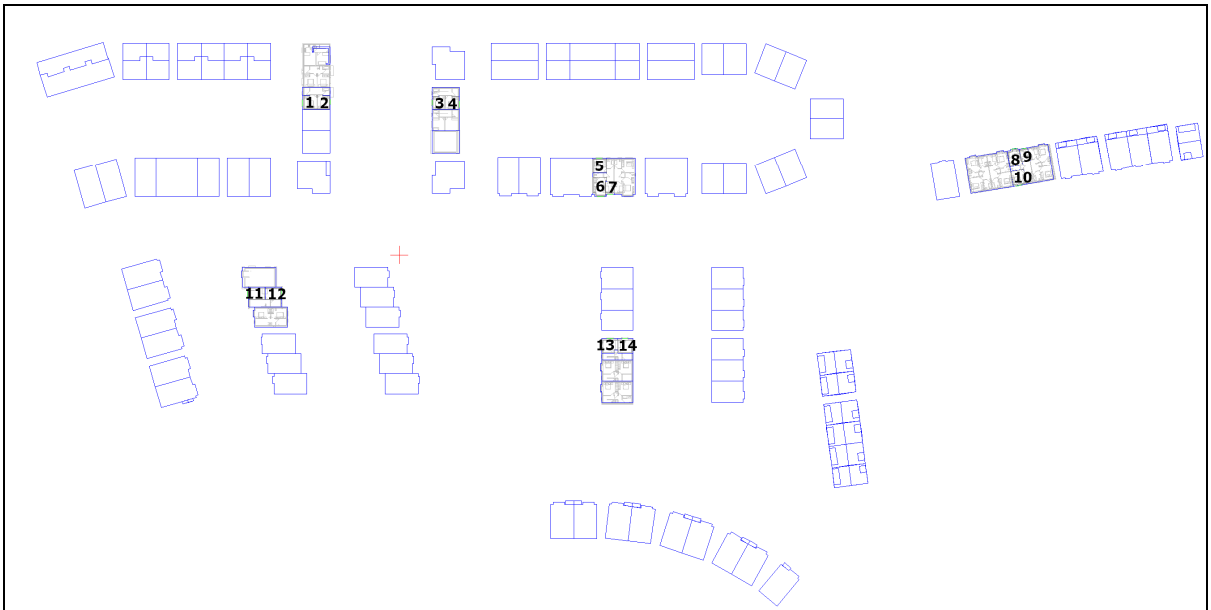


Ref.	Room Reference	Room Activity	External Window Area (m^2)	Whole Space ADF (%)	Comment
1	L00: 3C-01_Kitchen/Dining	K/D	5.2	2.79	✓
2	L00: 3C-01_Living	Living	3.3	2.33	✓
3	L00: 2D-01_Living	Living	3.3	1.73	✓
4	L00: 2D-01_Kitchen/Dining	K/D	5.2	2.81	✓
5	L00: 2A-01_Kitchen/Dining	K/D	5.1	2.05	✓
6	L00: 2A-01_Living	Living	3.1	1.67	✓
7	L00: 1C-01_Living	Living	3.2	1.99	✓
8	L00: 1C-01_Kitchen/Dining	K/D	5.1	2.46	✓
9	L00: 4A-4B-01_Living	Living	2.4	1.77	✓
10	L00: 4A-4B-01_Kitchen/Dining	K/D	5.5	2.55	✓
11	L00: 1E-1F-01_Living	Living	6.7	2.19	✓
12	L00: 1E-1F-01_Kitchen/Dining	K/D	8.6	2.87	✓

The following conclusion can be made:

✓ These rooms have an ADF greater than the recommended minimum values (2.0% for combined Kitchen/Dining Areas, 1.5% for Living areas and 1.0% for bedrooms) as stated within the BRE Guide.

