

SANTRY AVENUE SHD, CHADWICKS BUILDERS MERCHANTS SITE

Daylight & Shadow Assessment

V2



Executive Summary

This report examines the performance of Blocks AB, CD, EF & G in terms of light distribution and the shared amenity spaces. We have also provided a commentary on impact or lack thereof on neighbours.

The report is, in accordance with "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice, BS 8206 Lighting for Buildings, Part 2: Code of Practice for Daylighting and other updated relevant documents".

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."

" 1.6The 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 based on testing the 1st floor of all 7x apartment blocks.

- **Light Distribution ADF** - ADF (average daylight factors)
 - The development generally shows excellent ADF results.
 - 98% tested rooms on the 1st floor comply with the relaxed requirements.
 - The two that don't are just marginal.
 - 90% comply with the strict BRE requirements.
 - Average high ADFs for all tested living rooms is 3.2% and for bedrooms 2.5%
 - A supplementary ADF analysis for the Ground Floor is also provided in Appendix 1.
- **Sunlight to Living rooms:** All windows were tested for Annual APSH and Winter WPSH
 - All Living rooms receive some sunlight over the course of the year.
 - If we include the marginal results then:
 - 1st Floor 57% pass the Annual APSH requirements and 57% pass the WPSH
 - 3rd Floor 70% pass the Annual APSH requirements and 82% pass the WPSH
 - This is in generally in accordance with what the guidelines define as "careful layout" design 80%.
- **Shadow:** Provided shared and public amenity were tested against the BRE requirement relating to the area receiving 2 hours of sunlight on the 21st of March > 50%.
 - Private amenity spaces, if we include the marginal results then:
 - 1st Floor 64% of private spaces pass the shadow requirements.
 - 3rd Floor 90% of private spaces pass the shadow requirements.
 - This is in generally in accordance with what the guidelines define as "careful layout" design 80%.
 - All the main shared spaces receive excellent and compliant sunlight results.
- Please see Architects comments on alternative, compensatory design solutions relating to sunlight/shadow.

Summary impact Neighbours

- Non-residential buildings sit to the West, North and East of the proposal and do not require testing.
- Phase 1 Santry Place sits to the South of this Phase 2 proposal.
 - Sunlight to amenity and windows of the granted Santry Place cannot be impacted by this current proposal as it sits to the North.
 - In relation to skylight (VSC) this proposal Phase 2 along the interface line is a mirrored development of the permitted and constructed Phase 1 design. Any impact along the closer façades will therefore be compliant with the guidelines and Mirrored development approach of Appendix F.

Solar Orientation and Architect's Compensatory Measures/Justification.

The design is an urban infill scheme with competing design constraints and objectives it is specifically covered by clause 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities – amended Dec 2020:

6.6 Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision.

6.7 Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution.

We accept that some balconies and living rooms may not meet the BRE recommendations for sun lighting in certain locations at the lower levels of the development, however, a high level of residential amenity will be delivered for all the residents of this scheme, such as:

- a) In this urban infill site, a strong emphasis was placed on catering for high-quality sun lit areas such as the public and communal spaces, as well as private amenity spaces, which ensures that sunlit spaces will be accessible to all residents within the development and not just those with more favourably orientated apartments. A wide variety of communal amenity areas are also provided for within the scheme at the Ground, First, Seventh and Fourteenth floors. Furthermore, there is an overprovision of communal amenity space, of over 860sq.m, which can be likened to a compensatory measure for certain apartments receiving below the BRE recommendations. All amenity spaces surpass the sun-lighting requirement by substantial margins.

- b) The design of the private balconies has been influenced by the necessity to provide shelter and protection from the wind in addition to any sunlighting requirement. In this regard, all balconies are fully or partially recessed into the block, and we recognize that these recessed balconies will naturally reduce sunlight exposure, but they will ultimately contribute to a more user-friendly and comfortable private amenity space for residents. It should also be noted, however, that a high proportion of balconies are substantially larger than the required areas for private open space, thus affording increased residential amenity for future residents of the development.
- c) 98 % of the apartments receive above the required levels of daylighting and the analysis shows that all private spaces and living rooms also receive sunlight. There are no single north-facing single-aspect apartments within the entire scheme of 350 no. dwellings.
- d) In order to improve sun lighting to ground floor units, the floor to ceiling height has been set at a generous 3m height and ground floor windows will be 2.7m high, which is substantially higher than the 2.1m standard height.

Future occupants will enjoy great levels of both daylight and sunlight within the proposed units and while having access to a number of amenity areas that are capable of receiving excellent levels of sunlight. The site is also directly opposite Santry Demesne Park which has large areas of open space and additional amenities. The results find that any impact on the sunlight received by individual apartments would be minimal in the overall context of the urban setting of the proposed development. There is a sufficient good quality of daylight in the apartments analysed and the amenity areas all have sufficient sunlight to be bright and pleasant spaces.

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 and other updated relevant documents.

It has successfully been designed to maximise the occupants' 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 design constraints to arrive at this design.

