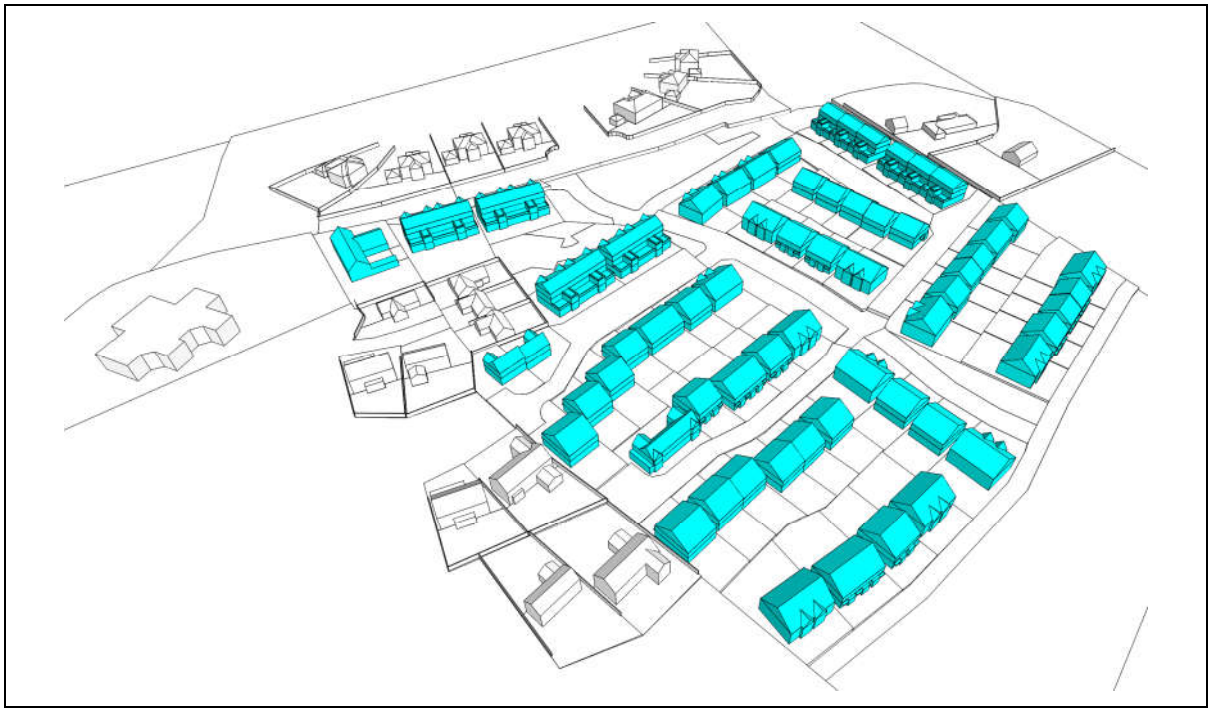
Report for: Cairn Homes Properties Ltd

Project No: 15221

Proposed Residential Development at Enniskerry, County Wicklow

Daylight, Sunlight and Overshadowing Study



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Issued For:	**Prepared by:**	**Checked by:**	
Final Report	Douglas Allan Senior Project Consultant	Douglas Bell Project Manager	
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1 Contents

Executive Summary

This report details the analysis undertaken to quantify the Sunlight / Daylight performance of the proposed residential development at Enniskerry, County Wicklow. The report focuses on measuring the daylight impact to the surrounding dwellings when compared to the existing situation. It also considers the impact to daylight and sunlight when considering the proposed design itself. The following can be concluded based on the preliminary studies undertaken:

Shadow Analysis

The Shadow analysis shows different shadows being cast from the existing and proposed schemes at particular periods throughout the year. Overall the impact of overshadowing would be classed as a negligible adverse impact given the following.

- **Enniskerry Demesne (North)**

No additional shading visible from the proposed development on these residential property during March and June with minimal overshadowing during *December to some of the properties. It should also be noted that there is extensive tree coverage between the proposed site and these existing properties and as such during the winter months the shadows cast will be from said trees and not the proposed development.

- **Pineheights/Tinnabeg (East)**

No additional shading visible from the proposed development on these existing residential properties during the months of March, June and December.

- **Powers Court National School (West)**

No additional shading visible from the proposed development on the existing School during the months of March, June and December.

- **Powers Court Estate (Permitted Development 19/871) (West)**

Minimal additional shading is noted in the early mornings of March and December. No additional shading is visible from the proposed development on the existing properties at any other period.

* 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. As noted above, there is extensive tree coverage between the proposed site and these existing properties and therefore during the winter months the shadows cast will be from said trees and not the proposed development.

The potential impact is further quantified via the Daylight Analysis of Existing Buildings, Annual Probable Sunlight Hours and Sunlight to Existing Amenities sections within this report.

Sunlight to Existing and Proposed Amenity Spaces

As mentioned in Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight, for a space to appear adequately sunlit throughout the year, at least 50% of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.

All of the private existing amenity areas tested out with the development site would continue to be quality spaces in terms of sunlight received exceeding BRE recommendations. The proposed development would have a negligible adverse impact to these existing gardens.

On the 21st of March, the proposed amenity spaces provide across the development site as a whole would receive at least 2 hours of sunlight across 92% of their area, exceeding BRE recommendations. The crèche play area itself would receive 2 hours of sunlight across 63% of its area, again exceeding the BRE recommendations for sunlight and highlighting these will be quality spaces in terms of sunlight.

Daylight Analysis of Existing Buildings

The Vertical Sky Component for 99% (145 of 147) of the points tested have a value greater than 27% or not less than 0.8 times their former value (that of the Existing Situation), exceeding the BRE recommendations.

The remaining two points from the permitted development have values of 15% and 25% with a large windows in place. In addition these windows are I of 3 light sources to the space beyond and therefore should continue to receive adequate daylight. The results are to be expected in a typical modern housing development like this.

Given the comments above there would be a minor adverse effect to these proposed neighbouring dwellings with an overall negligible adverse impact from the development as a whole.

Annual Probable Sunlit Hours

The Annual Probable Sunlit Hours (APSH) for 100% of the points tested have an annual value greater than 25% and a winter value greater than 5% or not less than 0.8 times their former values (that of the Existing Situation), exceeding the BRE recommendations. Given the comments above there would be a negligible adverse effect to these existing neighbouring dwellings.

Average Daylight Factors

95% of the rooms sampled across the development within the apartments are achieving Average Daylight Factors (ADF) above the recommended minimum average daylight factors as noted within the BRE guidelines. This increases to 100% when the living spaces are assessed individually as the main living spaces as discussed above. It can be expected that the results from of the development as a whole would perform to the same high level.

Observations

It should be noted that the guidance in 'Site layout planning for daylight and sunlight: a guide to good practice' is not mandatory and the Report 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 very well in relation to the metrics considered in this report.

Overall the results demonstrate that the proposed development performance exceeds 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.

2 Introduction

2.1 Analysis Undertaken

This report details the analysis undertaken to quantify the Sunlight / Daylight performance of the proposed Enniskerry residential development. The report focuses on measuring the daylight impact to the surrounding dwellings when compared to the existing situation. It also considers the impact to daylight and sunlight when considering the proposed design itself. The following can be concluded based on the preliminary studies undertaken:

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

- **Shadow Analysis** - a visual representation analysing any potential changes that may arise from the proposed development to neighbouring existing developments.
- **Sunlight to Existing & Proposed Amenity Spaces** – via solar analysis on the 21st of March.
- **Daylight Analysis of Existing Buildings** - via consideration of Vertical Sky Component (VSC).
- **Annual Probable Sunlight Hours of Existing Buildings (APSH)** - via an annual sunlight hour's analysis.
- **Average Daylight Factors** – via average daylight factor calculations carried for floor plans across the site of the proposed development.

The analysis was completed using IES VE software and the assessment based on recommendations given in BRE 'Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" by Paul Littlefair, 2011 sometimes referred to as BRE Digest 209.

2.2 Development Description

The development will consist of the construction of 165 no. dwellings and associated ancillary infrastructure as follows:

A) 105 no. 2 storey houses (49 no. 3 bedroom houses [House Types B, B1, & B2], 56 no. 4 bedroom houses [House Types A, D, E & E1];
B) 56 no. apartments/duplex apartments in 6 no. 3 storey buildings – (28 no. 2 bedroom apartments and 28 no. 3 bedroom duplex apartments) all with terrace;
C) 4 no. 1 bedroom Maisonette dwellings in a 2 storey building;
D) Part 2-storey and single storey creche (c. 510 sq. m - including storage);
E) Open space along southern boundary of c. 0.93 hectares [with pedestrian connections to boundary to 'Lover's Leap Lane' to the south and to boundary to the east and west], hard and soft landscaping (including public lighting) and open space (including boundary treatment), communal open space for duplex apartments; regrading/re-profiling of site where required [including import/export of soil as required] along with single storey bicycle/bin stores and ESB substation;
F) Vehicular access (including construction access) from the Cookstown Road from a new junction as well as 313 no. car parking spaces and 150 no. cycle spaces;

G) Surface water attenuation measures and underground attenuation systems as well as connection to water supply, and provision of foul drainage infrastructure (along the Cookstown Road to existing connection at junction with R760) and provision of underground local pumping station to Irish Water specifications;
H) 3 no. temporary (for 3 years) marketing signage structures [2 no. at the proposed entrance and 1 no. at the junction of the R760 and the Cookstown Road] and a single storey marketing suite (c. 81 sq.m) within site;
I) All ancillary site development/construction/landscaping works, along with provision of footpath/public lighting to Powerscourt National School pedestrian entrance and lighting from Powerscourt National School entrance to the junction of the R760 along southern side of Cookstown Road and pedestrian crossing across Cookstown Road.

3 Methodology

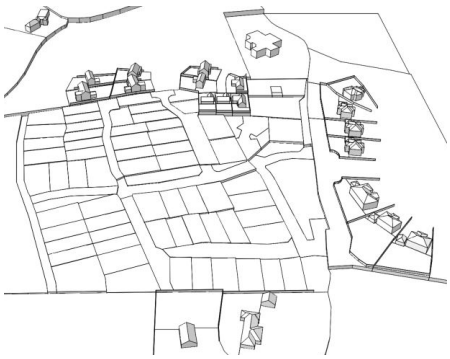
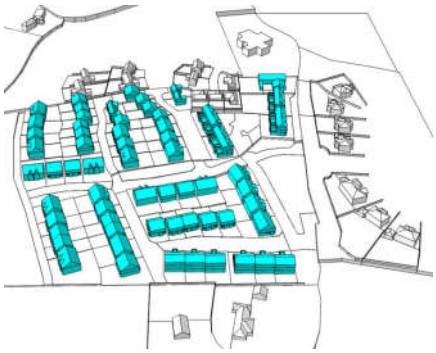
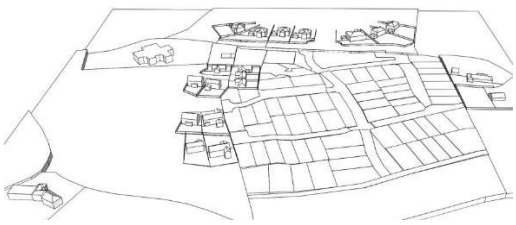
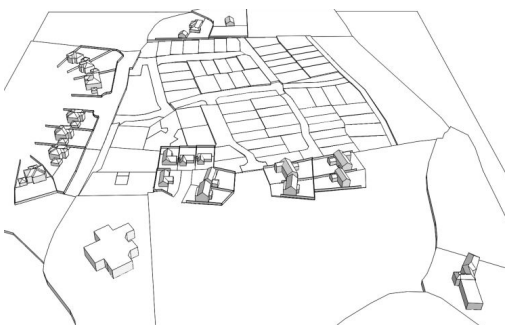
3.1 Orientation

The model orientation is taken from drawings provided by the Architect with the resulting angle shown below.

Orientation

3.2 Model Geometry

The following images show the model 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 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 housing while not obstructing light to existing homes nearby.

The BRE Report, "Site layout planning for daylight and sunlight: a guide to good practice (BR209)", advises on planning developments for good access to daylight and sunlight, and is widely used by local authorities to help determine the impacts 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 as follows;

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.

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)*

Conventional Windows

The BRE Guide talks about Conventional window design based on the discussions around these it could be determined that this term refers to windows typical with a sill height of 800mm – 1000mm as shown in the images below.

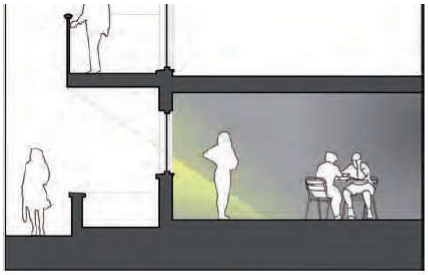


Figure 10: Balconies and projecting access ways can restrict daylight to rooms lit by windows below them

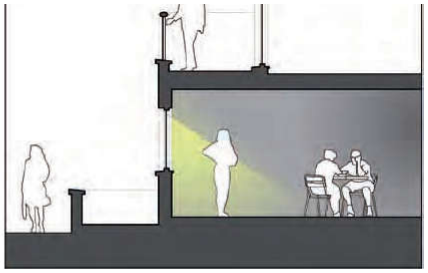
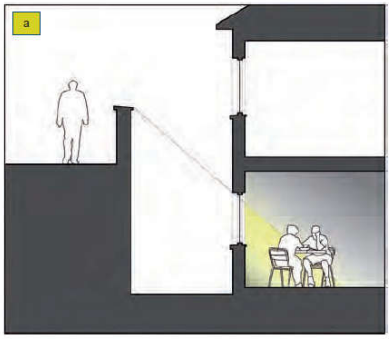
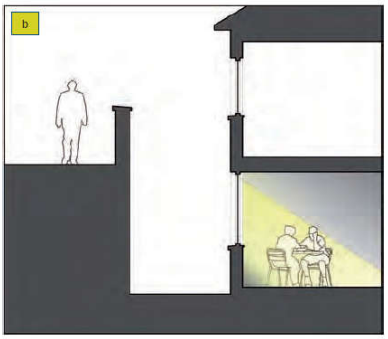


Figure 11: Section showing stepped back rooftop access ways. This gives improved daylight compared to a conventional section (see Figure 10).





4.2 Potential Sensitive Receptors

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

Inset plan	
	
	Site
	Enniskerry Demesne
	Pineheights, Tinnabeg
	Powerscourt Estate (Permitted Development 19/871)
	Powerscourt National School

5 Shadow Analysis

The statistics of Met Eireann, the Irish Meteorological Service, show the sunniest months in Ireland are May and June.

The following can also be shown:

- During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.4 hours sunlight each day, i.e. only 22% of potential sunlight hours.
- During June, Dublin receives a mean daily duration of 6.4 hours of sunlight out of a potential 16.7 hours sunlight each day, i.e. only 38% of potential sunlight hours.

Therefore, impact caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months. It is noted existing trees along with boundary walls would cast shadows during the winter months without the proposed development in place.

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

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

These images will show shadows cast for clear conditions with no clouds, assuming the sun is visible for every hour shown. To note, as mentioned previously, trees are not included within this assessment, but would have a significant effect given their maturity. The subsequent images portray the worst case scenario.

