

Tubber Lane (Phase 3), ADAMSTOWN SDZ

Sunlight, Daylight & Shadow Assessment (Development Performance)

V1



Executive Summary

This report examines how the proposed development performs in terms of light. The report is, in accordance with "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice" and BS 8206 Lighting for Buildings, Part 2: Code of Practice for Daylighting.

It should be noted at the outset that the BRE document sets out in its introduction that:

"Summary Page . . . It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location."

"1.6 . . . The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. . . ."

Performance of the proposed design

- **Light Distribution ADF**
 - 100% of all rooms on all floors comply with requirements.
 - Average ADF for the tested living rooms is 2.6% and for bedrooms 1.8%
 - The development shows excellent ADF results.
- **Sunlight to Living rooms:**
 - 100% of Living rooms receive some sunlight over the course of the year.
 - 76% achieve the BRE Annual APSH and 71% the Winter WPSH requirements.
 - This is in generally in accordance with what the guidelines define as "careful" design 80%.
 - These results should be considered in conjunction with the high daylight ADF results achieved.
- **Shadow:**
 - The communal amenity space complies with the BRE requirement relating to sunlight/shadow.

The application generally complies with the recommendations and guidelines of Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (BRE 2011) and BS 8206 Lighting for Buildings, Part 2: Code of Practice for Daylighting.

This development has been successfully designed to maximise the occupant's access to light. As such the design has used the guidelines in the spirit they have been written and balanced the requirements of this report with other constraints to arrive at this design.

Introduction

Chris Shackleton Consulting (CSC) have been asked to examine how the proposed development performs in terms of light.

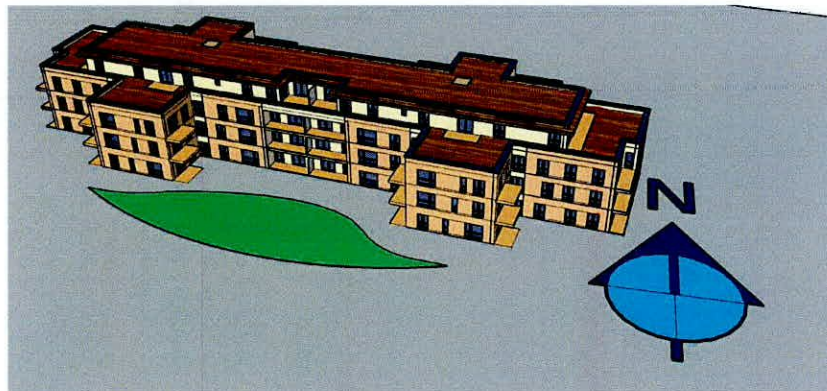
This analysis has been carried out in accordance with the recommendations of Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (BRE 2011) and BS 8206 Lighting for Buildings and Part 2: Code of Practice for Daylighting.

All references quoted in this report are from BRE document "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice – Second Edition – 2011 (BR 209) by Paul Littlefair" unless specifically noted otherwise.

Design Model

A 3D model of the proposed development and the surrounding neighbouring properties was provided by the Architect. These had been modelled from survey information and drawings provided in plan, elevation and section formats. The model was geo-referenced to its correct location and an accurate solar daylight system was introduced.

The analysis is based on the information provided.



Proposed Model

Scope of this Report

We have been asked to address the following specific items in this report and our scope is limited to the same:

Development Performance

For the proposed development we will examine the performance of the development under the following headings:

- Light distribution Average Daylight Factor – ADF – All habitable rooms
- Sunlight availability - Living room spaces APSH/WPSH.
- Shadow performance proposed communal amenity space.

When examining the internal performance of the development we note that the layout and rooms follow similar design principles floor to floor.

For the avoidance of doubt, we have chosen to test all floors and all rooms for the overall building performance.

Development Performance

Development Performance - Average Daylight Factor - ADF

Internal light distribution within a room is examined by testing ADF (Average Daylight Factor) against pre-defined parameters. Calculation of average daylight factor is based the BRE guidance document BR 209 and the referenced BS 8206-2:2008 Lighting for buildings – Part 2: Code of practice for daylighting.