Introduction

CSC have been asked to examine the performance of Blocks AB, CD, EF & G in terms of light distribution and the shared amenity spaces. We have also provided a commentary on impact or lack thereof on neighbours.

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.

Preliminary Overview

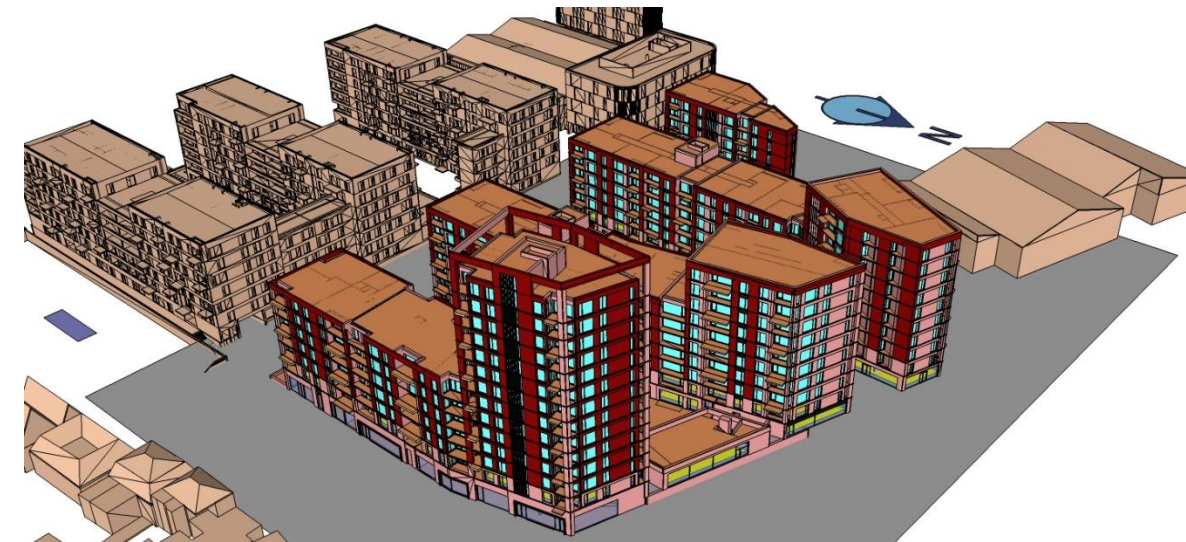
The aerial extract from Google Earth shows the context for the site. The proposed development provides for 350 no. apartments, comprised of 113 no. 1 bed, 218 no. 2 bed, & 19 no. 3 bed dwellings, in 4 no. seven to fourteen storey buildings, over basement level, with 5 no. retail / commercial units and a community use unit located at ground floor level facing onto Santry Avenue and Swords Road. A one storey residential amenity unit, facing onto Santry Avenue, is also provided for between Blocks A & D.



Google Earth extract © Google 2021

Design Model

A 3D model of the proposed development was provided by the client. This model was extracted from the BIM design model and is an accurate representation proposal and used in this analysis. This 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

Development performance was examined under the following headings:

- Light distribution Average Daylight Factor - ADF
 - This report looks at all rooms at 1st floor level for each of the 7 x blocks
The 1st floor was selected across these blocks since it is representative of multiple floor levels. (Ground floor is less representative since it includes entrances, lobbies, stores, and usually taller floor heights).
 - Sunlight to living room windows.
 - Sunlight/Shadow to:
 - Private amenities – Balconies
 - Shared Amenity spaces
- An additional ADF analysis was also provided for the Ground floor in Appendix 1 as requested.

A commentary was also provided relating to Impact on Neighbours.

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 daylit 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 daylit 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 if 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.

We have thus used the minimum values of **1.0%** for bedrooms and **1.5%** for the Living room spaces. Additional columns are provided relating to the strict **2.0%** living room values.

An explanation of the reasoning behind this relaxed test figure and the constraints relating to single aspect living rooms in larger developments is provided below.

Alternative targets for Living rooms and specifically for Single Aspect ones

The BRE guidelines are standard guidelines which may be applied to room types in all development forms. It is evident that constraints applied to traditional housing would differ greatly from that applied to apartment design especially where density and other constraints apply and must be balanced in the planning process.

The BRE guidelines acknowledge in their introduction that natural lighting is only one of the factors in design and that while numerical values are provided, they should be interpreted flexibly.

1.6 The guide is intended for building designers and their clients, consultants, and planning officials. 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 (see Section 5). In special circumstances the developer or planning authority may wish to use different target values...

The guidelines note the following ADF minimums relating to Living spaces.

- Living rooms: 1.5%
- Kitchens: 2.0%
- The guidelines further expand as follows:
 - Where a 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%.