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		

5.1.2 June 21st

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

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

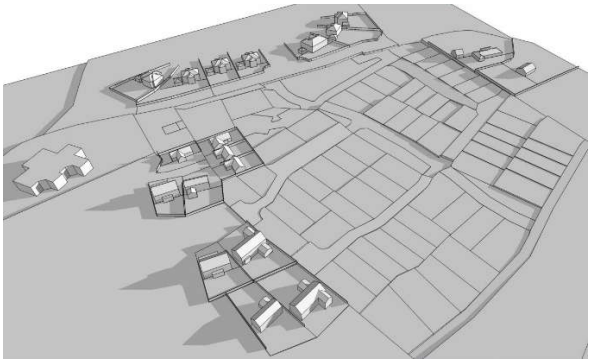
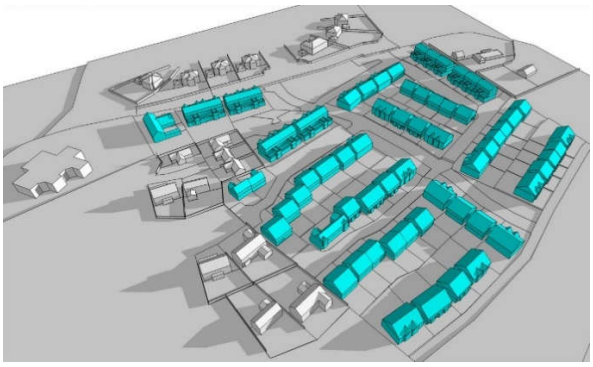
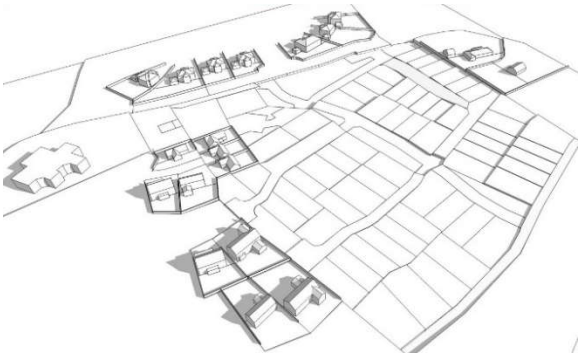
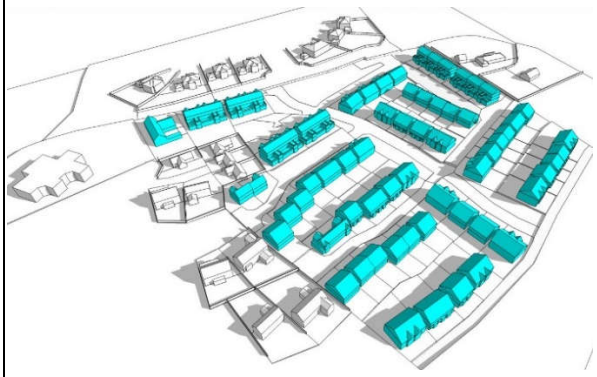
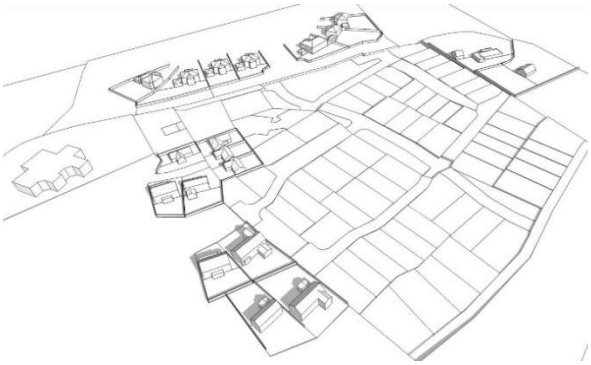
5.1.3 December 21st

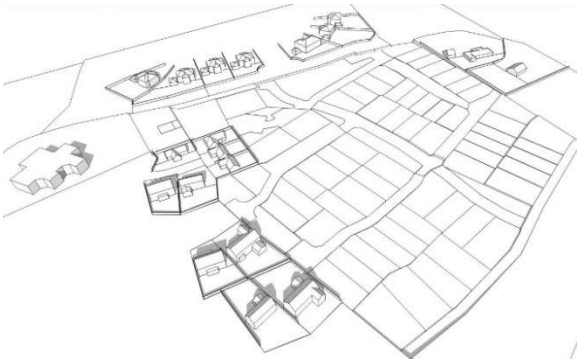
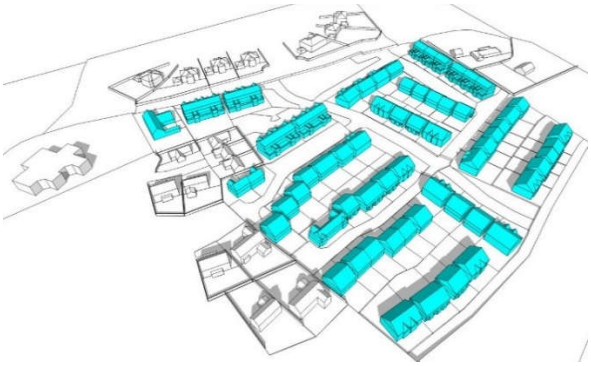
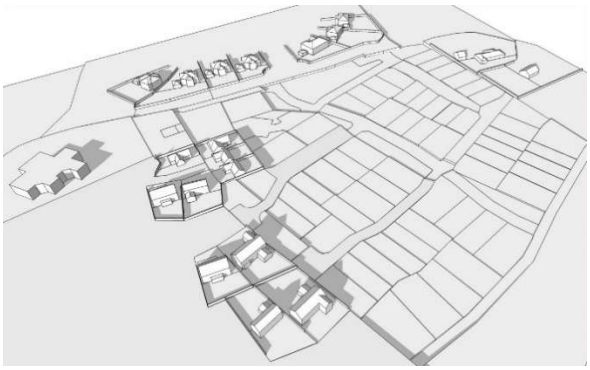
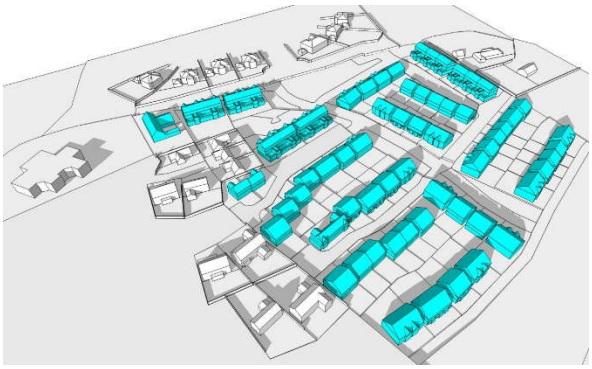
	Existing	Proposed
December 21st - 8:00		
December 21st - 10:00		
December 21st - 12:00		

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

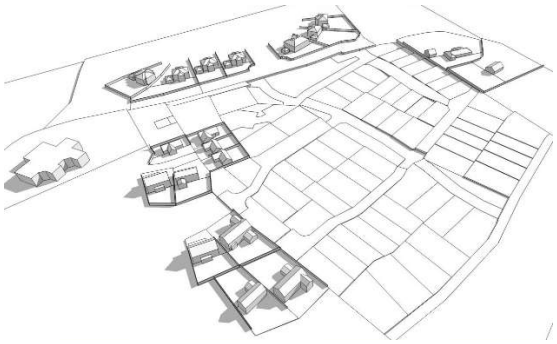
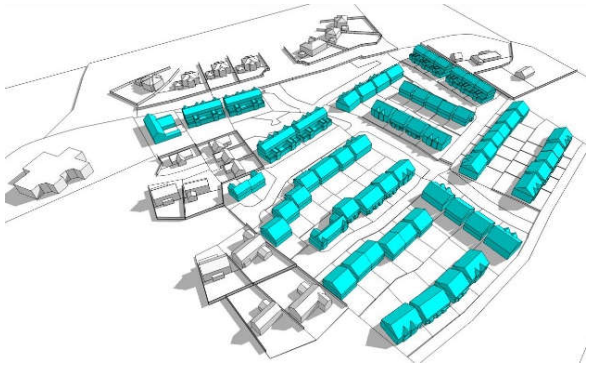
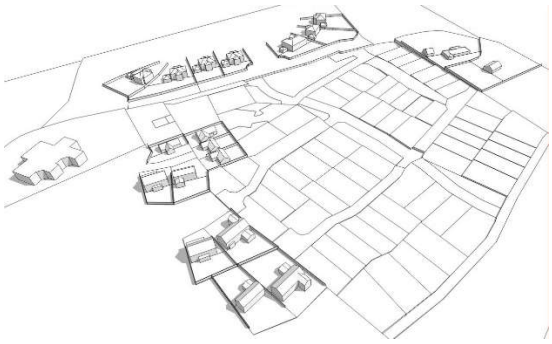
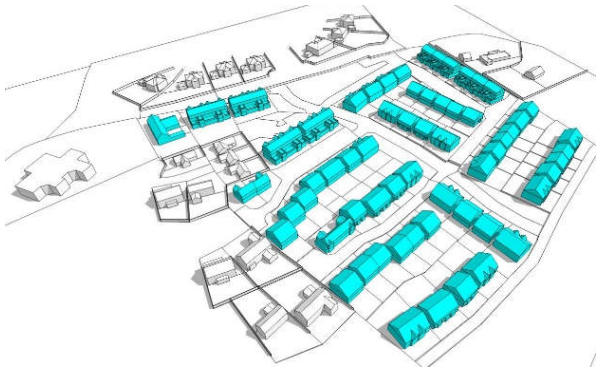
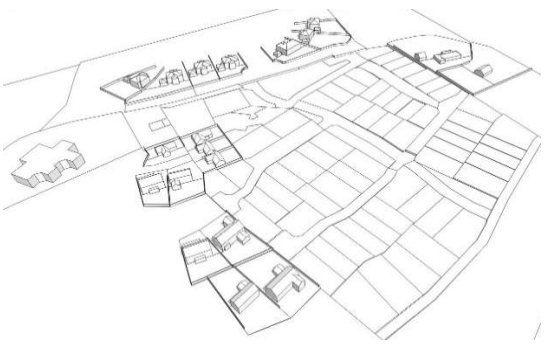
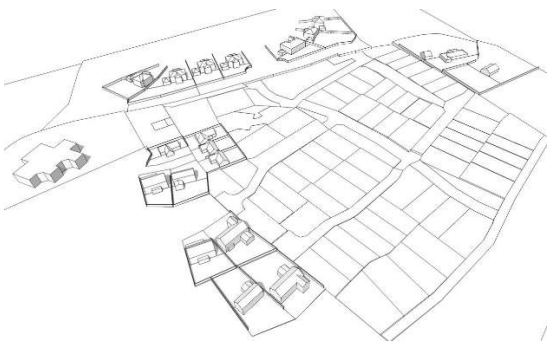
5.2 3D View South West

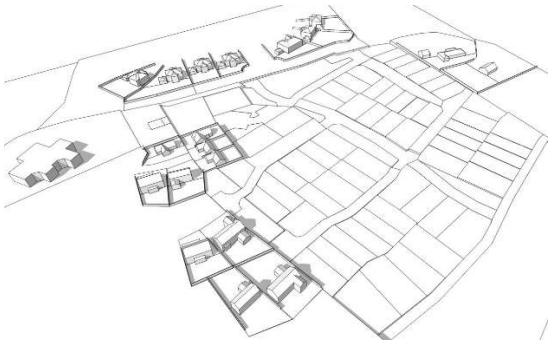
5.2.1 March 21st

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

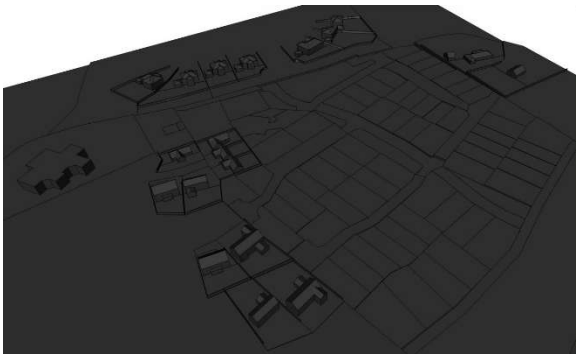
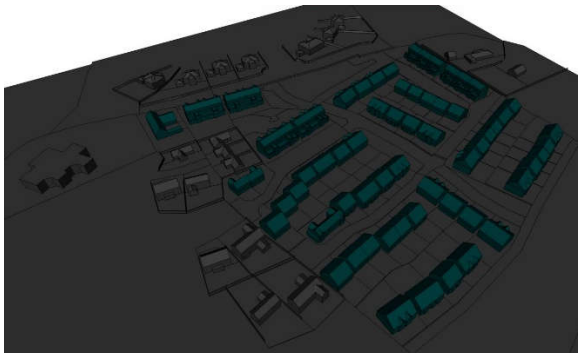
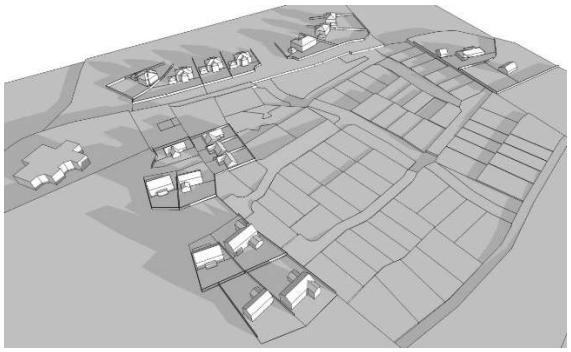
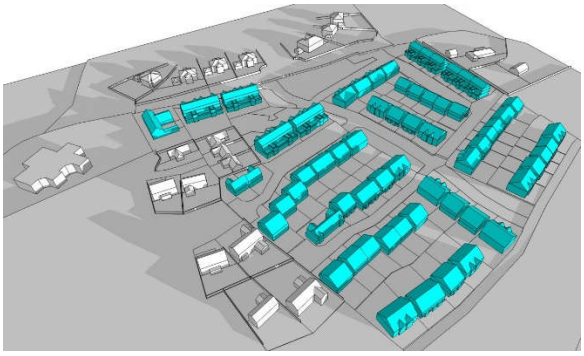
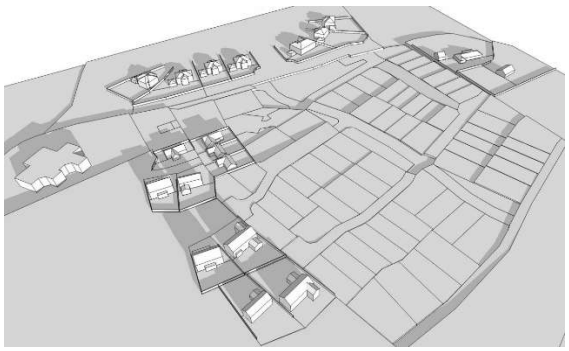
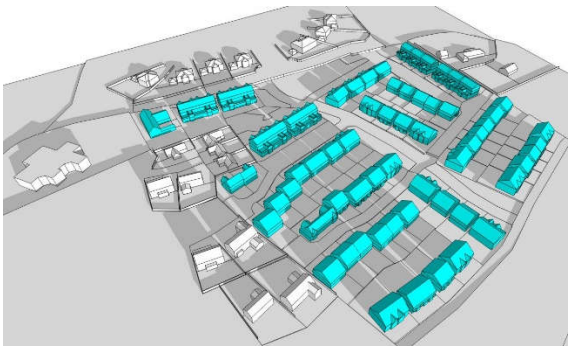
March 21st - 14:00		
March 21st - 16:00		

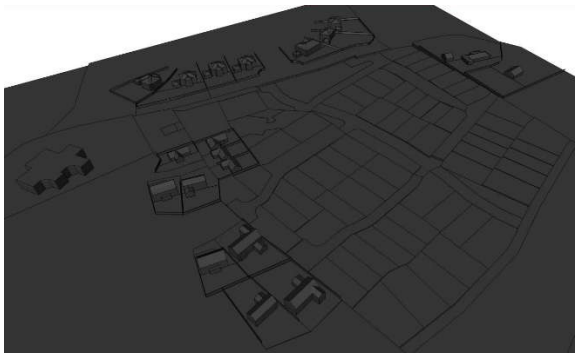
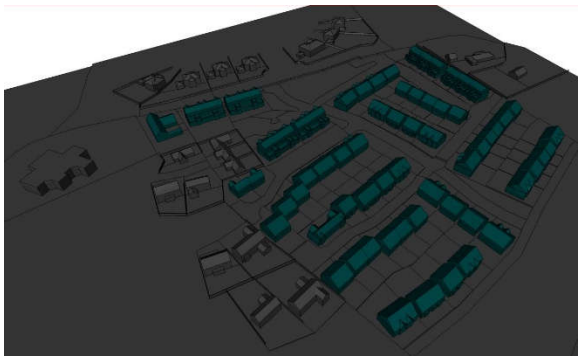
5.2.2 June 21st

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

June 21st - 16:00		

5.2.3 December 21st

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

December 21st - 16:00		

5.3 Shadow Analysis Discussion

Shading from the proposed development is summarised as follows based on the analysis of the preceding images:

- **Enniskerry Demesne (North)**

No additional shading visible from the proposed development on these residential property during March and June with minimal overshadowing during *December to some of the properties. It should also be noted that there is extensive tree coverage between the proposed site and these existing properties and as such during the winter months the shadows cast will be from said trees and not the proposed development.

- **Pineheights/Tinnabeg (East)**

No additional shading visible from the proposed development on these existing residential properties during the months of March, June and December.

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No additional shading visible from the proposed development on the existing School during the months of March, June and December.

- **Powers Court Estate (Permitted Development 19/871) (West)**

Minimal additional shading is noted in the early mornings of March and December. No additional shading is visible from the proposed development on the existing properties at any other period.

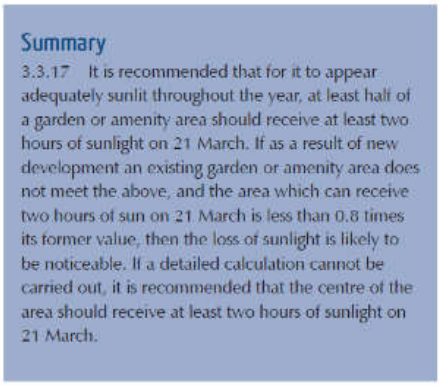
* Overshadowing can be expected in December when the sun is lower in the sky and shadows cast are much longer. Although this is the case, overshadowing is least noticeable during the winter months as there is a lot less sunlight available at this time of year and so the overall impact is vastly reduced. As noted above, there is extensive tree coverage between the proposed site and these existing properties and as such during the winter months the shadows cast will be from said trees and not the proposed development.

Overall the potential impact of overshadowing would be classed as a negligible adverse impact given the comments above and is further quantified via the Daylight Analysis of Existing Buildings and Sunlight To Existing Amenity Spaces sections within this report.

6 Sunlight to Existing & Proposed Amenity Spaces

6.1 Guidance Requirements

The impact of the development proposal on the sunlight availability in the amenity areas will be considered to determine how the amenities perform when assessed against the BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight 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.

BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight states in 3.3.17 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.