This is defined under **Clause 2.11.3**

Daylight Factor

Ratio of illuminance at a point on a given plane due to light received from a sky of known or assumed luminance distribution, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky [BS 6100-7:2008, 59011]

Defined in the **BRE 209 Glossary** (similarly in the BS code **Clause 2.11.4** and **5.5**)

Average daylight factor:

Ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE standard overcast sky. Thus a 1% ADF would mean that the average indoor illuminance would be one hundredth the outdoor unobstructed illuminance

The average daylight factor (see 2.11.4) is used as the measure of general illumination from skylight. It is considered good practice to ensure that rooms in dwellings and in most other buildings have a predominantly daylight appearance. In order to achieve this the average daylight factor should be at least 2%.

If the average daylight factor in a space is at least 5% then electric lighting is not normally needed during the daytime, provided the uniformity is satisfactory (see 5.7 BS or 2.1.8 BRE 209). If the average daylight factor in a space is between 2% and 5% supplementary electric lighting is usually required. Values greater than 6% might suggest that the room has too much daylight.

- For the purposes of the calculation of daylight factor in this standard, it is assumed that the sky has the luminance distribution of the standard overcast sky.
- Direct and reflected sunlight are excluded from all values of illuminance.

This Code also provides under **Clause 5.6** guidance for

Minimum values of average daylight factor in dwellings

Even if a predominantly daylight appearance is not achievable in a dwelling, it is recommended that the average daylight factor should be at least the relevant value as given in Table 2 or clause 2.1.8 BRE 209

Table 2 - Minimum average daylight factor

| Room type | Minimum Average daylight factor % |
|--------------|-----------------------------------|
| Bedrooms | 1 |
| Living rooms | 1.5 |
| Kitchens | 2 |

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%.

In accordance with BRE 209 & BS 8206-2 computations are based on the standard CIE (Commission Internationale de l'Eclairage) overcast sky model. With the exclusion of direct and reflected sunlight from the computation of room average daylight factor it may be considered as worst-case scenario.

Light distribution was computed by modelling the internal configuration of rooms and windows placed within the existing topography and the adjacent buildings and then running a radiance analysis on the same. This analysis was based on a standard working plane for residential of 0.850m and results are provided in terms of Average Daylight Factor for selected rooms. See code for definitions.

The following reflectance/transmittance values were used for the analysis

These are generally from BS 8206 Part 2 - tables A.1 & A.2

| Surface | Description | Reflectance | |
|----------------|---------------------------|-------------|----------------|
| External Plane | Earth | 0.2 | |
| External Walls | Grey render / concrete | 0.4 | |
| Floor | Light Wood / cream carpet | 0.4 | |
| Internal Wall | Cream | 0.7 | |
| Ceiling | White | 0.8 | |
| Frame | Medium Grey | 0.5 | |
| | | | |
| Glass | Sealed double glazed unit | 0.63 | <Transmittance |

We note that for apartment developments the majority of councils in Ireland and the UK accept the lower value of 1.5% assigned to living rooms to also include those with a small food preparation area (kitchen) as part of this space. The higher kitchen figure of 2.0% is more appropriate to a traditional house layout and room usage. The use of a reduced value accepted by Local Authorities is still compliant within the terms of the guidelines. This has been confirmed as acceptable and standard practice by the author Dr Paul Littlefair.

For this project, however, have used the more strict BRE minimum values of **1.0%** for bedrooms and **2.0%** for the Living room spaces with food preparation areas (kitchens).