Level 01 – Houses

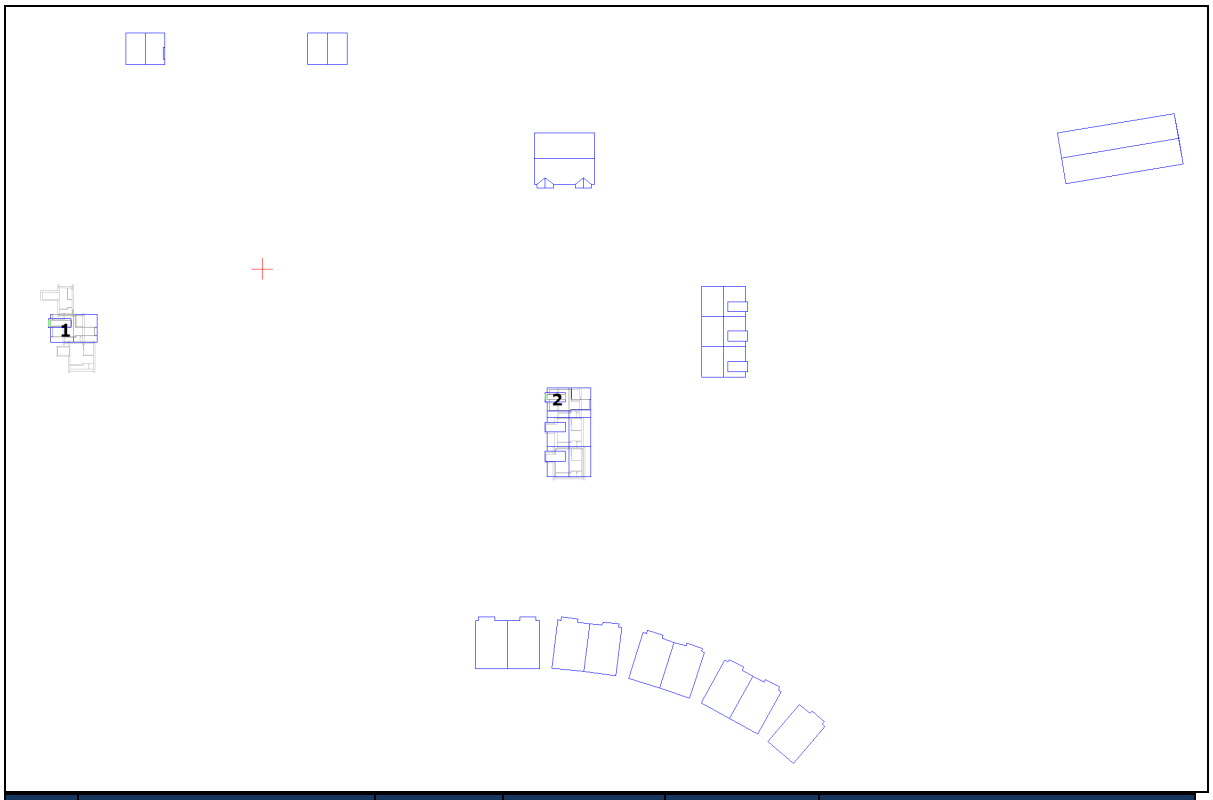


Ref.	Room Reference	Room Activity	External Window Area (m^2)	Whole Space ADF (%)	Comment
1	L01: 3C-01_Bedroom 01	Bedroom	2.2	2.00	✓
2	L01: 3C-01_Bedroom 02	Bedroom	2.7	2.46	✓
3	L01: 2D-01_Bedroom 01	Bedroom	2.4	1.96	✓
4	L01: 2D-01_Bedroom 02	Bedroom	2.2	1.44	✓
5	L01: 2A-01_Bedroom 01	Bedroom	2	1.01	✓
6	L01: 2A-01_Bedroom 02	Bedroom	2.3	1.16	✓
7	L01: 2A-01_Bedroom 03	Bedroom	1.7	1.84	✓
8	L01: 1C-01_Bedroom 02	Bedroom	2.4	1.5	✓
9	L01: 1C-01_Bedroom 03	Bedroom	1.7	1.87	✓
10	L01: 1C-01_Bedroom 01	Bedroom	2	1.22	✓
11	L01: 4A-4B-01_Bedroom 01	Bedroom	2	1.26	✓
12	L01: 4A-4B-01_Bedroom 02	Bedroom	1.7	1.56	✓
13	L01: 1E-1F-01_Bedroom 01	Bedroom	4.2	1.02	✓
14	L01: 1E-1F-01_Bedroom 02	Bedroom	3.7	1.00	✓

The following conclusions can be made:

✓ These rooms have an ADF greater than the recommended minimum values (2.0% for combined Kitchen/Dining Areas, 1.5% for Living areas and 1.0% for bedrooms) as stated within the BRE Guide.

9.6.4 Level 02 – Houses



Ref.	Room Reference	Room Activity	External Window Area (m^2)	Whole Space ADF (%)	Comment
1	L02: 1E-1F-01_Bedroom 03	Bedroom	1.6	1.01	✓
2	L02: 4A-4B-01_Bedroom 03	Bedroom	1.5	1.03	✓

The following conclusion can be made:

✓ These rooms have an ADF greater than the recommended minimum values (2.0% for combined Kitchen/Dining Areas, 1.5% for Living areas and 1.0% for bedrooms) as stated within the BRE Guide.