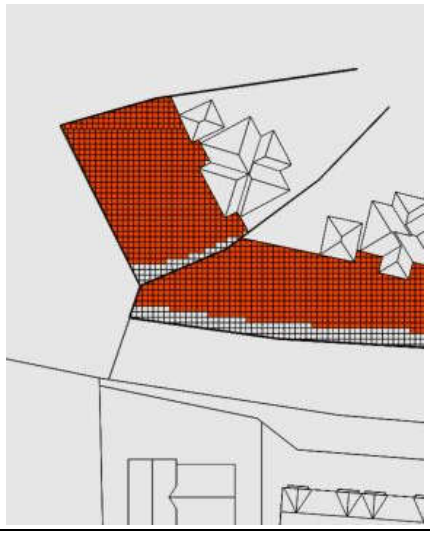
The following images shows the predicted results with respect to this space receiving at least 2 hours of sunlight on 21st March, across the gridded cells. Any gridded cells area below 2 hours are shown as grey.

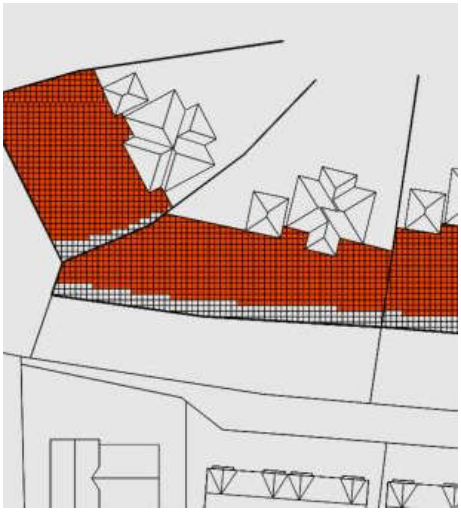
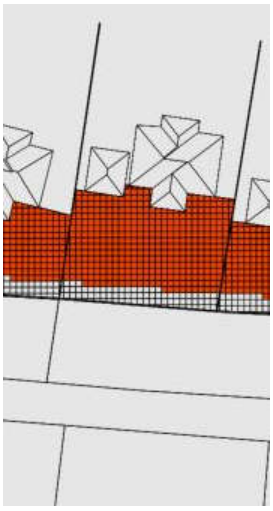
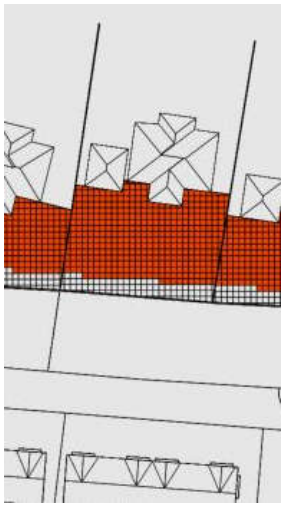
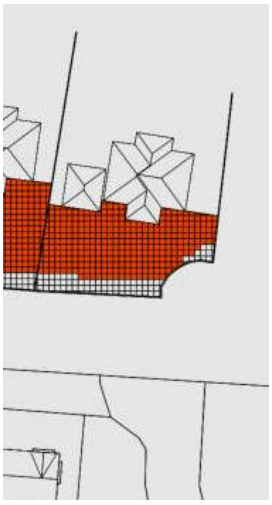
6.2 Existing Amenity Areas

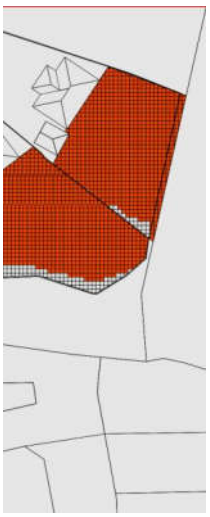
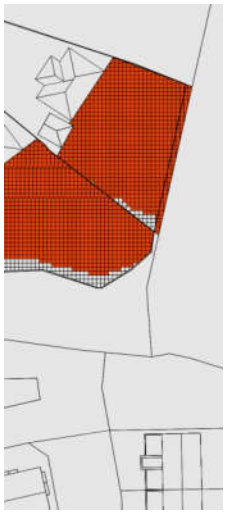
As stated above, for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least 2 hours of sunlight on 21st March.

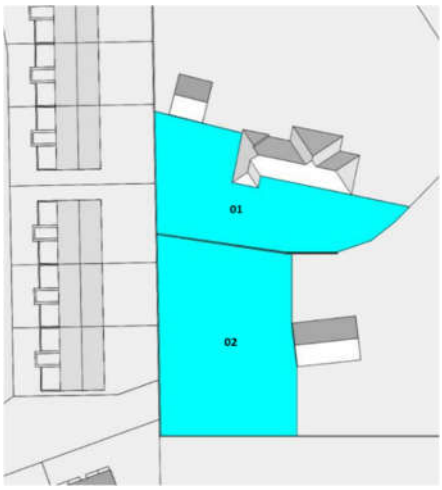
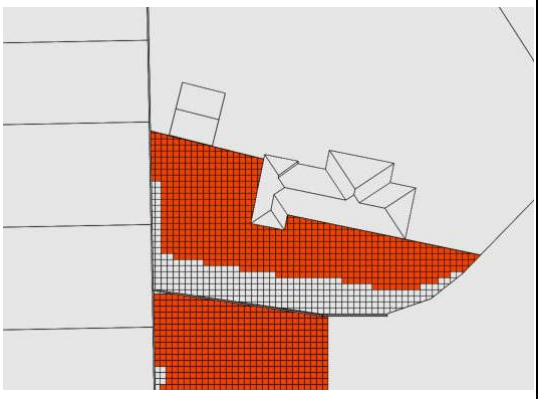
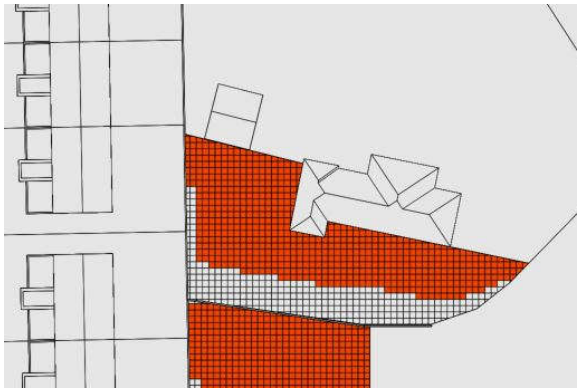
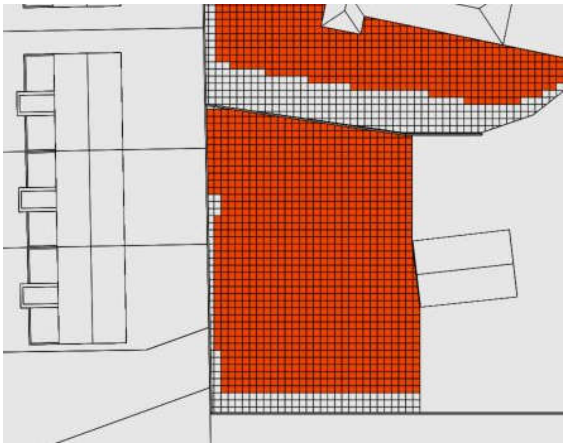
This analysis will be performed on the amenity spaces shown in the images below for the existing and proposed scenarios:

6.2.1 Existing Residential Amenity Areas

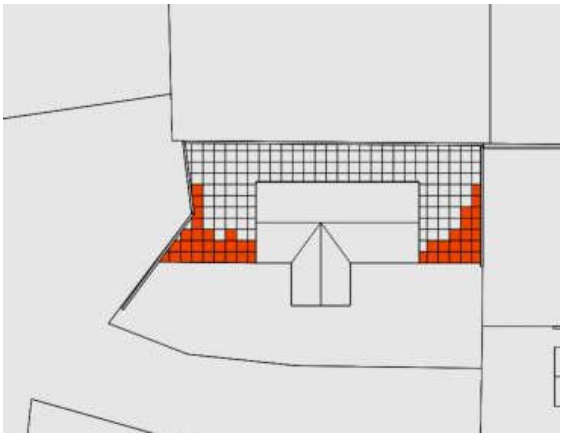
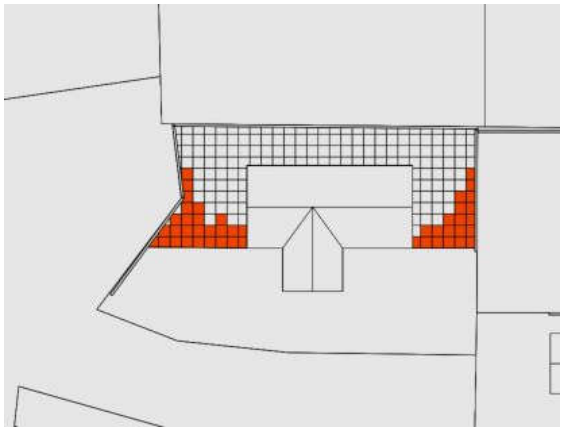
<table>
<tr><td></td><td colspan="2">Enniskerry Demesne – Rear Gardens - Hours > 2 in red</td></tr>
<tr><td></td><td colspan="2"> 
</td></tr>
<tr><td></td><td>Existing</td><td>Proposed</td></tr>
<tr><td>01 – 4 Enniskerry Demesne</td><td>  </td><td>  </td></tr>
</table>

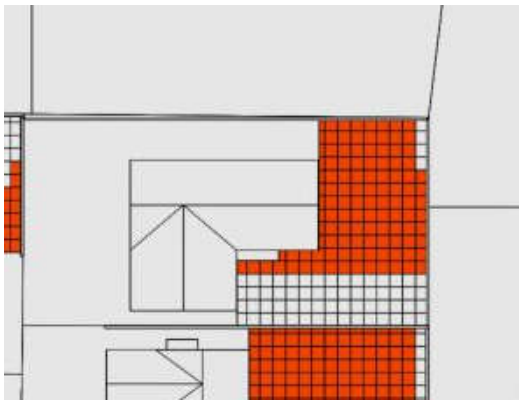
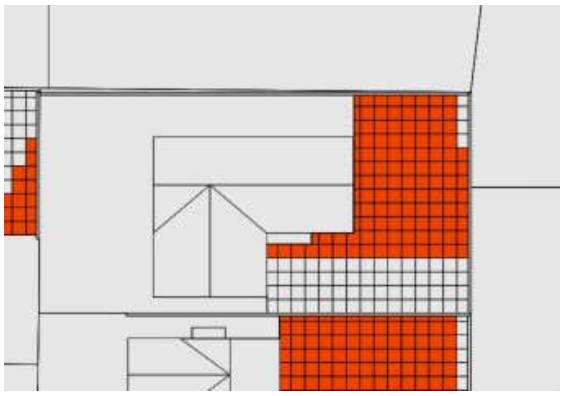
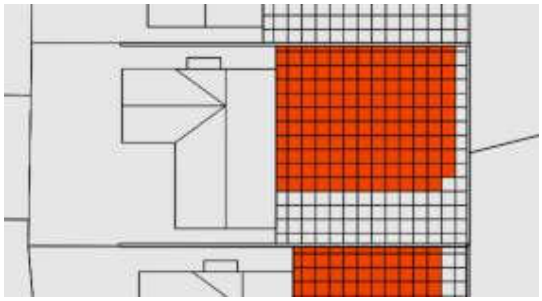
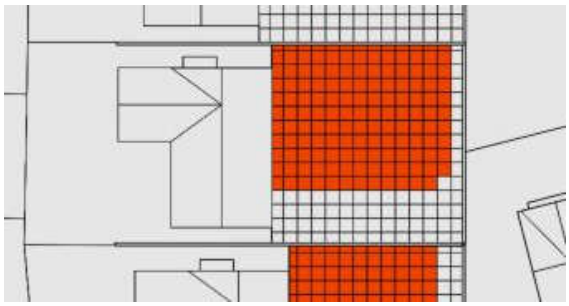
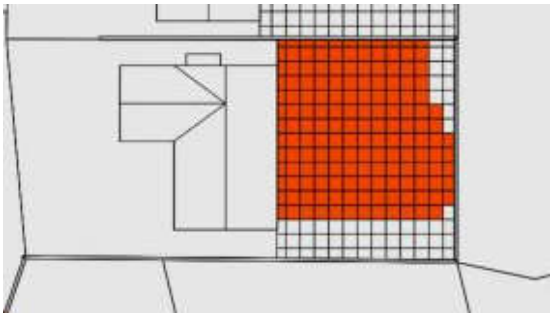
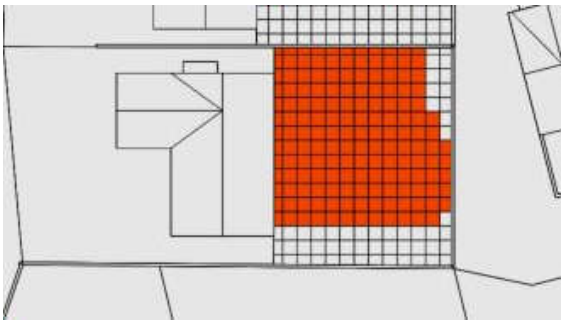
02 – 3 Enniskerry Demesne		
03 – 2 Enniskerry Demesne		
04 – 1 Enniskerry Demesne		

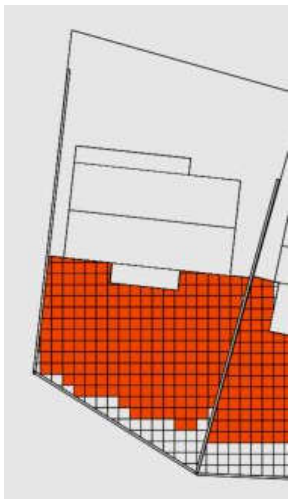
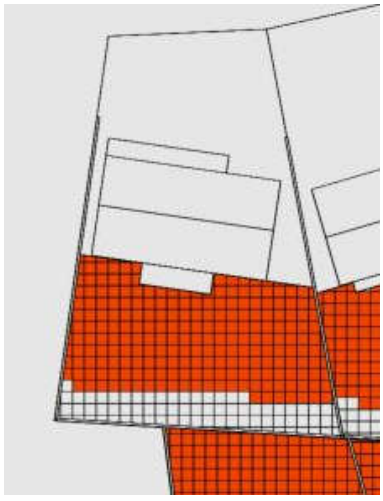
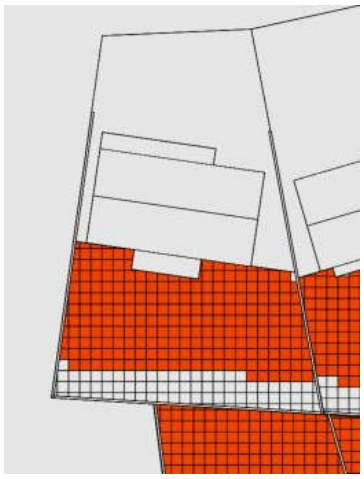
05 – 14 Enniskerry Demesne		
06 – 9 Enniskerry Demesne		
07 – 10 Enniskerry Demesne		

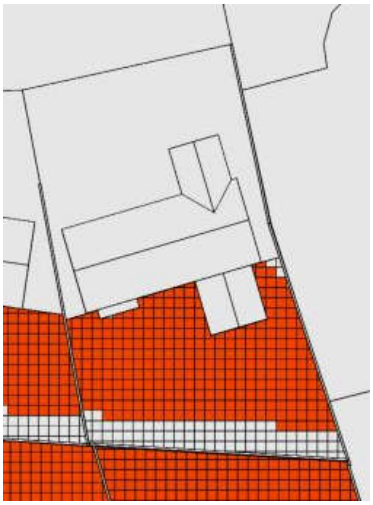
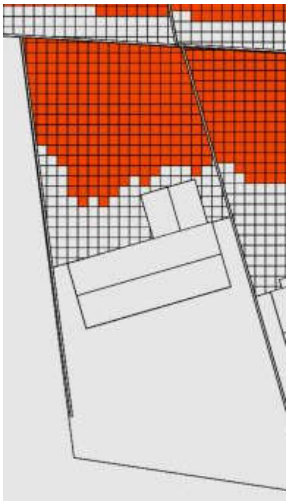
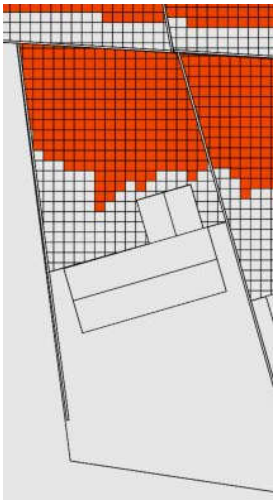
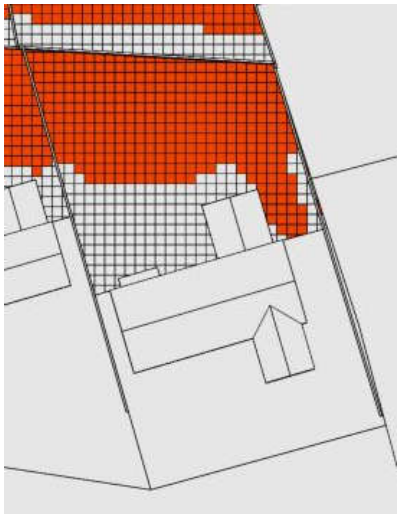
	Pineheights / Tinnabeg – Rear Gardens - Hours > 2 in red	
		
	Existing	**Proposed**
01 – Pineheights		
02 – Tinnabeg		

	Enniskerry Estate (Permitted Development 19/871) – Rear Gardens - Hours > 2 in red
	

	Existing	Proposed
01: 27 Enniskerry Estate		

02: 26 Enniskerry Estate		
03: 25 Enniskerry Estate		
04: 24 Enniskerry Estate		

05: 22 Enniskerry Estate		
06: 23 Enniskerry Estate		
07: 14 Enniskerry Estate		

08: 13 Enniskerry Estate		
09: 11 Enniskerry Estate		
10: 12 Enniskerry Estate		

6.2.2 Observations

Inspection of the images above highlights that the proposed development has no observable effect on sunlight received to the rear gardens of the existing properties out with the development site. Number 11 and 12 Enniskerry Estate have a minor change to sunlight received, but both will still be quality amenity spaces in terms of sunlight received. For clarity the following table details this minor change.