Legend for radiance plots:

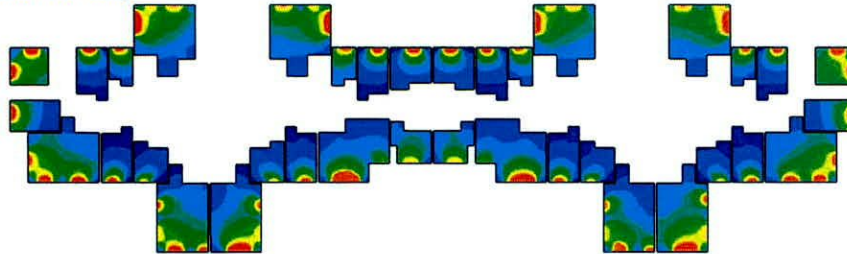
Daylight Factor [DF] %



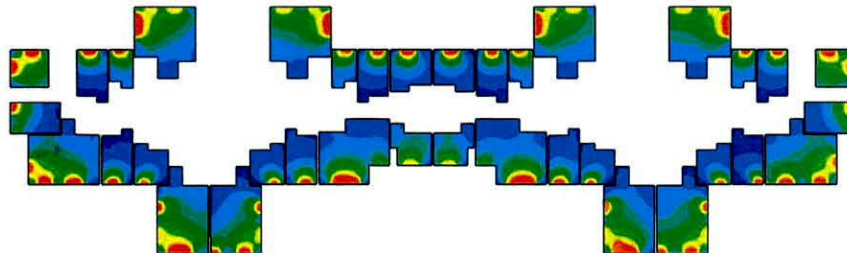
GFL, 1st and 2nd Floor Layouts – Naming Convention



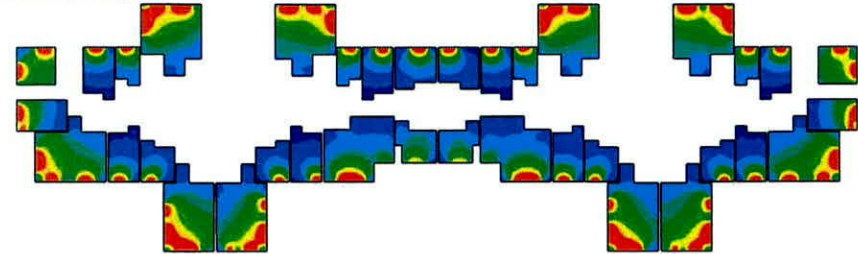
GFL Floor Analysis



1st Floor Analysis



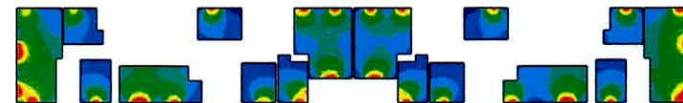
2nd Floor Analysis



3rd Floor Layouts – Naming Convention



3rd Floor Analysis



Average Daylight Factor

For all habitable rooms

| V2 | | | | |
|-----------------------------------|----------------|-----|----------------|-------|
| ADF Values from radiance 3D model | | | Yes | |
| Type | | | | |
| Ref | Type | ADF | Strict BRE Min | Check |
| 00-01 | Bedroom | 2.1 | 1.0 | Pass |
| 00-02C | Living/Kitchen | 2.4 | 2.0 | Pass |
| 00-03 | Bedroom | 1.2 | 1.0 | Pass |
| 00-04 | Bedroom | 1.0 | 1.0 | Pass |
| 00-05C | Living/Kitchen | 2.3 | 2.0 | Pass |
| 00-06C | Living/Kitchen | 2.4 | 2.0 | Pass |
| 00-07 | Bedroom | 1.1 | 1.0 | Pass |
| 00-08 | Bedroom | 1.3 | 1.0 | Pass |
| 00-09C | Living/Kitchen | 2.0 | 2.0 | Pass |
| 00-10 | Bedroom | 1.9 | 1.0 | Pass |
| 00-11 | Bedroom | 1.8 | 1.0 | Pass |
| 00-12C | Living/Kitchen | 2.0 | 2.0 | Pass |
| 00-13 | Bedroom | 1.3 | 1.0 | Pass |
| 00-14 | Bedroom | 1.0 | 1.0 | Pass |
| 00-15C | Living/Kitchen | 2.0 | 2.0 | Pass |
| 00-16C | Living/Kitchen | 2.6 | 2.0 | Pass |
| 00-17 | Bedroom | 1.0 | 1.0 | Pass |
| 00-18 | Bedroom | 1.2 | 1.0 | Pass |
| 00-19C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 00-20 | Bedroom | 2.1 | 1.0 | Pass |
| 00-21 | Bedroom | 3.8 | 1.0 | Pass |
| 00-22 | Bedroom | 1.4 | 1.0 | Pass |
| 00-23 | Bedroom | 2.0 | 1.0 | Pass |
| 00-24C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 00-25C | Living/Kitchen | 2.4 | 2.0 | Pass |
| 00-26 | Bedroom | 2.0 | 1.0 | Pass |
| 00-27 | Bedroom | 1.4 | 1.0 | Pass |
| 00-28 | Bedroom | 1.6 | 1.0 | Pass |
| 00-29 | Bedroom | 1.6 | 1.0 | Pass |
| 00-30 | Bedroom | 1.4 | 1.0 | Pass |
| 00-31 | Bedroom | 2.2 | 1.0 | Pass |
| 00-32C | Living/Kitchen | 2.3 | 2.0 | Pass |
| 00-33C | Living/Kitchen | 2.4 | 2.0 | Pass |
| 00-34 | Bedroom | 2.0 | 1.0 | Pass |
| 00-35 | Bedroom | 1.5 | 1.0 | Pass |
| 00-36 | Bedroom | 3.5 | 1.0 | Pass |