ADF Radiance Analysis

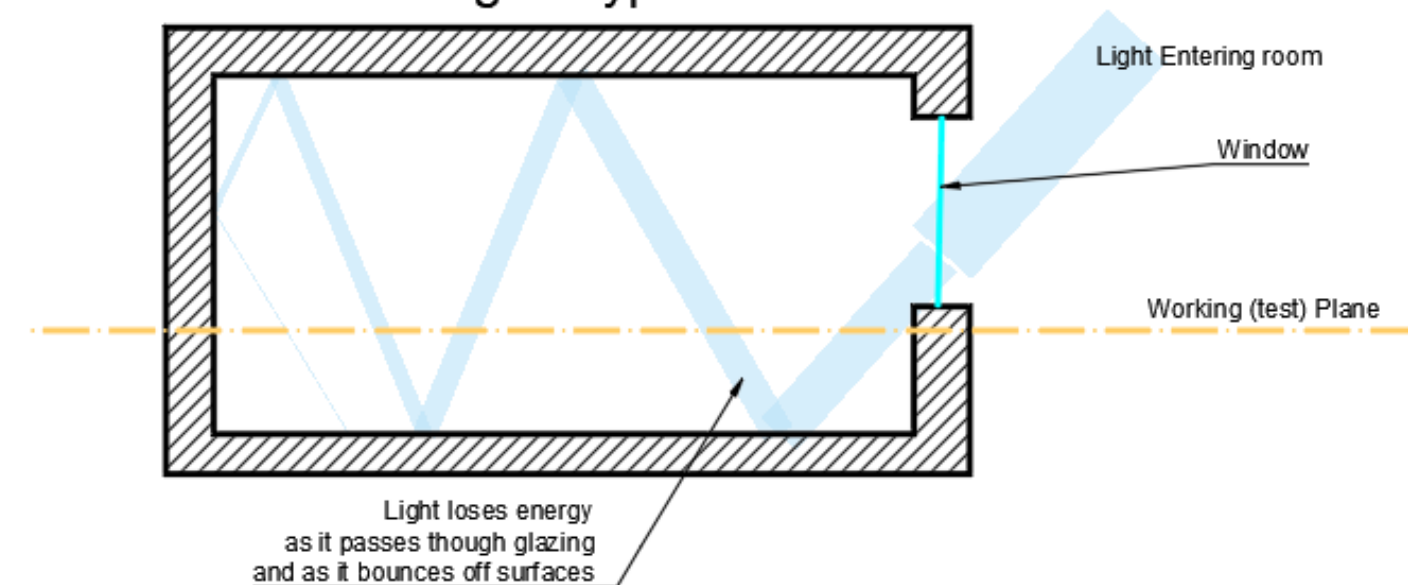
Daylight Factor (DF) is used to study daylight illuminance levels under overcast sky conditions. It depends on space geometry, materials and external obstructions (environment buildings and relief), regardless of climate data for building location.

Daylight factor is defined as the ratio of the inside illuminance to the exterior diffuse horizontal illuminance on an unobstructed plane, for a standard CIE Overcast Sky luminance distribution.

The advantages of DF are its ease of apprehension, speed of calculation and independence of climate. DF is a good indicator of the behaviour of the project in an unfavourable climatic situation (overcast sky) more typical in temperate climates such as our own.

The standard radiance analysis used for rooms looks at the light entering a space and its propagation around the same. Light entering a room is initially and immediately reduced by the transmittance value assigned to the glazing. As it moves around the room it bounces off the various surfaces (walls, floors, ceilings) each with their own reflectance properties. As it does, energy is lost to the reflectance of the same. Each time the light passes through the defined working plane (0.85m above floor level for residential) its contribution is added.

Section through a typical room

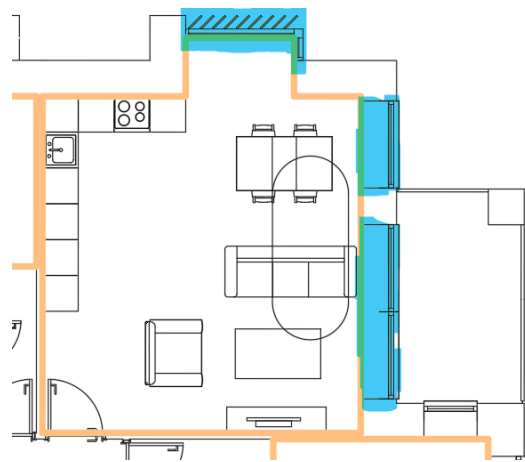


The various Daylight factors taken as an average over a test area (room) is defined as the Average Daylight Factor or ADF.