Reference	Property Address	Area (m^2)	Existing > 2 Hours (m^2)	Proposed > 2 Hours (m^2)	Existing > 2 Hours %	Proposed > 2 Hours %
9	No 11 Enniskerry Estate	311	236	225	76%	72%
10	No 12 Enniskerry Estate	464	327	275	70%	59%

6.2.3 Existing Neighboring School Amenity Area

	Powerscourt National School - Hours > 2 in red	
		
	Existing	**Proposed**
01 – Pineheights		

6.2.4 Observations

Inspection of the images above highlights that the proposed development has no observable effect on sunlight received to the amenity area of the existing Enniskerry National School, out with the development site.

6.3 Proposed Amenity Areas

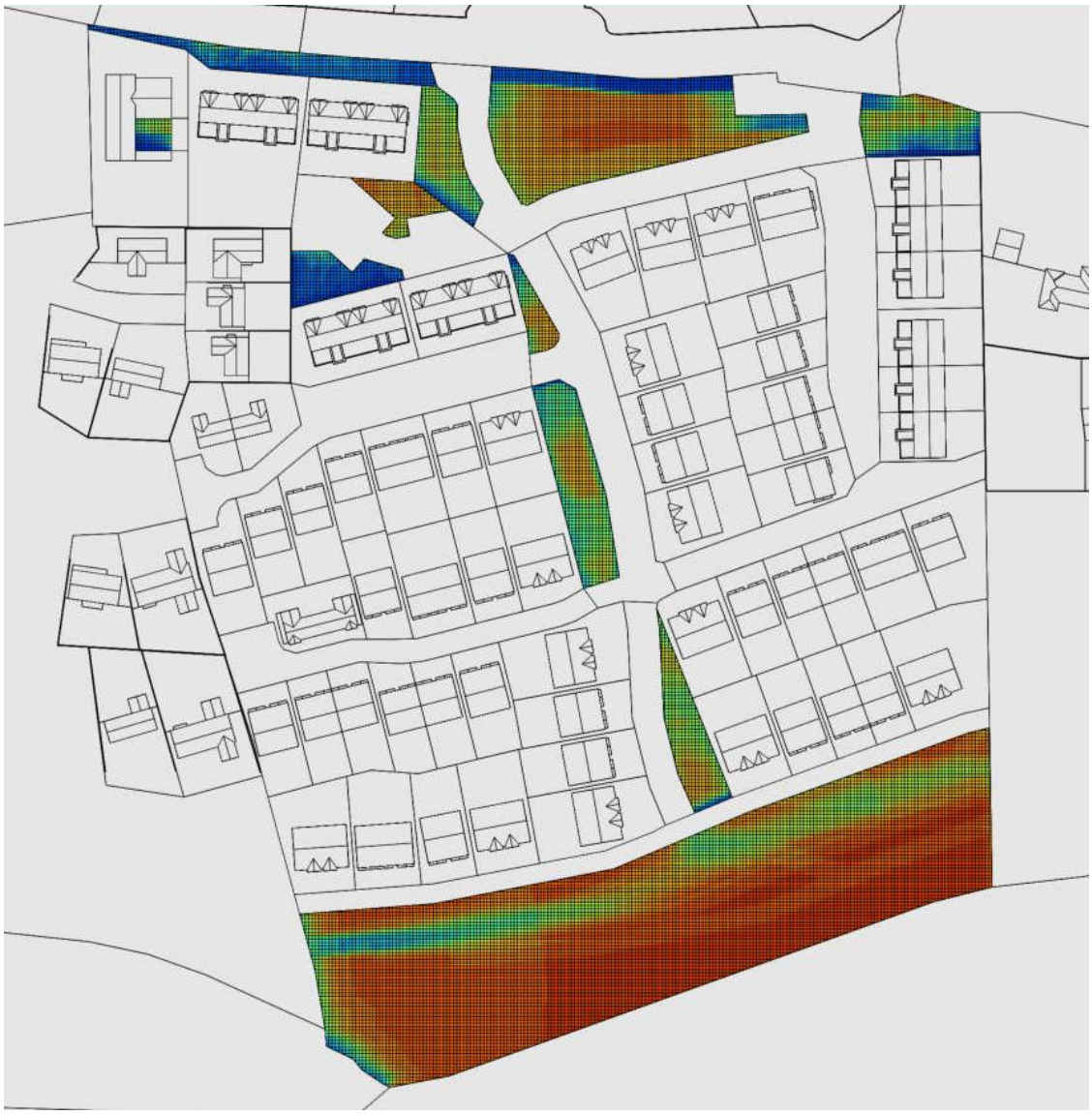
As stated above, for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least 2 hours of sunlight on 21st March.

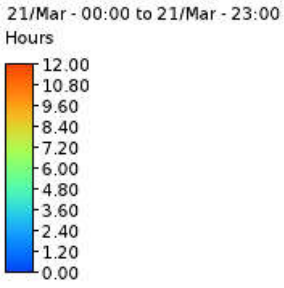
This analysis will be performed on the amenity spaces shown in the images below:

6.4 Proposed Solar Amenity Results

The following images show the predicted results with respect to the proposed building amenity areas that are receiving at least 2 hours of sunlight on 21st March, across the gridded cells.

Absolute Scale showing all hours of sunlight received





Hours > 2 in red

Receives more than 2 hours of sunlight

Receives less than 2 hours of sunlight

Reference	Area (m^2)	Area > 2 Hours (m^2)	Percentage > 2 Hours %
Crèche Play Area	104	66	63%
Public & Communal Amenities	15,386	14,196	92%

6.5 Solar Amenity Discussion

As mentioned in Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight, 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.

On the 21st of March, the proposed amenity spaces provide across the development site as a whole would receive at least 2 hours of sunlight across 92% of their area, exceeding BRE recommendations. The crèche play area itself would receive 2 hours of sunlight across 63% of its area, again exceeding the BRE recommendations for sunlight and highlighting these will be quality spaces in terms of sunlight.

7 Daylight Analysis of Existing Buildings (VSC)

7.1 Guidance Requirements

BRE Site layout planning for daylight and sunlight (Section 2.2)

When designing a new development, it is important to safeguard the daylight to nearby buildings. The BRE's 2011 guidance provide 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 Permitted 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 finding the vertical sky component at the centre of key reference points. The vertical sky component definition from the BRE's 2011 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 the Radiance module of the IES VE software.

For typical Schemes the BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight which 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 the primary purpose of this analysis is to check that the existing buildings are above the 27% or not less than 0.8 times their former value (that of the Existing Situation) when modelled.

7.1.1 VSC Values

The BRE Guide also states the following in Section 2.1.6 that the amount of daylight a room needs depends on what it is being used for, but roughly speaking if the VSC is:

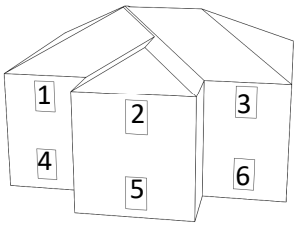
- ≥ 27%, conventional window design will usually give reasonable results
- between 15 % and 27 % special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight

As such these values will be referred to as part of the analysis of the adjacent properties.

It should be taken into consideration that for the purposes of this report, window positions in some cases have been estimated but are considered representative and sufficient to undertake the assessment.

7.2 Assessment – Enniskerry Demesne

1 Enniskerry Demesne

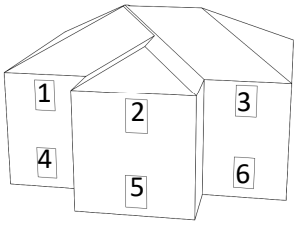


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	36.3	35.44	98%	✓
2	38.67	37.89	98%	✓
3	36.03	35.53	99%	✓
4	29.77	28.23	95%	✓
5	38.11	36.96	97%	✓
6	31.03	29.89	96%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

2 Enniskerry Demesne

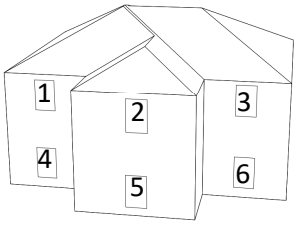


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	35.45	34.44	97%	✓
2	38.52	37.5	97%	✓
3	36.52	35.64	98%	✓
4	28.36	26.47	93%	✓
5	38.02	35.85	94%	✓
6	31.84	30.03	94%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

3 Enniskerry Demesne

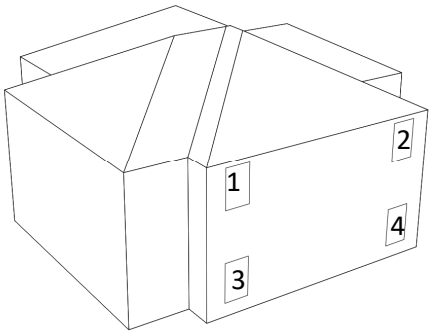


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	35.74	34.98	98%	✓
2	38.34	36.88	96%	✓
3	35.53	34.38	97%	✓
4	28.3	26.38	93%	✓
5	38.02	35.02	92%	✓
6	29.72	27.23	92%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

4 Enniskerry Demesne

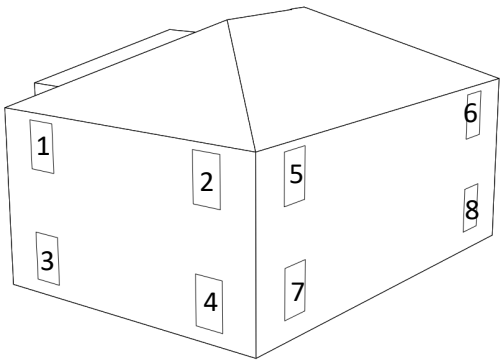


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	38.13	37.76	99%	✓
2	38.13	37.67	99%	✓
3	36.73	35.9	98%	✓
4	35.02	34.56	99%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

10 Enniskerry Demesne

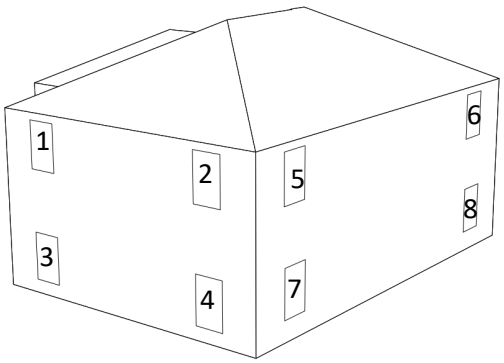


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	37.15	37.21	100%	✓
2	37.96	37.71	99%	✓
3	28.29	28.77	100%	✓
4	6.86	7.46	100%	✓
5	39.05	39.76	100%	✓
6	39.11	39.7	100%	✓
7	38.14	38.82	100%	✓
8	39	39.57	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

9 Enniskerry Demesne

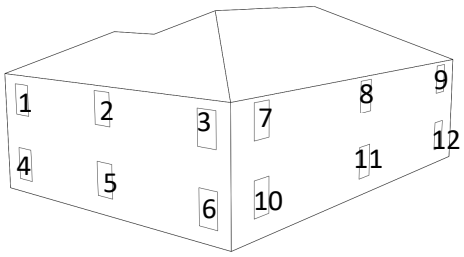


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	37.12	37.31	100%	✓
2	37.62	37.42	99%	✓
3	31.12	31.77	100%	✓
4	10.85	11.26	100%	✓
5	39.01	39.14	100%	✓
6	39.15	39.16	100%	✓
7	38.4	38.43	100%	✓
8	38.47	38.33	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

14 Enniskerry Demesne

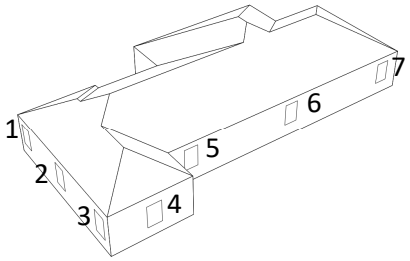


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	38.57	38.91	100%	✓
2	38.56	38.6	100%	✓
3	38.5	38.77	100%	✓
4	35.74	36.27	100%	✓
5	26.93	27.08	100%	✓
6	36.21	36.91	100%	✓
7	38.93	38.65	99%	✓
8	38.95	38.84	100%	✓
9	38.92	38.88	100%	✓
10	38.67	38.01	98%	✓
11	38.57	38.06	99%	✓
12	38.57	37.98	98%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

7.3 Assessment – Pine Heights, Tinnabeg

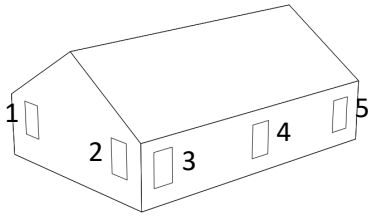


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	35.72	33.23	93%	✓
2	36.9	33.32	90%	✓
3	37.85	33.34	88%	✓
4	37.86	36.51	96%	✓
5	33.72	33.81	100%	✓
6	37.67	37.28	99%	✓
7	37.31	37.2	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

Tinnabeg



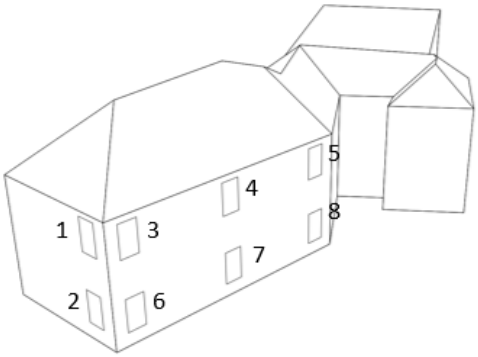
Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	38.63	36.61	95%	✓
2	38.72	37.09	96%	✓
3	38.96	39.22	100%	✓
4	39.04	39.51	100%	✓
5	38.94	39.52	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

7.4 Assessment – The Lodge

The Lodge



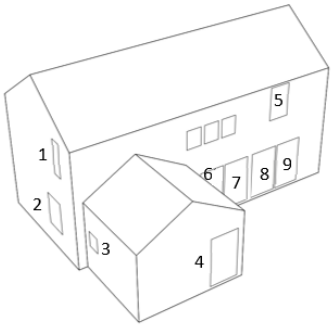
Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	39.11	39.9	100%	✓
2	39.12	39.98	100%	✓
3	39.22	39.95	100%	✓
4	39.08	39.97	100%	✓
5	38.95	39.79	100%	✓
6	39.04	39.9	100%	✓
7	38.93	39.76	100%	✓
8	38.6	39.43	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

7.5 Assessment – Powerscourt Estate (Permitted Development 19/871)

11 Powerscourt Estate

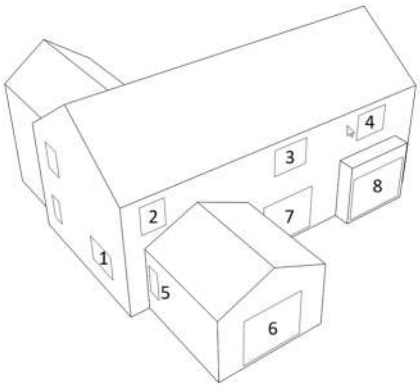


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	37.13	37.25	100%	✓
2	34.06	33.45	98%	✓
3	33.21	33.51	100%	✓
4	35.59	36.13	100%	✓
5	37.95	38.61	100%	✓
6	29.11	29.96	100%	✓
7	33.21	33.74	100%	✓
8	35	35.74	100%	✓
9	35.48	36.54	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

12 Powerscourt Estate



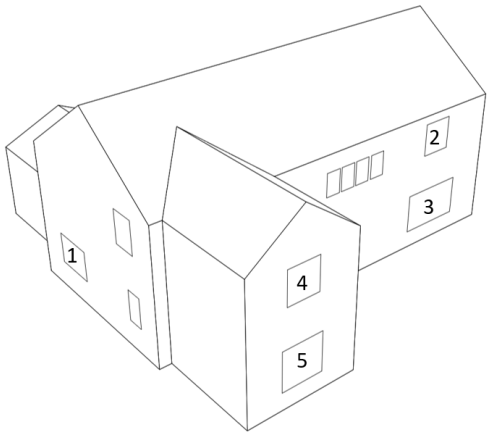
Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	39.13	25.78	66%	✓ⓘ
2	37.84	37.55	99%	✓
3	37.38	37.38	100%	✓
4	35.98	35.83	100%	✓
5	29.69	26.3	89%	✓
6	36.21	35.55	98%	✓
7	30.22	30.33	100%	✓
8	31.6	31.55	100%	✓

The following conclusions can be made: -

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

✓ⓘ This point is just out with the recommendations and has a large window in place as well as being 1 of 3 light sources to the space beyond therefore should continue to receive adequate daylight. This result is to be expected in a typical modern housing development like this., therefore should continue to receive adequate daylight.