Average Daylight Factor

For all habitable rooms

| V2 | | | | |
|-----------------------------------|----------------|-----|----------------|-------|
| ADF Values from radiance 3D model | | | Yes | |
| Type | | | | |
| Ref | Type | ADF | Strict BRE Min | Check |
| 01-01 | Bedroom | 1.8 | 1.0 | Pass |
| 01-02C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 01-03 | Bedroom | 1.4 | 1.0 | Pass |
| 01-04 | Bedroom | 1.3 | 1.0 | Pass |
| 01-05C | Living/Kitchen | 2.8 | 2.0 | Pass |
| 01-06C | Living/Kitchen | 2.2 | 2.0 | Pass |
| 01-07 | Bedroom | 1.3 | 1.0 | Pass |
| 01-08 | Bedroom | 1.5 | 1.0 | Pass |
| 01-09C | Living/Kitchen | 2.0 | 2.0 | Pass |
| 01-10 | Bedroom | 1.9 | 1.0 | Pass |
| 01-11 | Bedroom | 1.7 | 1.0 | Pass |
| 01-12C | Living/Kitchen | 2.0 | 2.0 | Pass |
| 01-13 | Bedroom | 1.5 | 1.0 | Pass |
| 01-14 | Bedroom | 1.3 | 1.0 | Pass |
| 01-15C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 01-16C | Living/Kitchen | 2.4 | 2.0 | Pass |
| 01-17 | Bedroom | 1.3 | 1.0 | Pass |
| 01-18 | Bedroom | 1.0 | 1.0 | Pass |
| 01-19C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 01-20 | Bedroom | 1.9 | 1.0 | Pass |
| 01-21 | Bedroom | 3.7 | 1.0 | Pass |
| 01-22 | Bedroom | 1.5 | 1.0 | Pass |
| 01-23 | Bedroom | 2.2 | 1.0 | Pass |
| 01-24C | Living/Kitchen | 2.6 | 2.0 | Pass |
| 01-25C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 01-26 | Bedroom | 2.1 | 1.0 | Pass |
| 01-27 | Bedroom | 1.5 | 1.0 | Pass |
| 01-28 | Bedroom | 1.6 | 1.0 | Pass |
| 01-29 | Bedroom | 1.8 | 1.0 | Pass |
| 01-30 | Bedroom | 1.5 | 1.0 | Pass |
| 01-31 | Bedroom | 2.1 | 1.0 | Pass |
| 01-32C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 01-33C | Living/Kitchen | 2.5 | 2.0 | Pass |
| 01-34 | Bedroom | 2.3 | 1.0 | Pass |
| 01-35 | Bedroom | 1.6 | 1.0 | Pass |
| 01-36 | Bedroom | 3.7 | 1.0 | Pass |