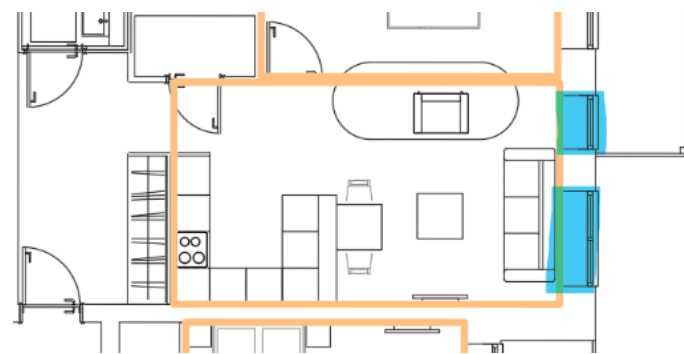
Typical Layouts Multi vs Single Aspect

In the case of a multi aspect living or open plan rooms with a traditional “window over the sink design” in both conventional housing and apartment developments will typically achieve the minimum combined requirement of 2%. Light can come from a number of directions and is thus distributed throughout the space,

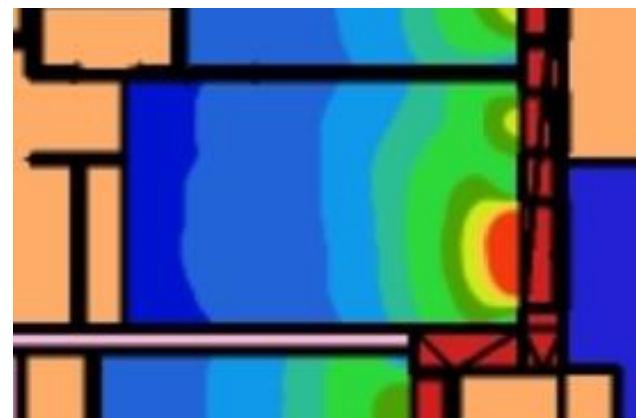
Single aspect rooms, however, receive light from only one source. The front element of the room near the window will receive the best light and this will tail off towards the rear. The graphics below show some typical examples of layouts (windows highlighted in blue) and the matching radiance maps of light distribution are shown below.



Multi-Aspect Living Space (ADF 2.3%)



Single Aspect Living Space (ADF 1.6%)



While both of these rooms receive high quality light near the external windows, rear of the single aspect room receives considerably less. This will be the case regardless of what average daylight factor is achieved over the full room surface area.

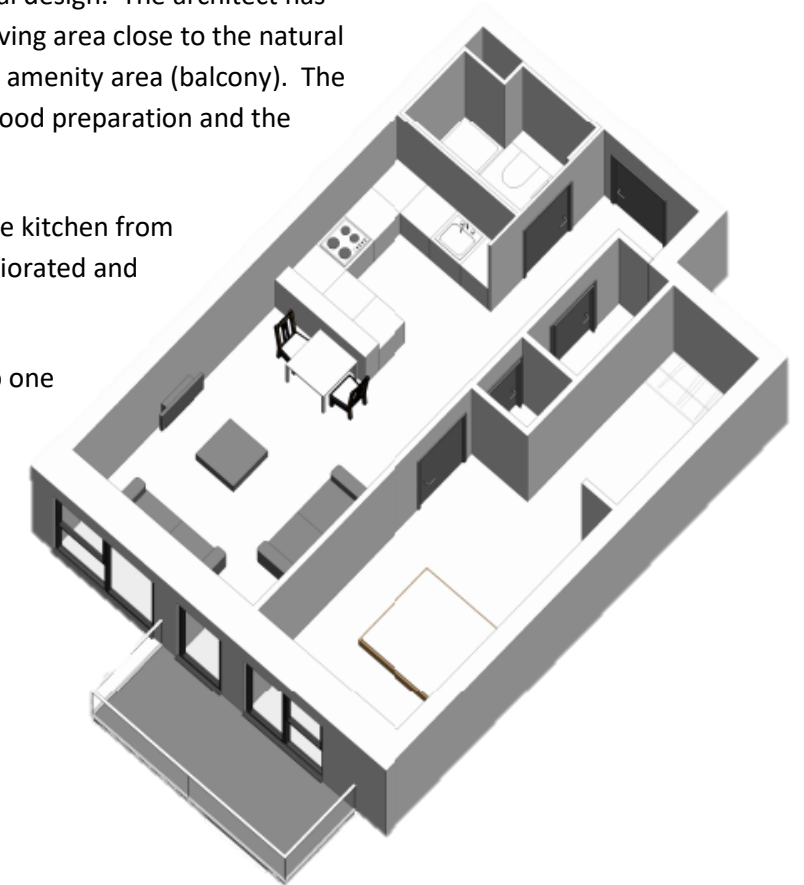
We can also see in these localised images that light is also reduce by the required provision of amenity space in terms of private balconies.

Design considerations

The isometric view here of an apartment shows a typical design. The architect has considered the usage of the space and prioritised the living area close to the natural light though the window and easy access to the private amenity area (balcony). The kitchen (unlike a traditional house kitchen) is used for food preparation and the space for living and dining sits beyond the same.

This is an effective use of the space and the offset of the kitchen from the natural light provided through the windows is ameliorated and supplemented by specific artificial kitchen task lighting.

Given the constraints and design form with windows to one end light will always be substantially less furthest from the same regardless of any average calculation of the full surface (ADF)



Analysis and guideline references for resolution Single Aspect layouts.