9.7 Discussion

The purpose of the ADF calculations is to quantify an overall percentage of units which exceeds the BRE recommendations and the BS 8206-2:2008 recommendations. Our proposed methodology is to complete the ADF calculations for the units located in the lower floors which would be considered "worst-case" units. The objective of the design team is to maximise the number of units which exceed the BRE and the BS 8206-2:2008 recommendations.

As noted previously in Section 9.3, where there are combined living/kitchen/dining areas within the development, these have been assessed as whole spaces against a 2% ADF target.

The results for the **Apartment Buildings** are summarised in the following tables.

Rooms Tested	No. Rooms
Total Bedrooms Tested	40
Total Living/Kitchen/Dining Areas Tested	20
Total Spaces Tested	60

Apartment Building Summary of Results (2% ADF Target for combined L/K/Ds)		%
Bedrooms Pass (1% ADF)	40	100%
L/K/D Areas Pass (2% ADF)	20	100%
Total Overall	60	100%

The results for the **Houses** are summarised in the following tables.

Rooms Tested (Houses)	No. Rooms
Total Bedrooms Tested	16
Total Kitchen/Dining Areas Tested (Houses)	6
Total Living Areas Only Tested (Houses)	6
Total Spaces Tested	28

Summary of Results (Houses)		%
Bedrooms Pass (1% ADF)	16	100%
K/D Areas Pass (2% ADF)	6	100%
Living Areas Pass (1.5% ADF)	6	100%
Total Overall	28	100%

Across the proposed development, 100% of the tested rooms in the Apartment Buildings and the Homes are achieving Average Daylight Factors (ADF) above the BRE and BS 8206-2:2008 guidelines when Living/Kitchen/Dining or Kitchen/Dining spaces are assessed as whole rooms against a 2% target.

10 Conclusion

The following can be concluded based on the studies undertaken:

10.1 Daylight Analysis of Existing Buildings

This study considers the proposed scheme and tests if the VSC results are greater than either 27% or 0.8 times their former value (that of the existing situation). Of the 105 points tested 100% exceed the BRE requirements.

10.2 Shadow Analysis

The shadow analysis illustrates different shadows being cast at three key times of the year (March 21st, June 21st and December 21st) for the existing scenario and then with the proposed development in place. It should be noted that sunlight is less prevalent during the winter months and as such the impact of overshadowing will be greatly reduced. Taking this into account, the overall impact of overshadowing can be classed as a negligible adverse impact given the position of the site to the west in relation to the existing buildings and the low-rise nature of the proposed development.

10.3 Sunlight to Existing and Proposed Amenity Spaces

All existing neighbouring amenities adjacent to the development site have been analysed in both the existing and proposed scenarios. The results highlight that in the proposed context the sunlight received in the neighbouring amenities continues to be the same, for the majority of the dwellings, as the existing scenario when measured against the 2 hours of sunlight on the 21st of March. Only two gardens have a negligible difference of 1% and 3%, thus all areas complying with BRE Guidelines.

On the 21st of March, the majority of the proposed garden amenity areas situated within the development site will receive at least 2 hours of sunlight on complying with the BRE recommendations. Of those that do not comply (23 of 109) it is simply as a result of their north facing position in relation to the proposed dwellings that they belong to.

Although this is the case on the 21st of March, the proposed public amenity areas provided within the development site will receive at least 2 hours of sunlight on 98% of their combined area, thus exceeding BRE recommendations.

The results included confirm these amenity areas will be quality spaces in terms of sunlight access.

10.4 Average Daylight Factors

Across the proposed development, 100% of the tested rooms in the Apartment Buildings and the Homes are achieving Average Daylight Factors (ADF) above the BRE and BS 8206-2:2008

guidelines when Living/Kitchen/Dining or Kitchen/Dining spaces are assessed as whole rooms against a 2% target.

10.5 Observations

It should be noted that the guidance in the BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice' is not mandatory and the 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'*.

Whilst the results shown relate to the criteria as laid out in the BRE guidance targets it is important to note that the BRE targets have been drafted primarily for use in low density suburban development and should therefore be used with flexibility and caution when dealing other types of sites. Despite the above, the site performs well in relation to the metrics considered in this report.

In addition, the BS 8206-2:2008 it also notes, "*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.*"

The approach within this report is further supported by the national policy guidance noted in the Sustainable Urban Housing: Design Standards for New Apartments, Section 6.7 which states:

"*Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to 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*."

Taking all of the above information into account, overall the results demonstrate that the proposed development performs well when compared to the BRE recommendations in the BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" by Paul Littlefair, 2011 sometimes referred to as BRE Digest 209 and the "BS 8206-2:2008: Lighting for Buildings - Part 2: Code of Practice for Daylighting".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