Average Daylight Factor

For all habitable rooms

| V2 | | | | |
|-----------------------------------|----------------|-----|----------------|-------|
| ADF Values from radiance 3D model | | | Yes | |
| Type | | | | |
| Ref | Type | ADF | Strict BRE Min | Check |
| 02-01 | Bedroom | 2.6 | 1.0 | Pass |
| 02-02C | Living/Kitchen | 3.1 | 2.0 | Pass |
| 02-03 | Bedroom | 1.5 | 1.0 | Pass |
| 02-04 | Bedroom | 1.6 | 1.0 | Pass |
| 02-05C | Living/Kitchen | 3.6 | 2.0 | Pass |
| 02-06C | Living/Kitchen | 3.0 | 2.0 | Pass |
| 02-07 | Bedroom | 1.5 | 1.0 | Pass |
| 02-08 | Bedroom | 1.3 | 1.0 | Pass |
| 02-09C | Living/Kitchen | 2.1 | 2.0 | Pass |
| 02-10 | Bedroom | 1.8 | 1.0 | Pass |
| 02-11 | Bedroom | 1.6 | 1.0 | Pass |
| 02-12C | Living/Kitchen | 2.1 | 2.0 | Pass |
| 02-13 | Bedroom | 1.6 | 1.0 | Pass |
| 02-14 | Bedroom | 1.6 | 1.0 | Pass |
| 02-15C | Living/Kitchen | 3.3 | 2.0 | Pass |
| 02-16C | Living/Kitchen | 3.3 | 2.0 | Pass |
| 02-17 | Bedroom | 1.6 | 1.0 | Pass |
| 02-18 | Bedroom | 1.5 | 1.0 | Pass |
| 02-19C | Living/Kitchen | 3.1 | 2.0 | Pass |
| 02-20 | Bedroom | 2.6 | 1.0 | Pass |
| 02-21 | Bedroom | 3.8 | 1.0 | Pass |
| 02-22 | Bedroom | 1.6 | 1.0 | Pass |
| 02-23 | Bedroom | 2.4 | 1.0 | Pass |
| 02-24C | Living/Kitchen | 3.8 | 2.0 | Pass |
| 02-25C | Living/Kitchen | 3.7 | 2.0 | Pass |
| 02-26 | Bedroom | 2.3 | 1.0 | Pass |
| 02-27 | Bedroom | 1.5 | 1.0 | Pass |
| 02-28 | Bedroom | 1.6 | 1.0 | Pass |
| 02-29 | Bedroom | 1.8 | 1.0 | Pass |
| 02-30 | Bedroom | 1.5 | 1.0 | Pass |
| 02-31 | Bedroom | 2.3 | 1.0 | Pass |
| 02-32C | Living/Kitchen | 3.7 | 2.0 | Pass |
| 02-33C | Living/Kitchen | 3.7 | 2.0 | Pass |
| 02-34 | Bedroom | 2.4 | 1.0 | Pass |
| 02-35 | Bedroom | 1.6 | 1.0 | Pass |
| 02-36 | Bedroom | 3.7 | 1.0 | Pass |

Average Daylight Factor

For all habitable rooms

| V2 | | | | |
|-----------------------------------|----------------|-----|----------------|-------|
| ADF Values from radiance 3D model | | | Yes | |
| Type | | | | |
| Ref | Type | ADF | Strict BRE Min | Check |
| 03-01C | Living/Kitchen | 2.8 | 2.0 | Pass |
| 03-02 | Bedroom | 1.5 | 1.0 | Pass |
| 03-03C | Living/Kitchen | 2.4 | 2.0 | Pass |
| 03-04 | Bedroom | 1.4 | 1.0 | Pass |
| 03-05 | Bedroom | 2.0 | 1.0 | Pass |
| 03-06 | Bedroom | 1.9 | 1.0 | Pass |
| 03-07 | Bedroom | 1.4 | 1.0 | Pass |
| 03-08C | Living/Kitchen | 2.2 | 2.0 | Pass |
| 03-09 | Bedroom | 1.6 | 1.0 | Pass |
| 03-10C | Living/Kitchen | 2.9 | 2.0 | Pass |
| 03-11 | Bedroom | 1.7 | 1.0 | Pass |
| 03-12 | Bedroom | 1.4 | 1.0 | Pass |
| 03-13C | Living/Kitchen | 2.0 | 2.0 | Pass |
| 03-14C | Living/Kitchen | 2.1 | 2.0 | Pass |
| 03-15 | Bedroom | 1.4 | 1.0 | Pass |
| 03-16 | Bedroom | 1.5 | 1.0 | Pass |