In terms of the guidelines, we can consider the food preparation element of the main living space as a non-daylit internal galley kitchen. This layout is inevitable if we are to balance the various objectives set by the department guidelines, project and site specific design constraints. This is acceptable since it does not include a dining area and the space opens onto a well daylit living room.

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.

Since the remaining space is a living room the minimum requirement is thus 1.5%. In addition, the area tested will now be limited to the living space (excluding the galley kitchen area) and thus the average results will improve since the tested area is closer to the windows.

We can consider the galley kitchen in two ways.

1. As a physical space separated by a wall, into which no daylight will be received.
 - The physical wall will bounce light back into the front section of the room.
2. As a virtual space without a wall, into which some daylight will be received.
 - As a virtual space light will continue progress to light the space behind.

The radiance graphics for the ADF analysis for the spaces based on these two options is show below. In both cases the ADF results relate to the same front area defined as “well daylit living room” clause 2.1.14.



Virtual Wall - ADF 2.0%

Physical Wall - ADF 2.1%

We can see that the ADF for the living rooms well exceed the 1.5% living room requirement and may be considered as well lit. The results with a physical wall are slightly higher but the benefits of having some natural daylight penetrate the galley kitchens we believe outweigh the minimal improvement this might make.

Alternative/Relaxed Strategy – Adopted

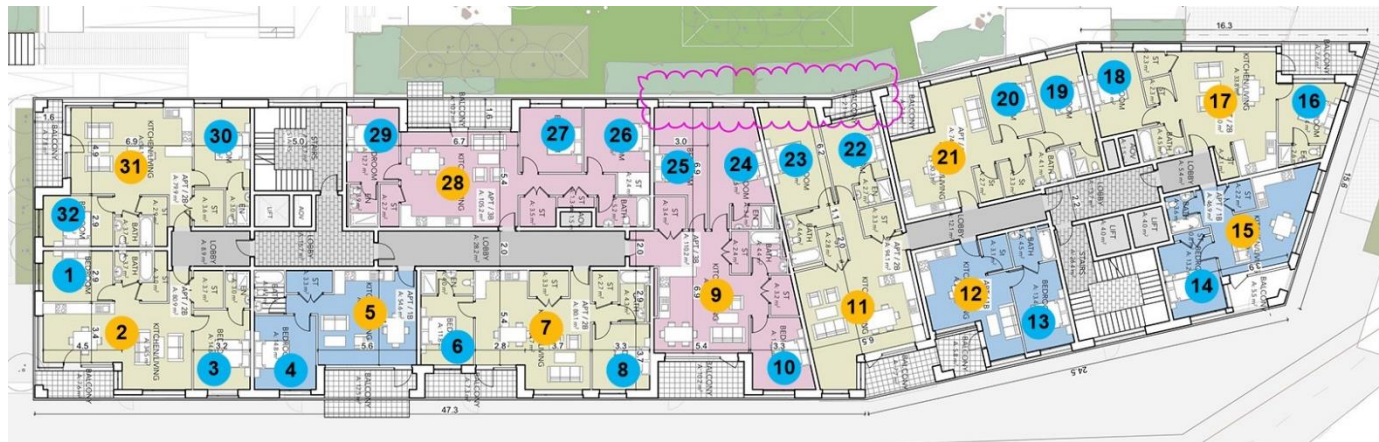
While this methodology shows a compliant result based on segregating the space into a non-daylit internal galley kitchen and a well daylit living room, common practice in Ireland and the UK is to assign an alternative target to such single aspect rooms.

In this case the primary use of the single aspect living room is considered as living room with a target ADF of 1.5% set. The entire floor area including the gally kitchen is then evaluated at this relaxed specification.

Typically, this requirement is more onerous as it requires overall light levels to include the food preparations areas, notwithstanding specific task lighting which will be provided.

These options have been discussed with Dr Littlefair the Author of the BRE guidelines and this option is the preferred relaxation and is in common usage.

1st Floor Layout - Naming Convention - AB

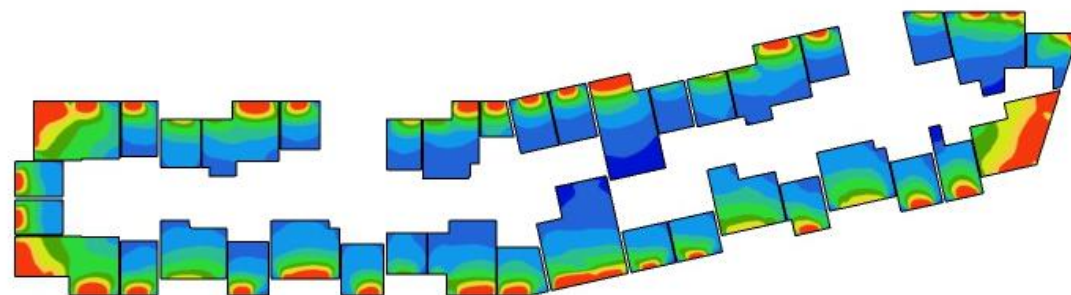


Legend for radiances plots:

Daylight Factor [DF] %



1st Floor Analysis - AB

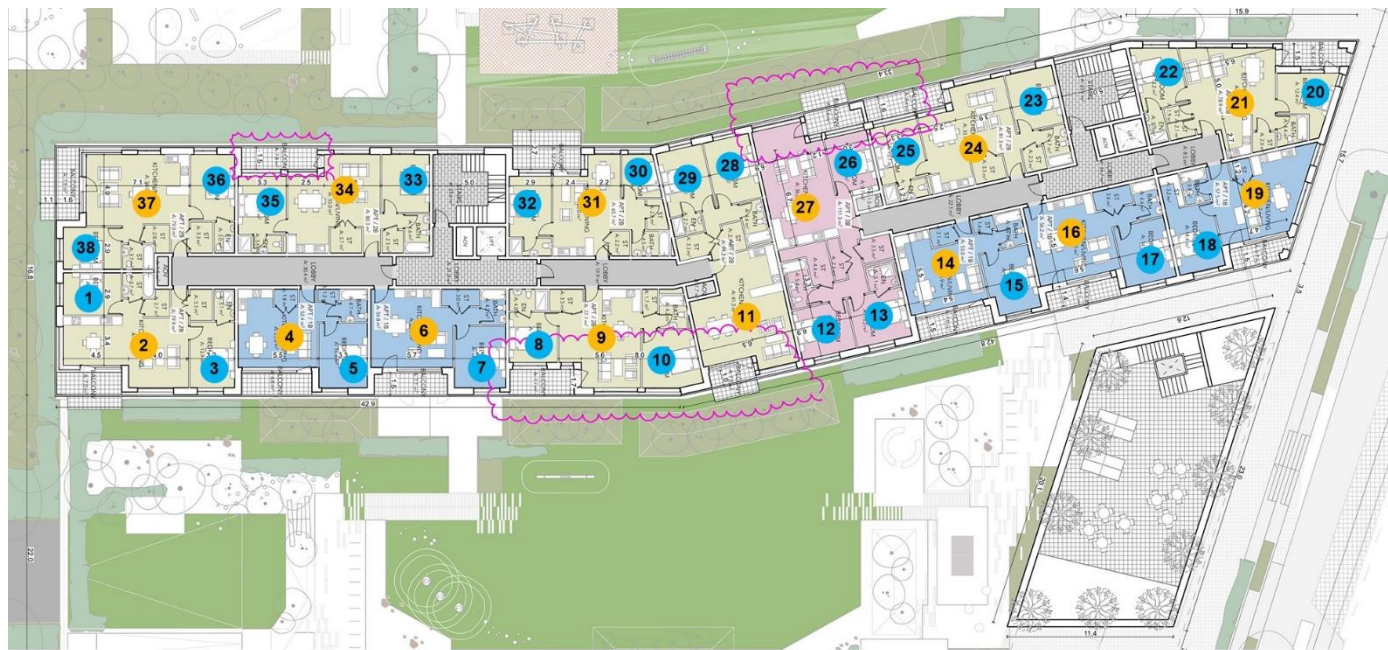


1AB Average Daylight Factor							
For all habitable rooms							
ADF Values from radiances 3D m Yes							
Room	Ref	Type	Calc ADF	Relaxed		Strict	
				Min	Check	Min	Check
1	1AB01	Bedroom	2.6	1.0	Pass	1.0	Pass
2	1AB02L	Living Room	5.9	1.5	Pass	2.0	Pass
3	1AB03	Bedroom	3.6	1.0	Pass	1.0	Pass
4	1AB04	Bedroom	3.4	1.0	Pass	1.0	Pass
5	1AB05L	Living Room	3.7	1.5	Pass	2.0	Pass
6	1AB06	Bedroom	2.3	1.0	Pass	1.0	Pass
7	1AB07L	Living Room	4.4	1.5	Pass	2.0	Pass
8	1AB08	Bedroom	3.7	1.0	Pass	1.0	Pass
9	1AB09L	Living Room	1.7	1.5	Pass	2.0	Fail
10	1AB10	Bedroom	4.4	1.0	Pass	1.0	Pass
11	1AB11L	Living Room	2.9	1.5	Pass	2.0	Pass
12	1AB12L	Living Room	3.2	1.5	Pass	2.0	Pass
13	1AB13	Bedroom	4.5	1.0	Pass	1.0	Pass
14	1AB14	Bedroom	5.2	1.0	Pass	1.0	Pass
15	1AB15L	Living Room	7.3	1.5	Pass	2.0	Pass
16	1AB16	Bedroom	3.0	1.0	Pass	1.0	Pass
17	1AB17L	Living Room	2.7	1.5	Pass	2.0	Pass
18	1AB18	Bedroom	1.9	1.0	Pass	1.0	Pass
19	1AB19	Bedroom	2.0	1.0	Pass	1.0	Pass
20	1AB20	Bedroom	2.5	1.0	Pass	1.0	Pass
21	1AB21L	Living Room	1.6	1.5	Pass	2.0	Fail
22	1AB22	Bedroom	2.4	1.0	Pass	1.0	Pass
23	1AB23	Bedroom	2.1	1.0	Pass	1.0	Pass
24	1AB24	Bedroom	2.0	1.0	Pass	1.0	Pass
25	1AB25	Bedroom	2.0	1.0	Pass	1.0	Pass
26	1AB26	Bedroom	2.2	1.0	Pass	1.0	Pass
27	1AB27	Bedroom	2.3	1.0	Pass	1.0	Pass
28	1AB28L	Living Room	1.7	1.5	Pass	2.0	Fail
29	1AB29	Bedroom	2.2	1.0	Pass	1.0	Pass
30	1AB30	Bedroom	1.9	1.0	Pass	1.0	Pass
31	1AB31L	Living Room	4.2	1.5	Pass	2.0	Pass
32	1AB32	Bedroom	2.4	1.0	Pass	1.0	Pass
				Pass	32		29
				Count	32		32
				Percentage	100%		91%