13 Powerscourt Estate



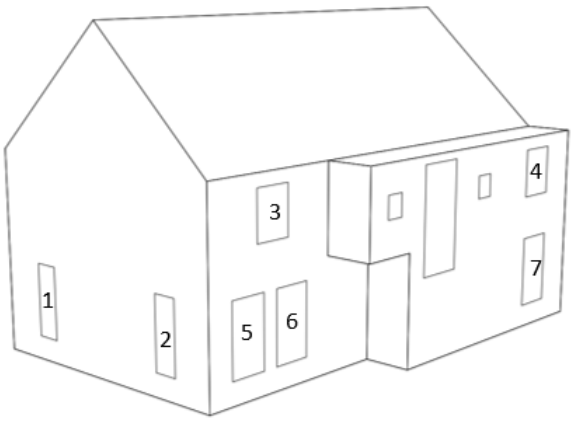
Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	38.94	15.05	39%	✓①
2	38.09	38.68	100%	✓
3	36.23	36.91	100%	✓
4	38.68	39.13	100%	✓
5	38.23	37.98	99%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

✓① This point is out with the recommendations but has a large window in place as well as being 1 of 3 light sources to the space beyond therefore should continue to receive adequate daylight. This result is to be expected in a typical modern housing development like this.

14 Powerscourt Estate

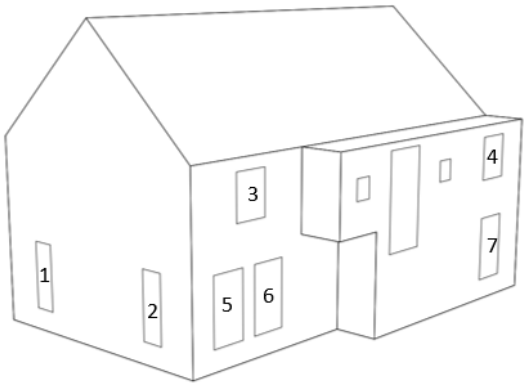


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	22.21	22.3	100%	✓
2	18.81	18.8	100%	✓
3	37.12	37.72	100%	✓
4	38.56	39.35	100%	✓
5	36.04	36.85	100%	✓
6	34.51	34.46	100%	✓
7	37.96	38.72	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

22 Powerscourt Estate

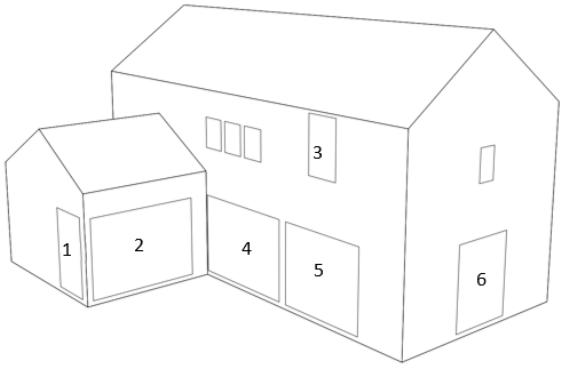


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	19.61	20.79	100%	✓
2	27.62	28.1	100%	✓
3	37.76	38.51	100%	✓
4	39.1	39.84	100%	✓
5	37.5	37.95	100%	✓
6	35.01	35.66	100%	✓
7	38.6	39.22	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

23 Powerscourt Estate

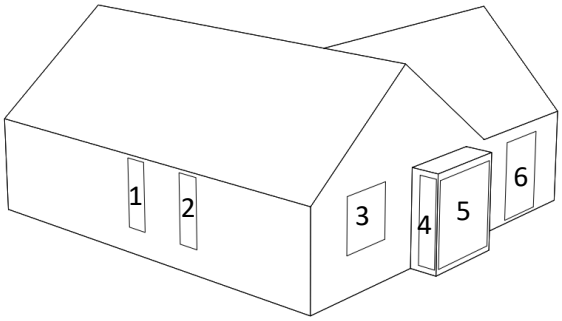


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	37.36	37.43	100%	✓
2	28.2	25.91	92%	✓
3	38.19	38.38	100%	✓
4	36.15	30.45	84%	✓
5	38.19	35.3	92%	✓
6	37.73	34.62	92%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

24 Powerscourt Estate

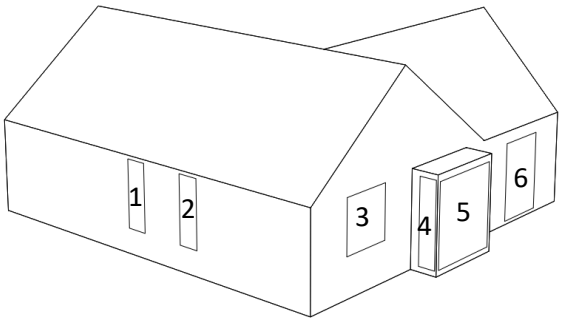


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	39.06	35.83	92%	✓
2	39.07	35.84	92%	✓
3	30.15	29.7	99%	✓
4	20.82	19.72	95%	✓
5	16.21	16.37	100%	✓
6	29.64	30.3	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

25 Powerscourt Estate

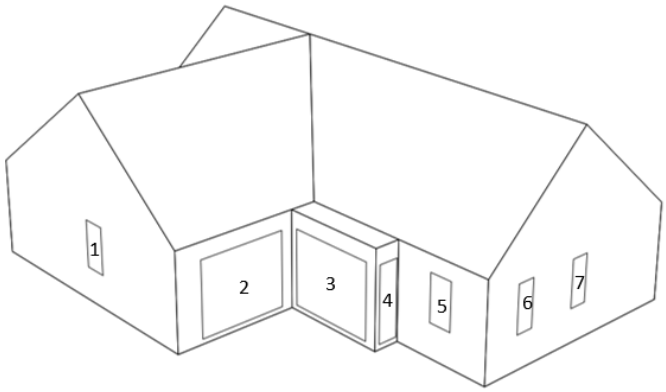


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	38.97	35.95	92%	✓
2	38.69	35.96	93%	✓
3	25.5	26.15	100%	✓
4	20.2	20.21	100%	✓
5	12.42	12.76	100%	✓
6	28.15	28.52	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

26 Powerscourt Estate

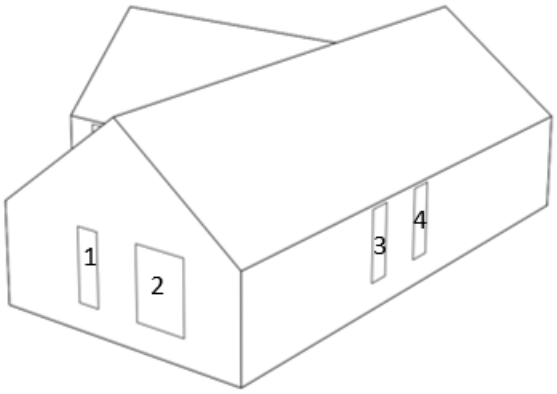


Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	17.26	17.74	100%	✓
2	33.06	30.91	93%	✓
3	30.02	28.33	94%	✓
4	23.66	21.3	90%	✓
5	34.55	32.22	93%	✓
6	39.03	36.54	94%	✓
7	39.08	36.91	94%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

27 Powerscourt Estate



Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	36.41	36.15	99%	✓
2	36.85	36.78	100%	✓
3	38.92	38.46	99%	✓
4	39	38.45	99%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27%. Therefore, these points exceed BRE recommendations.

7.6 Assessment – Powerscourt National School

Powerscourt National School

Points	Existing Scheme VSC	Proposed Scheme VSC	Proposed Scheme VSC as a % of the Existing	Comment
1	38.91	39.36	100%	✓
2	31.44	31.95	100%	✓
3	37.46	37.76	100%	✓
4	24.12	24.72	100%	✓
5	39.13	39.84	100%	✓
6	39.22	39.79	100%	✓
7	39.01	39.22	100%	✓
8	38.91	39.09	100%	✓
9	34.16	34.86	100%	✓
10	38.51	39.31	100%	✓
11	26.7	27.28	100%	✓
12	36.88	37.03	100%	✓

The following conclusions can be made:

✓ These points tested have a vertical sky component greater than 27% or not less than 0.8 times their former value. Therefore, these points exceed BRE recommendations.

7.7 VSC Analysis Discussion

The Vertical Sky Component for 99% (145 of 147) of the points tested have a value greater than 27% or not less than 0.8 times their former value (that of the Existing Situation), exceeding the BRE recommendations.

The remaining two points from the permitted development have values of 15% and 25% with a large windows in place. In addition these windows are I of 3 light sources to the space beyond and therefore should continue to receive adequate daylight. The results are to be expected in a typical modern housing development like this.

Given the comments above there would be a minor adverse effect to these proposed neighbouring dwellings with an overall negligible adverse impact from the development as a whole.

8 Daylight Analysis of Existing Buildings (APSH)

8.1 Annual Probable Sunlit Hours (APSH)

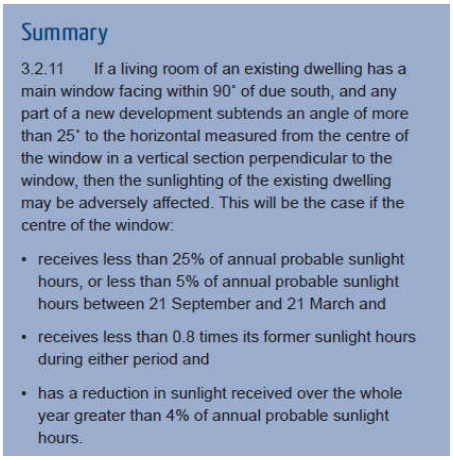
The BRE Site layout planning for daylight and sunlight (Section 3.2) states;

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 21 September and 21 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 21 September and 21 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 (21 September to 21 March), then the occupants of the existing building will notice the loss of sunlight. The room may appear colder and less cheerful and pleasant.



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.

BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight

8.1.1 APSH Values

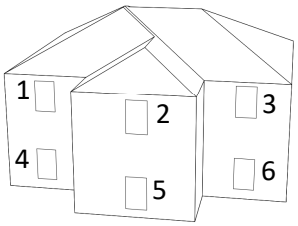
Generally, a line is drawn from the centre of a window due south, if any obstructions lie within 90° East or 90° West of the centre line the window should be included in the analysis.

The BRE Site layout planning for daylight and sunlight (Section 3.2.3) states; that this test should be applied to all main living rooms of dwellings and that kitchens and bedrooms are less important.

Floorplans were available for the house types of Powerscourt Estate and as such the Living areas were identified and included in the analysis. The kitchens, bedrooms, bathrooms etc. were not included in the analysis. Floorplans were not available for the other existing dwellings at Enniskerry Demesne, Pineheights, Tinnabeg and The Lodge or for the Powerscourt National School. For completeness, all windows facing the proposed development were included in the analysis although not required as part of the guidance noted above.

8.2 Assessment – Enniskerry Demesne

1 Enniskerry Demesne

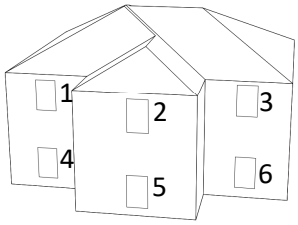


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	69.28	29.13	66.14	25.79	95%	89%	✓
2	79.02	37.06	75.48	32.12	96%	87%	✓
3	67.5	31.65	63.88	28.2	95%	89%	✓
4	45.54	23.38	42.66	20.49	94%	88%	✓
5	74.92	33.07	72.41	29.16	97%	88%	✓
6	55.19	28.66	52.8	25.57	96%	89%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, and the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

2 Enniskerry Demesne

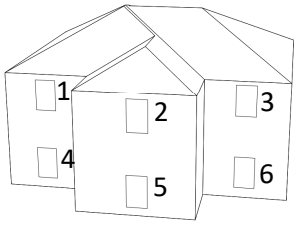


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	65.36	27.28	63.64	25.19	97%	92%	✓
2	79.27	37.32	75.12	32.47	95%	87%	✓
3	69.92	32.59	65.91	28.83	94%	88%	✓
4	43.77	22.30	40.61	19.11	93%	86%	✓
5	74.30	33.45	71.54	30.00	96%	90%	✓
6	55.03	27.49	52.34	24.07	95%	88%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, and the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

3 Enniskerry Demesne

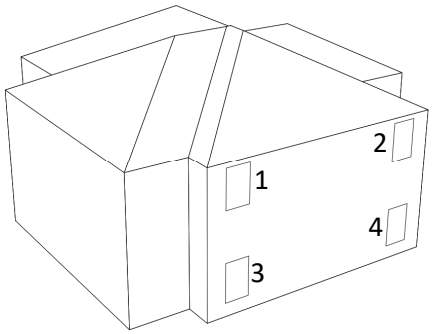


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	68.06	26.62	67.11	25.66	99%	96%	✓
2	79.59	36.93	77.21	33.85	97%	92%	✓
3	68.01	32.30	65.99	30.55	97%	95%	✓
4	42.56	21.11	39.50	18.60	93%	88%	✓
5	76.77	34.11	70.10	26.83	91%	79%	✓
6	54.97	28.79	50.85	24.67	93%	86%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, and the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

4 Enniskerry Demesne

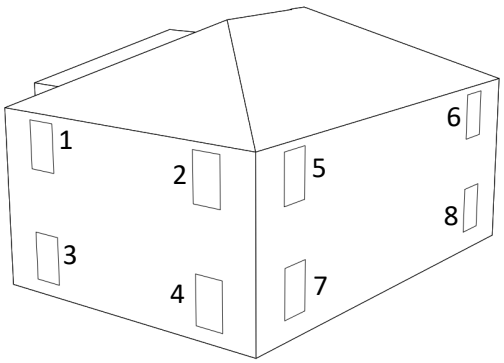


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	74.05	32.80	73.35	32.10	99%	98%	✓
2	74.32	33.30	73.25	31.54	99%	95%	✓
3	55.60	18.74	55.24	18.57	99%	99%	✓
4	63.89	24.69	63.59	23.88	100%	97%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, and the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

10 Enniskerry Demesne

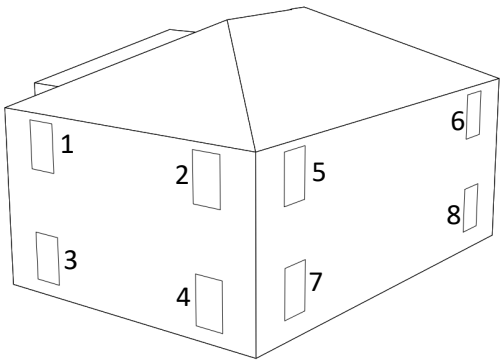


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	☐
1	70.89	29.64	70.89	29.64	100%	100%	✓
2	72.95	32.04	72.95	32.04	100%	100%	✓
3	49.49	9.95	49.49	9.95	100%	100%	✓
4	17.37	3.90	17.35	3.89	100%	100%	✓
5	63.64	27.97	63.53	27.97	100%	100%	✓
6	63.64	27.97	63.64	27.97	100%	100%	✓
7	57.47	22.06	57.47	22.08	100%	100%	✓
8	61.41	26.82	61.67	26.82	100%	100%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

9 Enniskerry Demesne

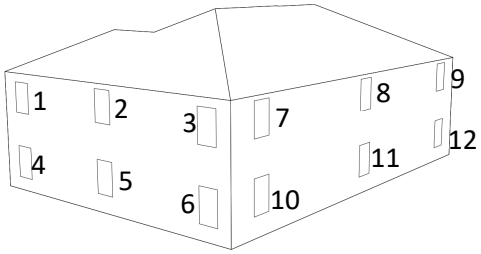


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	☐
1	62.29	24.66	62.29	24.66	100%	100%	✓
2	63.85	27.24	63.85	27.24	100%	100%	✓
3	48.59	13.54	48.59	13.54	100%	100%	✓
4	17.93	5.69	17.93	5.69	100%	100%	✓
5	74.13	33.57	74.13	33.26	100%	99%	✓
6	74.13	33.57	72.58	32.68	98%	97%	✓
7	65.84	27.49	65.84	27.49	100%	100%	✓
8	68.29	31.81	68.21	31.21	100%	98%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

14 Enniskerry Demesne

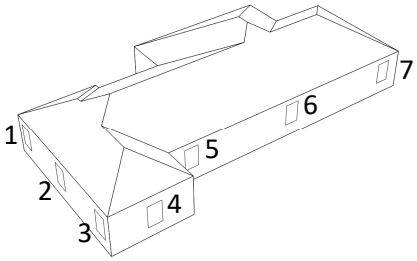


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	57.34	22.38	53.85	20.28	94%	91%	✓
2	56.81	22.38	54.89	20.45	97%	91%	✓
3	56.64	22.38	55.24	20.98	98%	94%	✓
4	47.33	13.97	45.64	12.71	96%	91%	✓
5	34.23	13.03	34.23	13.03	100%	100%	✓
6	51.44	21.37	50.26	20.19	98%	94%	✓
7	78.32	37.06	77.62	34.27	99%	92%	✓
8	78.32	37.06	77.55	34.20	99%	92%	✓
9	79.02	37.76	76.49	34.53	97%	91%	✓
10	76.92	35.66	76.50	33.14	99%	93%	✓
11	76.74	35.48	76.31	32.96	99%	93%	✓
12	75.80	35.26	74.46	32.28	98%	92%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