| | Living | Bedroom |
|---------|--------|---------|
| Average | 2.6 | 1.8 |

ADF Check - Summary

100% of tested rooms comply with the relevant ADF (average daylight factors) requirements.
The development shows excellent ADF results.

Average ADF for the tested living rooms is 2.6% and for bedrooms 1.8%

The proposed development complies with the requirements of the BRE guidelines in relation to ADF light distribution.

Development Performance - Sunlight into living spaces

Clause 3.1.2 of the guidance document BRE indicates that special checks should be applied to living rooms to ensure that these core rooms receive the necessary sunlight.

In Housing, the main requirement for sunlight is in living rooms, where it is valued at any time of day but especially in the afternoon.

Check Clauses

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

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

3.1.16 Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations.

3.1.12..... If a room has two windows on opposite walls, the APSH due to each can be added together.

The guidelines accept the difficulty imposed by this requirement and that it will not always be possible to achieve this requirement for ALL living spaces. While it is preferred to have sunlight the guidelines are pragmatic in this regard.

The guidelines further define:

*3.1.8..... For larger developments of flats, especially those with site constraints, it may not be possible to have every living room facing within 90° of south.....
.....Arranging the flats so that living rooms are placed at the end corners of the building and hence can be dual aspect. That way, living rooms on the north side of the building can also have an east- or west-facing window which can receive some sun.....*

It then follows with an example of a careful layout for a relative small block where 4/5 flats have south facing living rooms, and one North which would receive no sunlight at all. From this layout and results we can conclude that an 80% pass rate is considered good design.

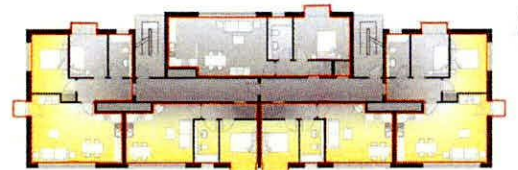


Figure 26: Careful layout design means that four out of the five flats shown have a south-facing living room