ADF Check - Summary

Average ADF for the tested living rooms is **3.6%** and for bedrooms **2.8%**

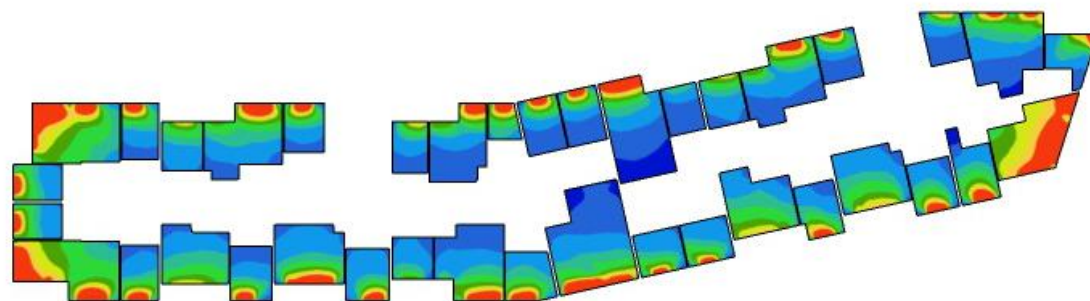
1st Floor Layout - Naming Convention - CD



Legend for radiances plots:
Daylight Factor [DF] %



1st Floor Analysis - CD

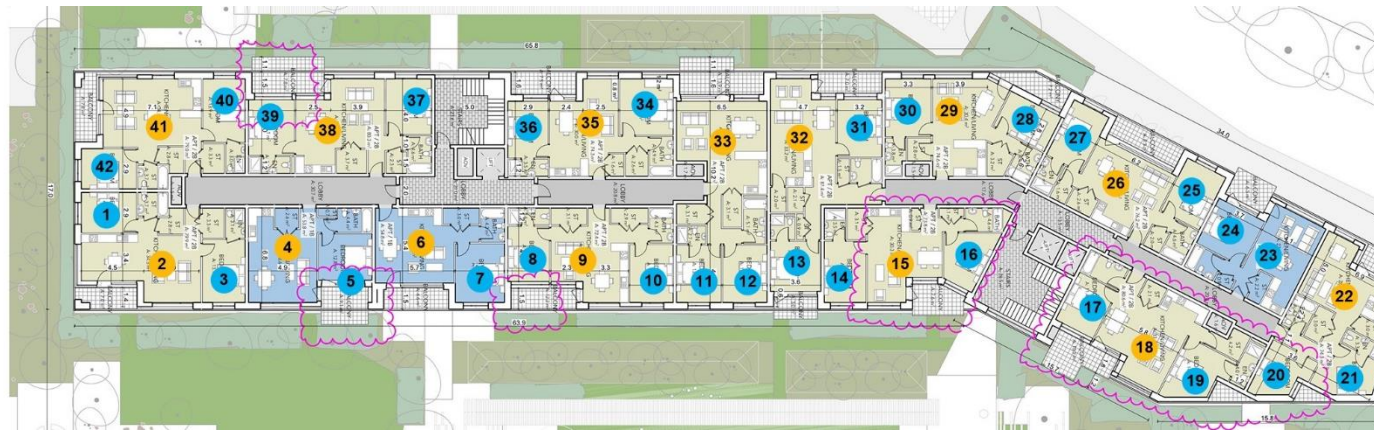


1CD Average Daylight Factor							
For all habitable rooms							
ADF Values from radiances 3D m Yes							
Room	Ref	Type	Type		Check	Strict	
			Calc ADF	Relaxed Min		Min	Check
1	1CD01	Bedroom	2.5	1.0	Pass	1.0	Pass
2	1CD02L	Living Room	4.6	1.5	Pass	2.0	Pass
3	1CD03	Bedroom	2.4	1.0	Pass	1.0	Pass
4	1CD04L	Living Room	1.8	1.5	Pass	2.0	Fail
5	1CD05	Bedroom	2.1	1.0	Pass	1.0	Pass
6	1CD06L	Living Room	2.4	1.5	Pass	2.0	Pass
7	1CD07	Bedroom	2.2	1.0	Pass	1.0	Pass
8	1CD08	Bedroom	1.4	1.0	Pass	1.0	Pass
9	1CD09L	Living Room	2.1	1.5	Pass	2.0	Pass
10	1CD10	Bedroom	2.7	1.0	Pass	1.0	Pass
11	1CD11L	Living Room	2.1	1.5	Pass	2.0	Pass
12	1CD12	Bedroom	2.0	1.0	Pass	1.0	Pass
13	1CD13	Bedroom	2.0	1.0	Pass	1.0	Pass
14	1CD14L	Living Room	2.1	1.5	Pass	2.0	Pass
15	1CD15	Bedroom	2.3	1.0	Pass	1.0	Pass
16	1CD16L	Living Room	2.0	1.5	Pass	2.0	Pass
17	1CD17	Bedroom	2.3	1.0	Pass	1.0	Pass