8.3 Assessment – Pine Heights, Tinnabeg

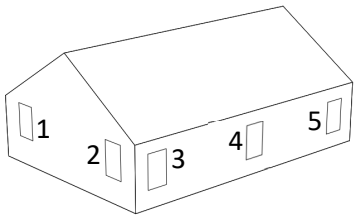


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	39.60	14.69	32.32	8.46	82%	58%	✓
2	42.29	15.38	31.70	8.39	75%	55%	✓
3	42.54	15.12	30.93	8.17	73%	54%	✓
4	78.30	34.94	67.46	26.20	86%	75%	✓
5	64.06	30.42	62.73	29.08	98%	96%	✓
6	79.13	36.37	74.09	31.34	94%	86%	✓
7	79.29	35.93	74.54	31.89	94%	89%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

Tinnabeg



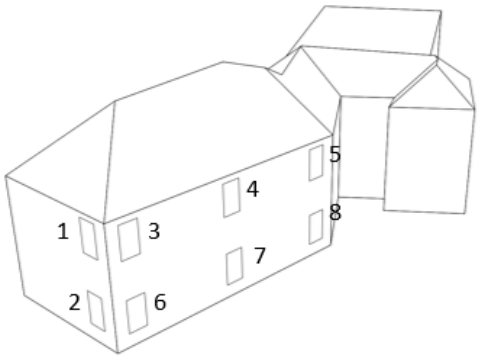
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	51.75	20.98	44.84	18.88	87%	90%	✓
2	51.75	20.98	43.20	17.59	83%	84%	✓
3	80.96	38.30	76.74	34.08	95%	89%	✓
4	80.82	38.17	76.23	33.57	94%	88%	✓
5	80.72	38.06	76.37	33.72	95%	89%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

8.4 Assessment – The Lodge

The Lodge

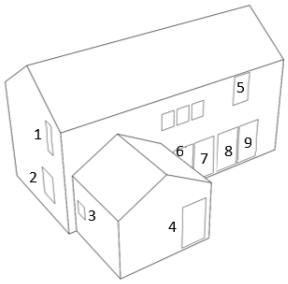


Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1
5	-	-	-	-	-	-	1
6	-	-	-	-	-	-	1
7	-	-	-	-	-	-	1
8	-	-	-	-	-	-	1

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

8.5 Assessment – Powerscourt Estate (Permitted Development 19/871)

11 Powerscourt Estate



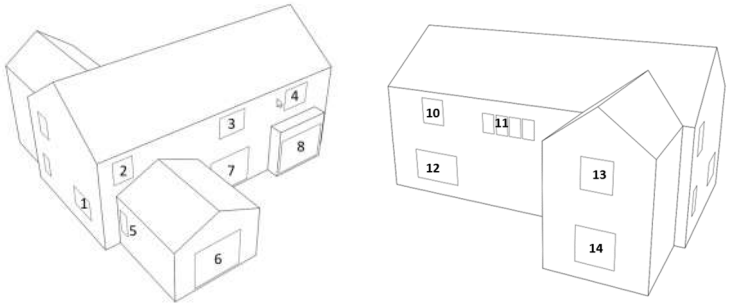
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	☐
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	19.76	0.22	17.66	0.22	89%	100%	✓
4	-	-	-	-	-	-	1
5	-	-	-	-	-	-	1
6	-	-	-	-	-	-	1
7	-	-	-	-	-	-	1
8	-	-	-	-	-	-	1
9	-	-	-	-	-	-	1

The following conclusions can be made:

- ✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

12 Powerscourt Estate



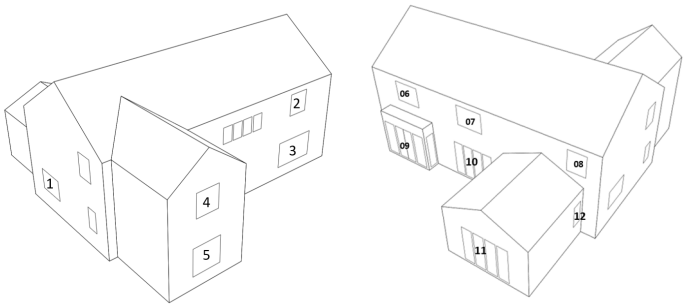
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	-	-	-	-	-	-	-
4	-	-	-	-	-	-	1
5	19.76	0.22	17.66	0.22	89%	100%	✓
6	-	-	-	-	-	-	1
7	-	-	-	-	-	-	1
8	-	-	-	-	-	-	1
9	-	-	-	-	-	-	1
10	-	-	-	-	-	-	1
11	-	-	-	-	-	-	1
12	-	-	-	-	-	-	1
13	-	-	-	-	-	-	1
14	79.39	36.03	72.03	31.25	91%	87%	✓

The following conclusions can be made:

- ✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

13 Powerscourt Estate



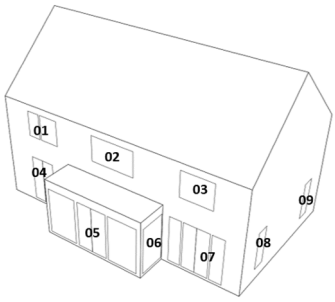
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1
5	-	-	-	-	-	-	1
6	-	-	-	-	-	-	1
7	-	-	-	-	-	-	1
8	-	-	-	-	-	-	1
9	-	-	-	-	-	-	1
10	-	-	-	-	-	-	1
11	76.49	33.87	70.24	28.59	92%	84%	✓
12	41.25	14.69	27.47	11.44	67%	78%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

14 Powerscourt Estate



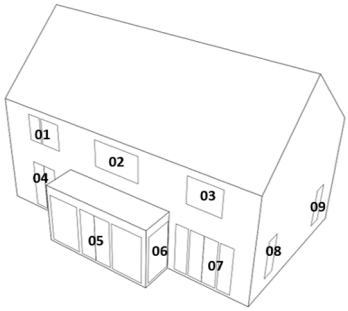
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1
5	76.26	32.91	74.78	31.68	98%	96%	✓
6	40.44	18.56	38.98	17.23	96%	93%	✓
7	50.89	24.61	49.64	23.36	98%	95%	✓
8	35.80	18.92	34.04	17.18	95%	91%	✓
9	20.40	12.01	20.40	12.01	100%	100%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

22 Powerscourt Estate



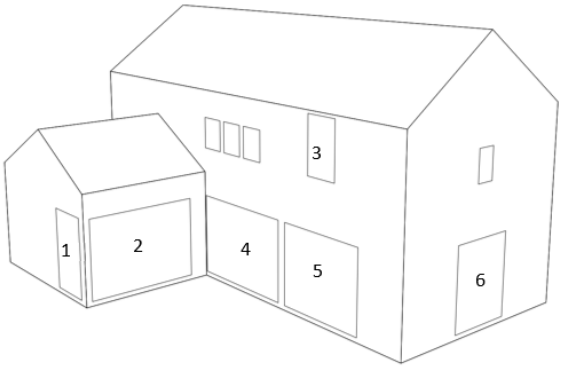
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	□
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1
5	79.02	36.36	74.80	32.47	95%	89%	✓
6	38.61	17.90	36.08	15.37	93%	86%	✓
7	50.57	24.22	48.16	21.80	95%	90%	✓
8	24.23	11.03	24.26	11.03	100%	100%	✓
9	29.40	6.91	28.04	6.91	95%	100%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

23 Powerscourt Estate



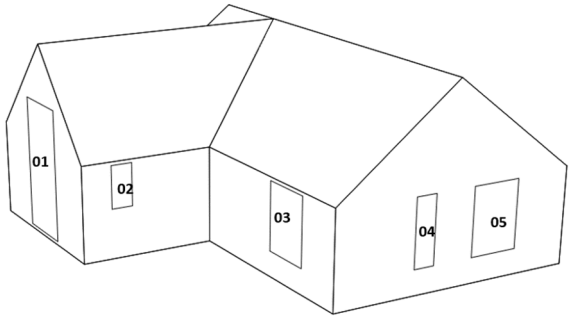
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	79.83	36.48	71.30	29.23	89%	80%	✓
2	45.21	22.19	38.49	15.47	85%	70%	✓
3	-	-	-	-	-	-	1
4	58.09	28.38	51.99	22.28	89%	79%	✓
5	72.62	34.62	65.44	27.49	90%	79%	✓
6	49.98	22.38	40.57	13.07	81%	58%	✓

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

24 Powerscourt Estate



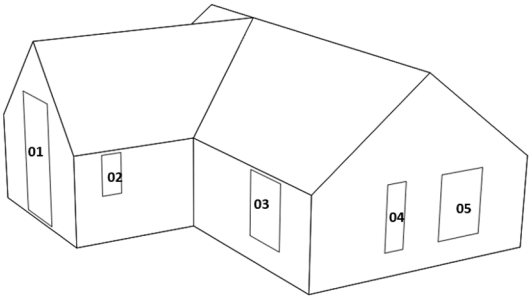
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	42.51	13.94	40.81	12.24	96%	88%	✓
2	63.06	25.54	56.67	18.45	90%	72%	✓
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1
5	-	-	-	-	-	-	1

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

25 Powerscourt Estate



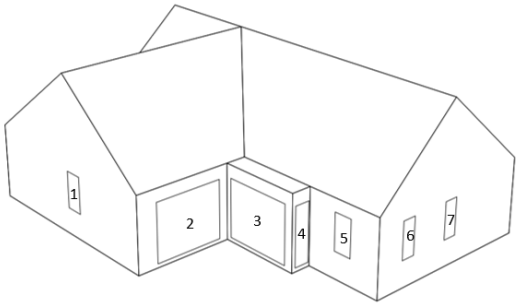
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	40.14	12.20	39.75	11.93	99%	98%	✓
2	55.80	17.59	55.80	17.56	100%	100%	✓
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1
5	-	-	-	-	-	-	1

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

26 Powerscourt Estate



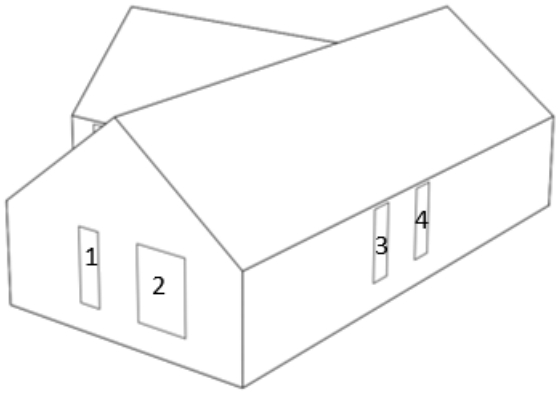
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	42.51	5.24	38.68	1.69	91%	32%	✓
2	45.10	17.02	34.03	6.59	75%	39%	✓
3	55.37	22.80	45.79	13.17	83%	58%	✓
4	43.77	19.54	34.34	10.18	78%	52%	✓
5	-	-	-	-	-	-	1
6	-	-	-	-	-	-	1
7	-	-	-	-	-	-	1

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

27 Powerscourt Estate



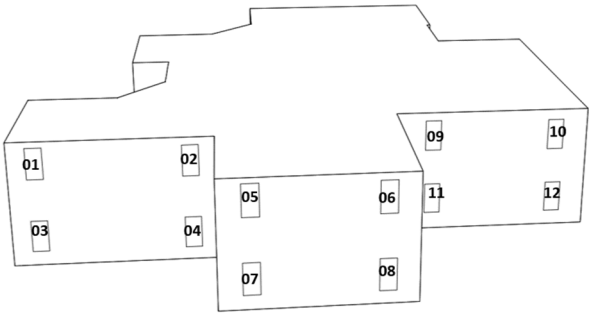
Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	
1	-	-	-	-	-	-	1
2	-	-	-	-	-	-	1
3	-	-	-	-	-	-	1
4	-	-	-	-	-	-	1

The following conclusions can be made:

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

8.6 Assessment – Powerscourt National School

Powerscourt National School



Points	Existing Scheme APSH		Proposed Scheme APSH		Proposed Scheme APSH as a % of the Existing		Comment
	Annual	Winter	Annual	Winter	Annual	Winter	☐
1	29.70	7.33	29.50	6.43	99%	88%	✓
2	29.76	7.39	29.61	6.53	99%	88%	✓
3	28.72	6.34	25.87	5.92	90%	93%	✓
4	29.07	6.70	28.13	6.20	97%	93%	✓
5	30.76	8.38	29.42	6.35	96%	76%	✓
6	30.77	8.39	29.50	6.42	96%	77%	✓
7	29.69	7.31	27.11	5.59	91%	76%	✓
8	29.22	6.85	28.40	5.59	97%	82%	✓
9	-	-	-	-	-	-	1
10	-	-	-	-	-	-	1
11	-	-	-	-	-	-	1
12	-	-	-	-	-	-	1

The following conclusions can be made:

✓ These points tested have an Annual value greater than 25%, a Winter value greater than 5%, or the Proposed value is greater than 80% of the Existing value . Therefore, these points exceed BRE recommendations.

1 All of these windows are out with the criteria for APSH. They are either not a living area or they are situated to the south of possible obstructions.

8.7 APSH Analysis Discussion

The Annual Probable Sunlit Hours (APSH) for 100% of the points tested have an annual value greater than 25% and a winter value greater than 5% or not less than 0.8 times their former values (that of the Existing Situation), exceeding the BRE recommendations. Given the comments above there would be a negligible adverse effect to these existing neighbouring dwellings.

9 Average Daylight Factors (ADF)

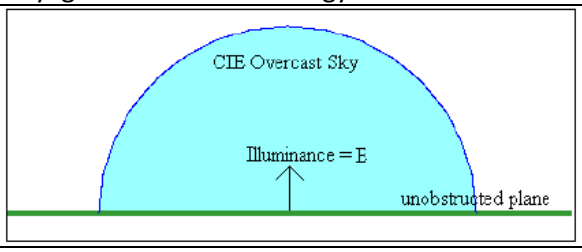
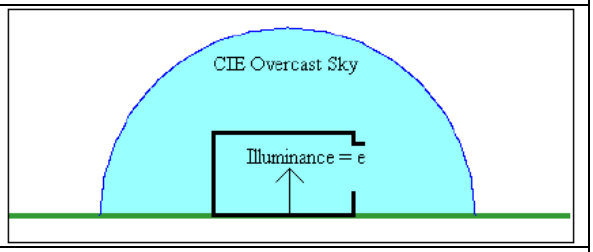
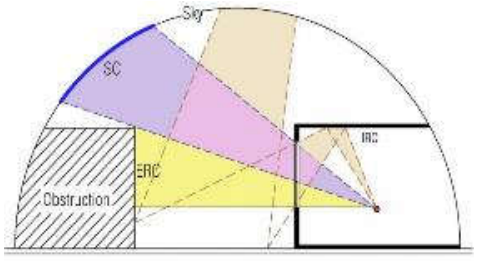
This section addresses daylight to the proposed homes and duplexes.

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 two 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. Light from the patch of sky visible at the point

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

9.1.1 Reference and Metrics

BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight 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.

From BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight

As noted above from this the recommended Average Daylight Factors (ADF) are therefore;

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

9.1.2 Combined Function Spaces - Living/Kitchen/Dining

Note the BRE guide does not provide explicit guidance for a space that is a combination space for the functions of Living/Kitchen/Dining.

In addition, a separate document the "BS 8206-2:2008: Lighting for Buildings - Part 2: Code of Practice for Daylighting" focus on internal lighting performance and it 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%."

It should be noted where there are open plan spaces within the development then the Living area has been treated as the main space in this context and as such an average daylight factor of 1.5% will then be used as the 'target value'.

This target value is also based on referenced advice within a recent 'Oral Hearing Presentation' prepared by *O'Connor Sutton Cronin* in respect of the proposed Strategic Housing Development at St. Clare's Convent and No's. 115-119 Harold's Cross Road, Harold's Cross, Dublin 6W (ABP Ref. PL29S.308533;).

Initially ADF simulations will be performed for the entire combined space, however if the results are found to be below the recommendations then a subsequent analysis of the Living area alone will be performed.

As noted in the BRE guide: *Section 2.1.14: 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. In order to help maximise the space, where previously partition walls may have existed to separate their functions, these are now removed to create 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 safety precautions whilst preparing meals, but with this open layout form they can utilise 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 daylight contribution should be seen as the goal and not measuring it to fixed requirements. Analysis will be performed on the kitchen area for guidance only.

Analysis has been carried by using the Radiance module of IES VE software to quantify the metrics describe below.

9.1.3 Planning Authority Guidelines

We understand there is a Consultation paper expected to be published in July by the BRE, in respect of BS EN 17037:2018 and following the consultation the BRE expect to make recommendations by way of update of the BRE 2011 guidelines sometime in 2022. This is to take into account that adjustments are required to be made to EN 17037:2018 to enable it to be applied in a British context, and EN17037 has not been adopted by the BRE. In this regard the current BRE 209 and BS 8206-2:208 standard used in this report is appropriate standard for assessment and referenced in the Apartment Guidelines 2020 and Urban Development and Building Heights 2018.