Tabulated results

Sunlight APSH - Living rooms

| v2a | | | | Annual > 25% | | Winter > 5% | |
|-------|-------|-------------|--------|--------------|------|-------------|------|
| Block | Floor | Window/Room | Ref | APSH | | WPSH | |
| B1 | F0 | W2 | 1.0.2 | 77.7 | Pass | 28.1 | Pass |
| B1 | F0 | W5 | 1.0.5 | 87.2 | Pass | 32.1 | Pass |
| B1 | F0 | W6 | 1.0.6 | 88.0 | Pass | 32.1 | Pass |
| B1 | F0 | W9 | 1.0.9 | 71.0 | Pass | 30.5 | Pass |
| B1 | F0 | W12 | 1.0.12 | 71.3 | Pass | 26.2 | Pass |
| B1 | F0 | W15 | 1.0.15 | 88.0 | Pass | 32.1 | Pass |
| B1 | F0 | W16 | 1.0.16 | 88.0 | Pass | 32.1 | Pass |
| B1 | F0 | W19 | 1.0.19 | 74.0 | Pass | 31.4 | Pass |
| B1 | F0 | W24 | 1.0.24 | 14.8 | Fail | 0.2 | Fail |
| B1 | F0 | W25 | 1.0.25 | 0.3 | Fail | 0.0 | Fail |
| B1 | F0 | W32 | 1.0.32 | 11.0 | Fail | 0.0 | Fail |
| B1 | F0 | W33 | 1.0.33 | 5.5 | Fail | 0.0 | Fail |
| B1 | F1 | W2 | 1.1.2 | 80.3 | Pass | 28.1 | Pass |
| B1 | F1 | W5 | 1.1.5 | 88.0 | Pass | 32.1 | Pass |
| B1 | F1 | W6 | 1.1.6 | 87.9 | Pass | 32.1 | Pass |
| B1 | F1 | W9 | 1.1.9 | 76.8 | Pass | 30.7 | Pass |
| B1 | F1 | W12 | 1.1.12 | 75.1 | Pass | 24.6 | Pass |
| B1 | F1 | W15 | 1.1.15 | 87.4 | Pass | 32.1 | Pass |
| B1 | F1 | W16 | 1.1.16 | 88.0 | Pass | 32.1 | Pass |
| B1 | F1 | W19 | 1.1.19 | 77.4 | Pass | 31.5 | Pass |
| B1 | F1 | W24 | 1.1.24 | 17.1 | Fail | 0.2 | Fail |
| B1 | F1 | W25 | 1.1.25 | 5.1 | Fail | 0.0 | Fail |
| B1 | F1 | W32 | 1.1.32 | 15.1 | Fail | 0.0 | Fail |
| B1 | F1 | W33 | 1.1.33 | 6.0 | Fail | 0.0 | Fail |
| B1 | F2 | W2 | 1.2.2 | 84.4 | Pass | 29.8 | Pass |
| B1 | F2 | W5 | 1.2.5 | 86.9 | Pass | 32.1 | Pass |
| B1 | F2 | W6 | 1.2.6 | 88.0 | Pass | 32.1 | Pass |
| B1 | F2 | W9 | 1.2.9 | 86.1 | Pass | 31.8 | Pass |
| B1 | F2 | W12 | 1.2.12 | 82.2 | Pass | 28.0 | Pass |
| B1 | F2 | W15 | 1.2.15 | 86.9 | Pass | 32.1 | Pass |
| B1 | F2 | W16 | 1.2.16 | 88.0 | Pass | 32.1 | Pass |
| B1 | F2 | W19 | 1.2.19 | 86.0 | Pass | 31.9 | Pass |
| B1 | F2 | W24 | 1.2.24 | 28.0 | Pass | 0.2 | Fail |
| B1 | F2 | W25 | 1.2.25 | 21.3 | Fail | 0.0 | Fail |
| B1 | F2 | W32 | 1.2.32 | 26.6 | Pass | 0.0 | Fail |
| B1 | F2 | W33 | 1.2.33 | 22.2 | Fail | 0.0 | Fail |
| B1 | F3 | W1 | 1.3.1 | 45.7 | Pass | 31.9 | Pass |
| B1 | F3 | W3 | 1.3.3 | 59.8 | Pass | 32.0 | Pass |
| B1 | F3 | W8 | 1.3.8 | 58.7 | Pass | 32.0 | Pass |
| B1 | F3 | W10 | 1.3.10 | 45.5 | Pass | 32.1 | Pass |
| B1 | F3 | W13 | 1.3.13 | 50.4 | Pass | 21.2 | Pass |
| B1 | F3 | W14 | 1.3.14 | 46.3 | Pass | 20.7 | Pass |

****1** All windows receive some sunlight and the number that face North are small.

76% pass the Annual APSH requirements and **71%** pass the WPSH which is generally in accordance with the guidelines example of "careful" design 80%.

This high quality of sunlight coupled with the excellent ADF results detailed above show that the living rooms to the apartments tested will receive an excellent quality of light

Sunlight to Living rooms - Summary

All Living rooms receive some sunlight over the course of the year.

76% achieve the BRE Annual APSH and **71%** the Winter WPSH requirements.

This is in generally in accordance with what the guidelines define as "careful" design 80%.

These results should be considered in conjunction with the high daylight ADF results achieved throughout.