9.2 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: 3.15m

The following Surface Reflectance's are to be used in the study:

Material Surface	Reflectance
External Wall	0.50
Internal Partition	0.50
Roof	0.20
Ground	0.20
Floor/Ceiling (Floor)	0.20
Floor/Ceiling (Ceiling)	0.70

Glazing Transmittance:

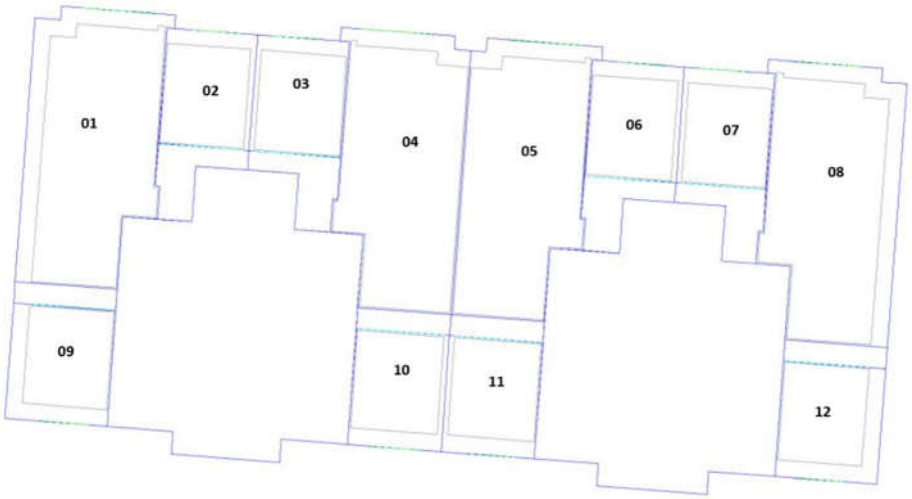
- Light Transmittance: 70%
- Window Frame thickness: 50 mm

9.3 Average Daylight Factor Results

The following floor plan highlights the rooms that were simulated to ascertain the Average Daylight Factors.

9.3.1 Block A – Level 0

Ground Floor – Duplex Block A



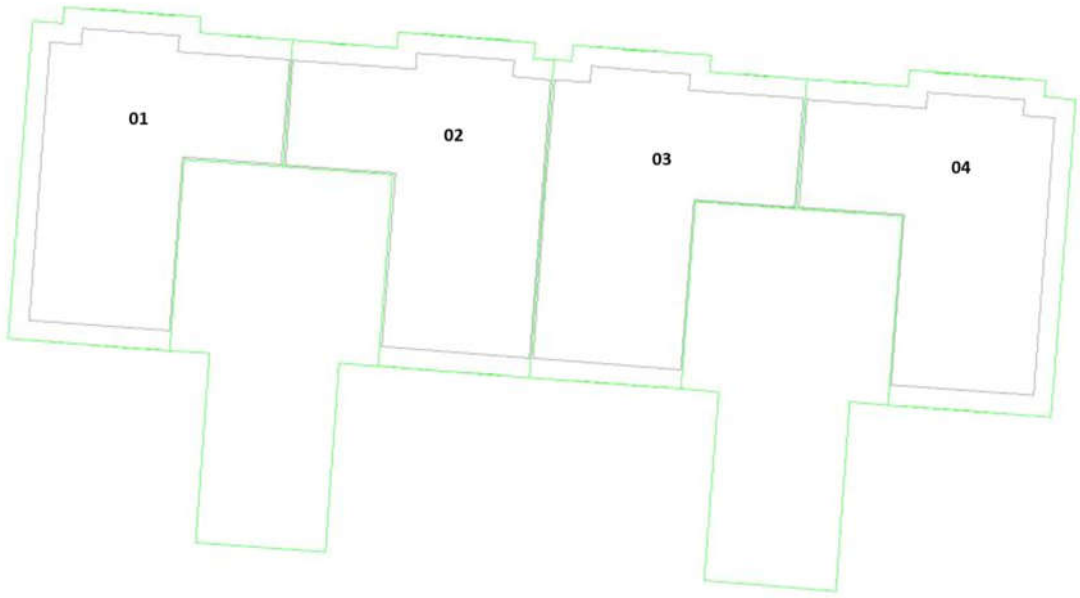
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L00: DX-A_Apt 01_Living	Liv/Kit/Dine	5.40	1.73	✓
2	L00: DX-A_Apt 01_Bedroom 01	Bedroom	3.12	2.48	✓
3	L00: DX-A_Apt 02_Bedroom 01	Bedroom	3.12	2.25	✓
4	L00: DX-A_Apt 02_Living	Liv/Kit/Dine	5.40	1.68	✓
5	L00: DX-A_Apt 03_Living	Liv/Kit/Dine	5.40	1.65	✓
6	L00: DX-A_Apt 03_Bedroom 01	Bedroom	3.12	2.43	✓
7	L00: DX-A_Apt 04_Bedroom 01	Bedroom	3.12	2.26	✓
8	L00: DX-A_Apt 04_Living	Liv/Kit/Dine	5.40	1.73	✓
9	L00: DX-A_Apt 01_Bedroom 02	Bedroom	2.88	2.03	✓
10	L00: DX-A_Apt 02_Bedroom 02	Bedroom	2.88	2.17	✓
11	L00: DX-A_Apt 03_Bedroom 02	Bedroom	2.88	2.18	✓
12	L00: DX-A_Apt 04_Bedroom 02	Bedroom	2.88	2.09	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.2 Block A – Level 1

First Floor – Duplex Block A


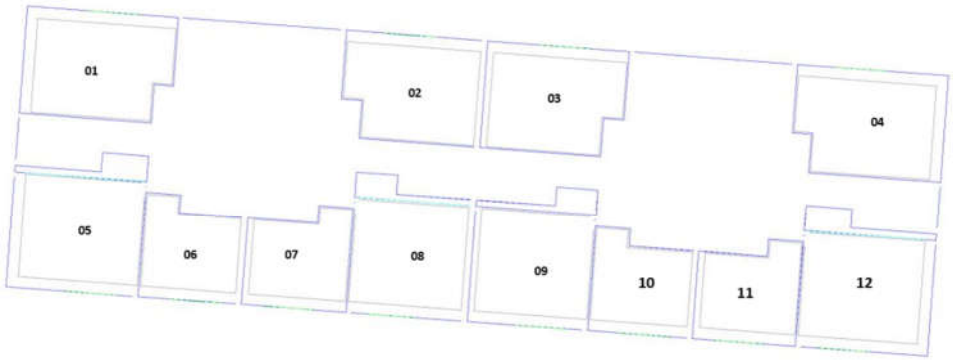
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L01: DX-A_Apt 05_Living	Liv/Kit/Dine	6.75	2.96	✓
2	L01: DX-A_Apt 06_Living	Liv/Kit/Dine	6.75	2.65	✓
3	L01: DX-A_Apt 07_Living	Liv/Kit/Dine	6.75	2.67	✓
4	L01: DX-A_Apt 08_Living	Liv/Kit/Dine	6.75	2.69	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.3 Block A –Level 2

Second Floor – Duplex Block A


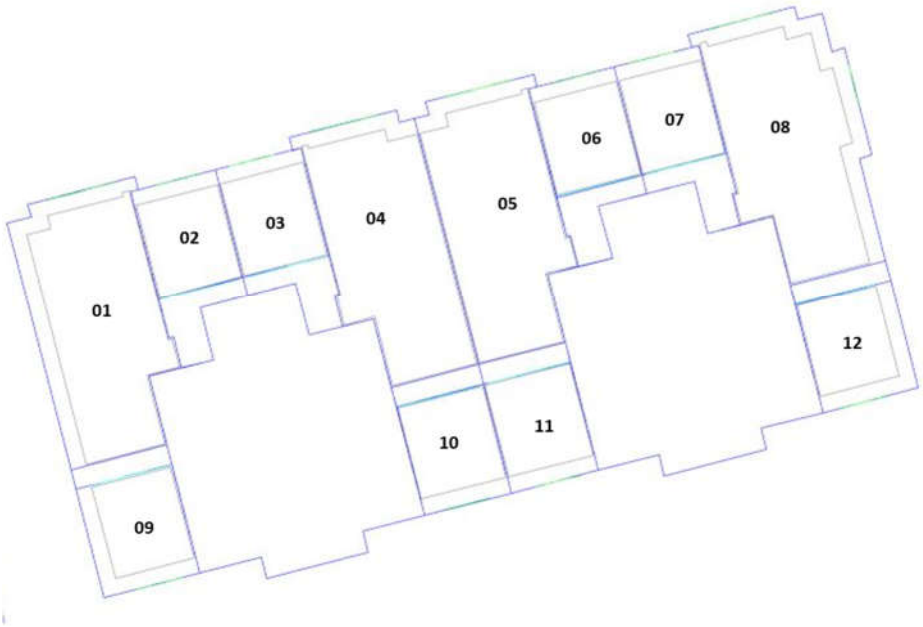
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L02: DX-A_Apt 05_Bedroom 02	Bedroom	1.92	2.10	✓
2	L02: DX-A_Apt 06_Bedroom 02	Bedroom	1.92	2.50	✓
3	L02: DX-A_Apt 07_Bedroom 02	Bedroom	1.92	2.18	✓
4	L02: DX-A_Apt 08_Bedroom 02	Bedroom	1.92	2.57	✓
5	L02: DX-A_Apt 05_Bedroom 01	Bedroom	2.88	2.34	✓
6	L02: DX-A_Apt 05_Bedroom 03	Bedroom	1.92	3.89	✓
7	L02: DX-A_Apt 06_Bedroom 03	Bedroom	1.92	3.21	✓
8	L02: DX-A_Apt 06_Bedroom 01	Bedroom	2.88	2.14	✓
9	L02: DX-A_Apt 07_Bedroom 01	Bedroom	2.88	2.29	✓
10	L02: DX-A_Apt 07_Bedroom 03	Bedroom	1.92	3.92	✓
11	L02: DX-A_Apt 08_Bedroom 03	Bedroom	1.92	3.24	✓
12	L02: DX-A_Apt 08_Bedroom 01	Bedroom	2.88	2.09	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.4 Block B – Level 0

Ground Floor –Duplex Block B


Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L00: DX-B_Apt 01_Living	Liv/Kit/Dine	5.40	1.71	✓
2	L00: DX-B_Apt 01_Bedroom 01	Bedroom	3.12	2.38	✓
3	L00: DX-B_Apt 02_Bedroom 01	Bedroom	3.12	2.36	✓
4	L00: DX-B_Apt 02_Living	Liv/Kit/Dine	5.40	1.64	✓
5	L00: DX-B_Apt 03_Living	Liv/Kit/Dine	5.40	1.65	✓
6	L00: DX-B_Apt 03_Bedroom 01	Bedroom	3.12	2.39	✓
7	L00: DX-B_Apt 04_Bedroom 01	Bedroom	3.12	2.25	✓
8	L00: DX-B_Apt 04_Living	Liv/Kit/Dine	8.44	2.30	✓
9	L00: DX-B_Apt 01_Bedroom 02	Bedroom	2.88	2.03	✓
10	L00: DX-B_Apt 02_Bedroom 02	Bedroom	2.88	2.08	✓
11	L00: DX-B_Apt 03_Bedroom 02	Bedroom	2.88	2.10	✓
12	L00: DX-B_Apt 04_Bedroom 02	Bedroom	2.88	2.38	✓

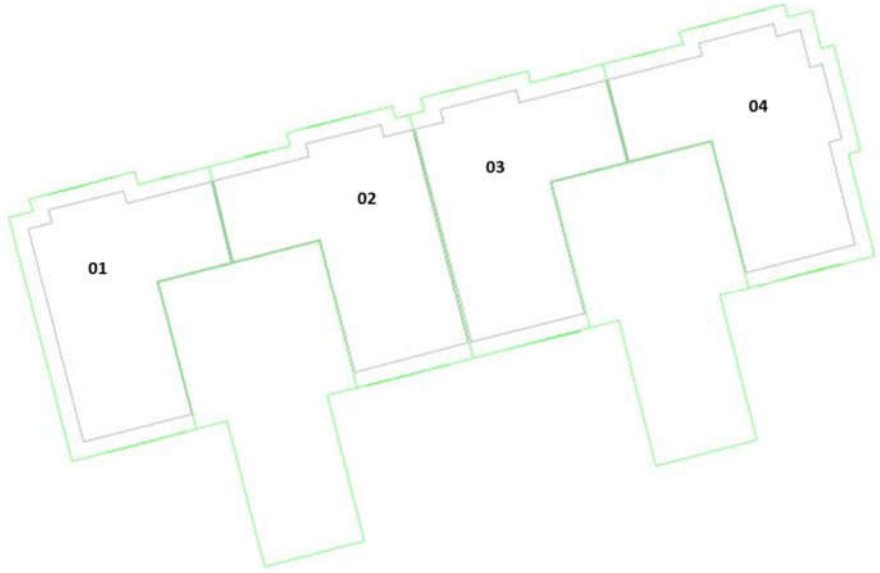
The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.5 Block B – Level 1

First Floor – Duplex Block B



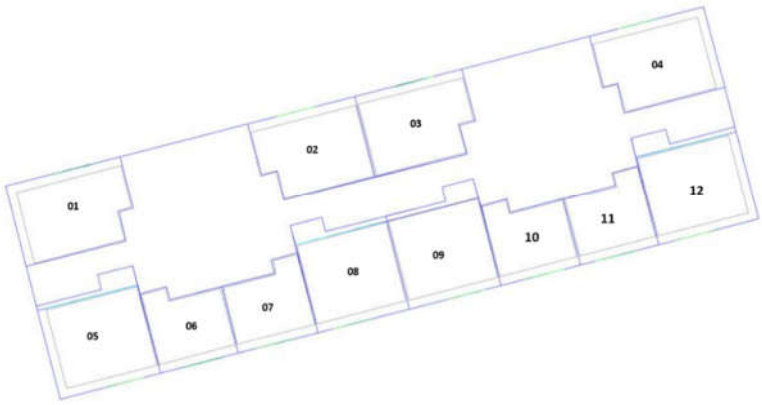
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L01: DX-B_Apt 05_Living	Liv/Kit/Dine	6.75	2.70	✓
2	L01: DX-B_Apt 06_Living	Liv/Kit/Dine	6.75	2.60	✓
3	L01: DX-B_Apt 07_Living	Liv/Kit/Dine	6.75	2.63	✓
4	L01: DX-B_Apt 08_Living	Liv/Kit/Dine	6.75	2.63	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.6 Block B – Level 2

Second Floor – Duplex Block B


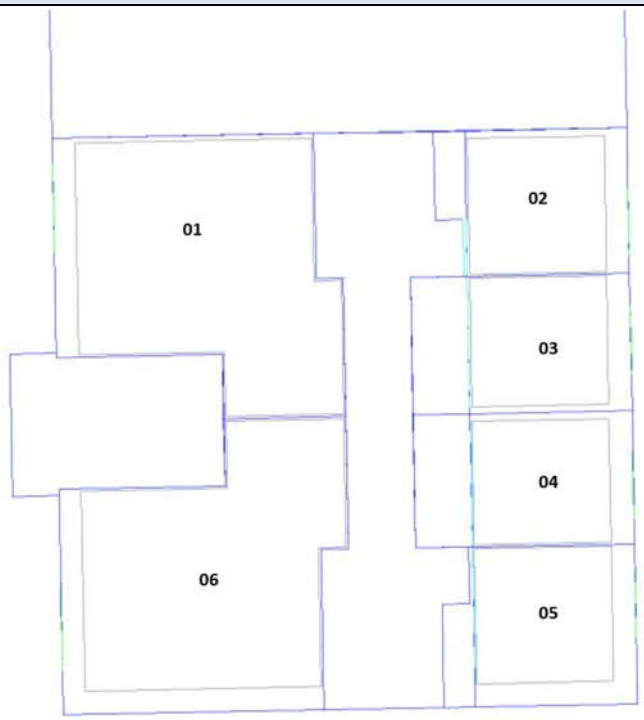
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L02: DX-B_Apt 05_Bedroom 02	Bedroom	1.92	2.32	✓
2	L02: DX-B_Apt 06_Bedroom 02	Bedroom	1.92	2.44	✓
3	L02: DX-B_Apt 07_Bedroom 02	Bedroom	1.92	2.39	✓
4	L02: DX-B_Apt 08_Bedroom 02	Bedroom	1.92	2.23	✓
5	L02: DX-B_Apt 05_Bedroom 01	Bedroom	2.88	2.28	✓
6	L02: DX-B_Apt 05_Bedroom 03	Bedroom	1.92	3.52	✓
7	L02: DX-B_Apt 06_Bedroom 03	Bedroom	1.92	3.24	✓
8	L02: DX-B_Apt 06_Bedroom 01	Bedroom	2.88	2.14	✓
9	L02: DX-B_Apt 07_Bedroom 01	Bedroom	2.88	2.39	✓
10	L02: DX-B_Apt 07_Bedroom 03	Bedroom	1.92	3.31	✓
11	L02: DX-B_Apt 08_Bedroom 03	Bedroom	1.92	3.40	✓
12	L02: DX-B_Apt 08_Bedroom 01	Bedroom	2.88	2.24	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.7 Block C – Level 0