The proposed development generally complies with the requirements of the BRE guidelines in relation to Sunlight availability and careful layout design.

Development Performance - Shadow/Sunlight - Gardens and Open spaces

Tests for the availability of sunlight in amenity areas.

Shadow/Sunlight - Clause 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.

3.3.3 The availability of sunlight should be checked for all open spaces where it will be required. This would normally include:

- gardens, usually the main back garden of a house
- parks and playing fields
- children's playgrounds
- outdoor swimming pools and paddling pools
- sitting out areas such as those between non-domestic buildings and in public squares
- focal points for views such as a group of monuments or fountains.

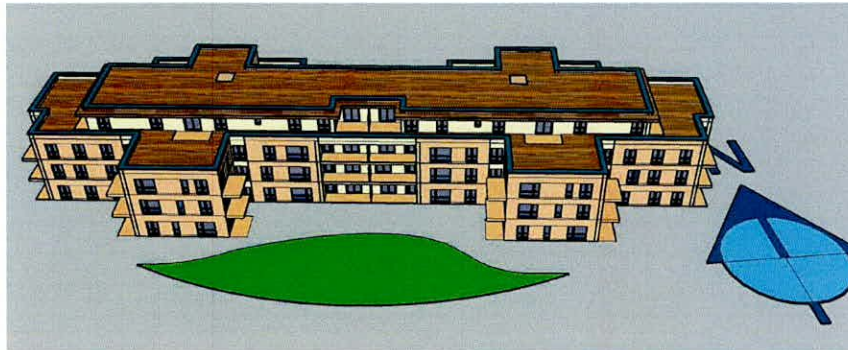
The amenities of the following properties were tested.

- Rear Communal Amenity to the South of the Apartment block.
- Private amenity spaces / balconies are not required to be tested under the BRE guidance document.

BRE 2-hour Shadow Plots

The graphic below indicates the areas which receive 2 hours of sunlight on the 21st March in accordance with the BRE guidelines.

- **Green** represents areas which exceed the 2-hour requirement - pass
- **Red** is less than the 2-hour requirement - fail
- **Orange** are marginal or borderline - just below the 2-hour requirement



Proposed

The results are tabulated below:

| V2 Shadow / Sunlight Amenity | | | | | |
|--------------------------------------------------|-------|-----|------|----------------|-------|
| >50% receives 2 hours of sunlight on 21st March) | | | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| B1 | F0 | A1 | 1.A1 | 100 | Pass |

Please note that passing the BRE requirements does not imply that shadows will not be cast over an amenity space at all. Shadows which are transient by nature may not impact on the percentage of the space which receives 2 hours of sunlight on the 21st of March.

Conclusion

All new provided communal amenity space passes the BRE requirement relating to the area receiving 2 hours of sunlight on the 21st of March > 50%.

The tested space complies with the requirements of the BRE guidelines.

Summary – Development Performance

This report is in compliance with: "Site layout planning for daylight and sunlight a guide to good practice Second Edition - 2011 by Paul J Littlefair - BR209". It also references "BS 8206-2:2008 Lighting for buildings – Part 2: Code of practice for daylighting" as and where called for in the above BRE guidance document.

Performance of the proposed design

- **Light Distribution ADF**
 - 100% of all rooms on all floors comply with requirements.
 - Average ADF for the tested living rooms is 2.6% and for bedrooms 1.8%
 - The development shows excellent ADF results.
- **Sunlight to Living rooms:**
 - 100% of Living rooms receive some sunlight over the course of the year.
 - 76% achieve the BRE Annual APSH and 71% the Winter WPSH requirements.
 - This is in generally in accordance with what the guidelines define as "careful" design 80%.
 - These results should be considered in conjunction with the high daylight ADF results achieved.
- **Shadow:**
 - The communal amenity space complies with the BRE requirement relating to sunlight/shadow.

The application generally complies with the recommendations and guidelines of Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (BRE 2011) and BS 8206 Lighting for Buildings, Part 2: Code of Practice for Daylighting.