Ground Floor – Duplex Block C


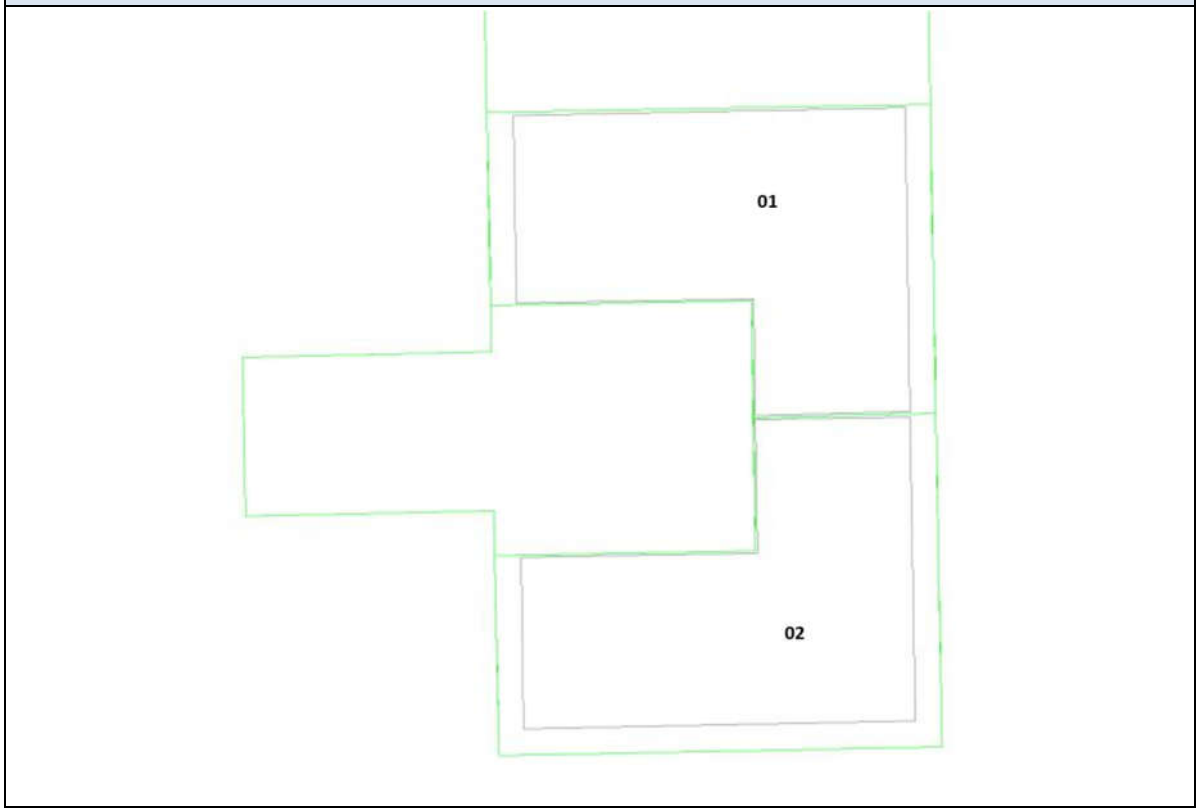
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	Living Room Only	BRE Recommendation
1	L00: DX-C_Apt 01_Living	Liv/Kit/Dine	3.69	1.28	1.54	x/✓
2	L00: DX-C_Apt 01_Bedroom 01	Bedroom	3.60	2.13	-	✓
3	L00: DX-C_Apt 01_Bedroom 02	Bedroom	3.60	2.24	-	✓
4	L00: DX-C_Apt 02_Bedroom 02	Bedroom	3.60	2.32	-	✓
5	L00: DX-C_Apt 02_Bedroom 01	Bedroom	3.60	2.25	-	✓
6	L00: DX-C_Apt 02_Living	Liv/Kit/Dine	3.69	1.3	1.76	x/✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight. Therefore, these rooms exceed the BRE recommendations.

x/✓ These rooms falls below the BRE recommendation for a living room when the whole space is assessed (Living/Kitchen/Dining Area). It should be noted this room when assessed as a living area alone meets the BRE recommendations.

9.3.8 Block C – Level 1

First Floor – Duplex Block C


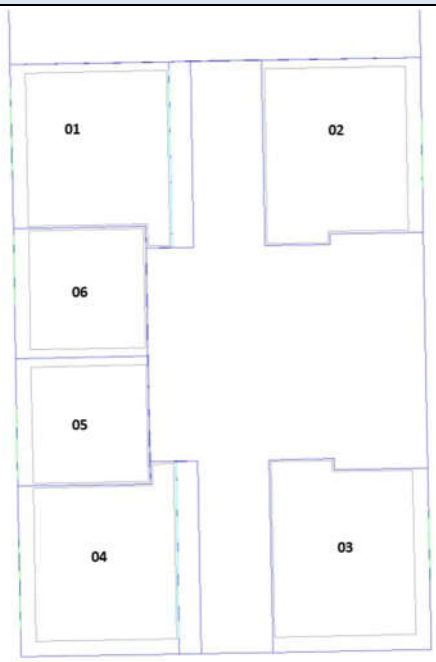
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L01: DX-C_Apt 03_Living	Liv/Kit/Dine	6.75	2.44	✓
2	L01: DX-C_Apt 04_Living	Liv/Kit/Dine	6.75	2.47	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.9 Block C – Level 2

Second Floor – Duplex Block C


Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L02: DX-C_Apt 03_Bedroom 01	Bedroom	3.69	3.29	✓
2	L02: DX-C_Apt 03_Bedroom 02	Bedroom	2.88	2.40	✓
3	L02: DX-C_Apt 04_Bedroom 02	Bedroom	2.88	2.40	✓
4	L02: DX-C_Apt 04_Bedroom 01	Bedroom	3.69	3.44	✓
5	L02: DX-C_Apt 04_Bedroom 03	Bedroom	1.92	3.14	✓
6	L02: DX-C_Apt 03_Bedroom 03	Bedroom	1.92	3.10	✓

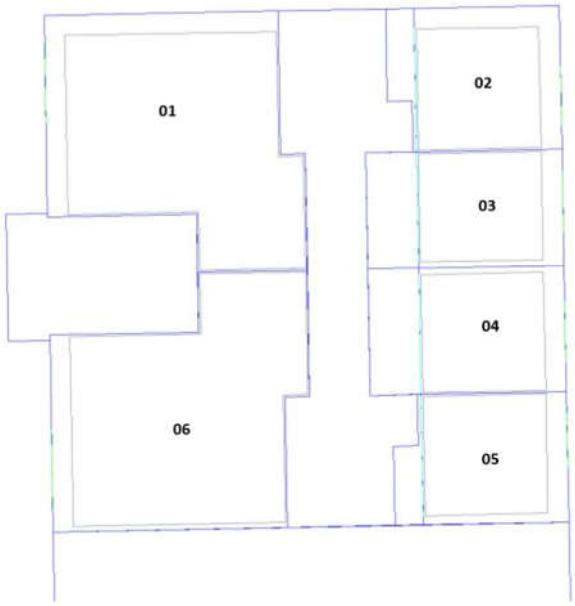
The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.10 Block D – Level 0

Ground Floor – Duplex Block D



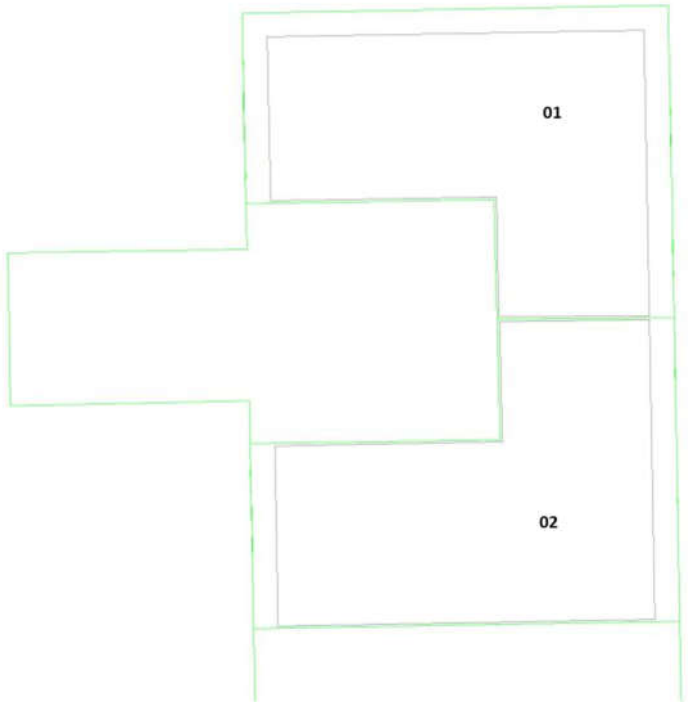
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	Living Room Only	BRE Recommendation
1	L00: DX-D_Apt 01_Living	Liv/Kit/Dine	3.69	1.30	1.64	x/✓
2	L00: DX-D_Apt 01_Bedroom 01	Bedroom	3.60	2.31	-	✓
3	L00: DX-D_Apt 01_Bedroom 02	Bedroom	3.60	2.47	-	✓
4	L00: DX-D_Apt 02_Bedroom 02	Bedroom	3.60	2.29	-	✓
5	L00: DX-D_Apt 02_Bedroom 01	Bedroom	3.60	2.29	-	✓
6	L00: DX-D_Apt 02_Living	Liv/Kit/Dine	3.69	1.20	1.60	x/✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight. Therefore, these rooms exceed the BRE recommendations.

x/✓ These rooms falls below the BRE recommendation for a living room when the whole space is assessed (Living/Kitchen/Dining Area). It should be noted this room when assessed as a living area alone meets the BRE recommendations.

9.3.11 Block D – Level 1

First Floor – Duplex Block D


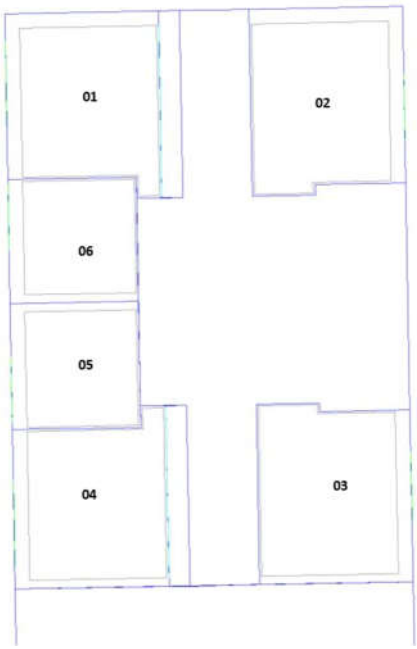
Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L01: DX-D_Apt 03_Living	Liv/Kit/Dine	6.75	2.54	✓
2	L01: DX-D_Apt 04_Living	Liv/Kit/Dine	6.75	2.37	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.3.12 Block D – Level 2

Second Floor – Duplex Block D


Ref.	Room Name	Room Activity	External Window Area	Average Daylight Factor	BRE Recommendation
1	L02: DX-D_Apt 03_Bedroom 01	Bedroom	3.69	3.45	✓
2	L02: DX-D_Apt 03_Bedroom 02	Bedroom	2.88	2.42	✓
3	L02: DX-D_Apt 04_Bedroom 02	Bedroom	2.88	2.40	✓
4	L02: DX-D_Apt 04_Bedroom 01	Bedroom	3.69	3.32	✓
5	L02: DX-D_Apt 04_Bedroom 03	Bedroom	1.92	3.02	✓
6	L02: DX-D_Apt 03_Bedroom 03	Bedroom	1.92	3.05	✓

The following conclusions can be made:

✓ All these rooms have an average daylight factor greater than the recommended minimum values (1.5% for living rooms and 1.0% for bedrooms) as stated under BRE's 2011 guidance document Site Layout Planning for Daylight and Sunlight.

Therefore, these rooms all exceed the BRE recommendations.

9.4 Discussion

It should be noted that the 'worst' case locations have been tested i.e. those on the lower floors, looking into elevations with obstructed views. Outwards facing rooms will generally have unobstructed views and should meet BRE recommendations. In addition, initially ADF simulations will be performed for the entire combined space, however if the results are found to be below the recommendations then a subsequent analysis of the Living area alone will be performed. (See section 9.1.2 for further information)

The results are summarised in the following table:

Tested	84
Bedrooms Over BRE recommendations	60
Living Rooms Over BRE recommendations	20
Rooms Below BRE recommendations	4

95% of the rooms sampled across the development within the apartments are achieving Average Daylight Factors (ADF) above the recommended minimum average daylight factors as noted within the BRE guidelines. This increases to 100% when the living spaces are assessed individually as the main living spaces as discussed above. It can be expected that the results from of the development as a whole would perform to the same high level.

10 Conclusion

The following can be concluded based on the studies undertaken.

10.1 Shadow Analysis

The Shadow analysis shows different shadows being cast from the existing and proposed schemes at particular periods throughout the year. Overall the impact of overshadowing would be classed as a negligible adverse impact given the following.

- **Enniskerry Demesne (North)**

No additional shading visible from the proposed development on these residential property during March and June with minimal overshadowing during *December to some of the properties. It should also be noted that there is extensive tree coverage between the proposed site and these existing properties and as such during the winter months the shadows cast will be from said trees and not the proposed development.

- **Pineheights/Tinnabeg (East)**

No additional shading visible from the proposed development on these existing residential properties during the months of March, June and December.

- **Powers Court National School (West)**

No additional shading visible from the proposed development on the existing School during the months of March, June and December.

- **Powers Court Estate (Permitted Development 19/871) (West)**

Minimal additional shading is noted in the early mornings of March and December. No additional shading is visible from the proposed development on the existing properties at any other period.

* 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. As noted above, there is extensive tree coverage between the proposed site and these existing properties and as such during the winter months the shadows cast will be from said trees and not the proposed development.

The potential impact is further quantified via the Daylight Analysis of Existing Buildings, Annual Probable Sunlight Hours and Sunlight to Existing Amenities sections within this report.

10.2 Sunlight to Existing and Proposed Amenity Spaces

As mentioned in Section 3.3.17 of BRE's Site Layout Planning for Daylight and Sunlight, for a space to appear adequately sunlit throughout the year, at least 50% of the garden or amenity area should receive at least 2 hours of sunlight on the 21st of March.

All of the private existing amenity areas tested out with the development site would continue to be quality spaces in terms of sunlight received exceeding BRE recommendations. The proposed development would have a negligible adverse impact to these existing gardens.

On the 21st of March, the proposed amenity spaces provide across the development site as a whole would receive at least 2 hours of sunlight across 92% of their area, exceeding BRE recommendations. The crèche play area itself would receive 2 hours of sunlight across 63% of its area, again exceeding the BRE recommendations for sunlight and highlighting these will be quality spaces in terms of sunlight.

10.3 Daylight Analysis of Existing Buildings

The Vertical Sky Component for 99% (145 of 147) of the points tested have a value greater than 27% or not less than 0.8 times their former value (that of the Existing Situation), exceeding the BRE recommendations.

The remaining two points from the permitted development have values of 15% and 25% with a large windows in place. In addition these windows are I of 3 light sources to the space beyond and therefore should continue to receive adequate daylight. The results are to be expected in a typical modern housing development like this.

Given the comments above there would be a minor adverse effect to these proposed neighbouring dwellings with an overall negligible adverse impact from the development as a whole.

10.4 Annual Probable Sunlight Hours of Existing Buildings

The Annual Probable Sunlit Hours (APSH) for 100% of the points tested have an annual value greater than 25% and a winter value greater than 5% or not less than 0.8 times their former values (that of the Existing Situation), exceeding the BRE recommendations. Given the

comments above there would be a negligible adverse effect to these existing neighbouring dwellings.

10.5 Average Daylight Factors

95% of the rooms sampled across the development within the apartments are achieving Average Daylight Factors (ADF) above the recommended minimum average daylight factors as noted within the BRE guidelines. This increases to 100% when the living spaces are assessed individually as the main living spaces as discussed above. It can be expected that the results from of the development as a whole would perform to the same high level.

10.6 Observations

It should be noted that the guidance in 'Site layout planning for daylight and sunlight: a guide to good practice' is not mandatory and the Report 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 very well in relation to the metrics considered in this report.

Overall the results demonstrate that the proposed development performance exceeds 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.

EUROPE

Glasgow Head Office
Helix Building, Kelvin Campus
West of Scotland Science Park
Glasgow G20 0SP UK
T +44 (0)141 945 8500
E sales@iesve.com

Dublin
4th Floor, Castleforbes House
Castleforbes Road
Dublin 1, Ireland
T +353 (0) 1875 0104
E sales@iesve.com

NORTH AMERICA

Atlanta
834 Inman Village Parkway NE
Suite 230, Atlanta GA 30307
T +1 (404) 806 2018
E consulting@iesve.com

ASIA

Pune
Dhananjay Plaza, II Floor,
Plot No. 21, Pune- Mumbai Highway
Near Lalani Quantum / Home Decor,
Bavdhan, Pune 411 021, India
T +91 (020) 6560 2848
E india@iesve.com

AUSTRALIA

Melbourne
Level 1, 123 Camberwell Road
Hawthorn East, Melbourne
Vic 3123, Australia
T +61 (0) 3 9808 8431
E support@iesve.com

www.iesve.com

www.iesve.com