18	1CD18	Bedroom	2.6	1.0	Pass	1.0	Pass
19	1CD19L	Living Room	6.4	1.5	Pass	2.0	Pass
20	1CD20	Bedroom	2.2	1.0	Pass	1.0	Pass
21	1CD21L	Living Room	1.7	1.5	Pass	2.0	Fail
22	1CD22	Bedroom	1.3	1.0	Pass	1.0	Pass
23	1CD23	Bedroom	1.8	1.0	Pass	1.0	Pass
24	1CD24L	Living Room	1.9	1.5	Pass	2.0	Fail
25	1CD25	Bedroom	1.6	1.0	Pass	1.0	Pass
26	1CD26	Bedroom	0.9	1.0	Marginal	1.0	Fail
27	1CD27L	Living Room	2.0	1.5	Pass	2.0	Pass
28	1CD28	Bedroom	1.9	1.0	Pass	1.0	Pass
29	1CD29	Bedroom	1.9	1.0	Pass	1.0	Pass
30	1CD30	Bedroom	3.4	1.0	Pass	1.0	Pass
31	1CD31L	Living Room	1.9	1.5	Pass	2.0	Fail
32	1CD32	Bedroom	1.6	1.0	Pass	1.0	Pass
33	1CD33	Bedroom	2.3	1.0	Pass	1.0	Pass
34	1CD34L	Living Room	2.5	1.5	Pass	2.0	Pass
35	1CD35	Bedroom	1.8	1.0	Pass	1.0	Pass
36	1CD36	Bedroom	2.3	1.0	Pass	1.0	Pass
37	1CD37L	Living Room	4.5	1.5	Pass	2.0	Pass
38	1CD38	Bedroom	2.6	1.0	Pass	1.0	Pass
			Pass		37		33
			Count		38		38
			Percentage		97%		87%

ADF Check - Summary

Average ADF for the tested living rooms is 2.7% and for bedrooms 2.1%

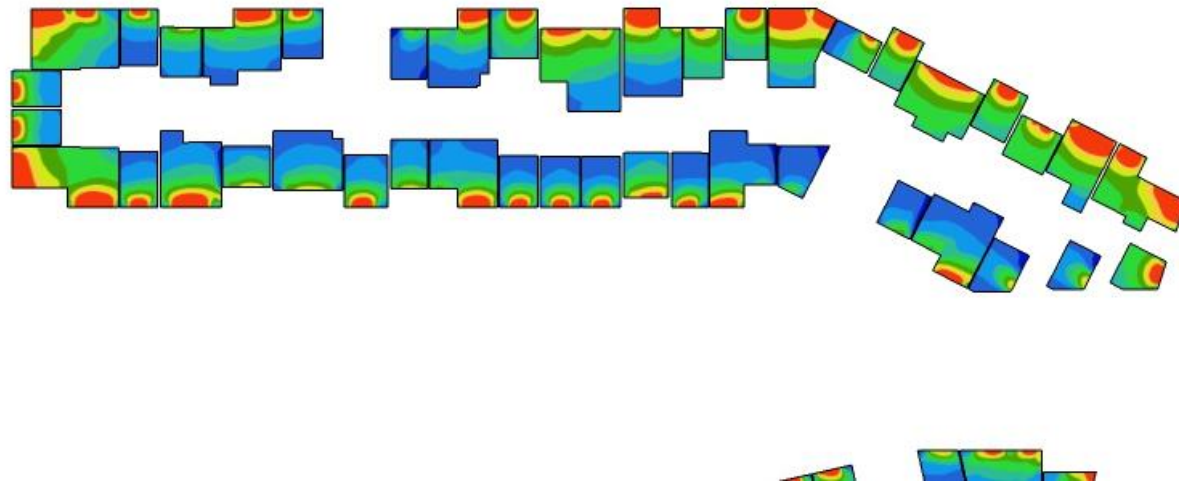
1st Floor Layout - Naming Convention - EF



Legend for radiance plots:
Daylight Factor [DF] %



1st Floor Analysis - EF

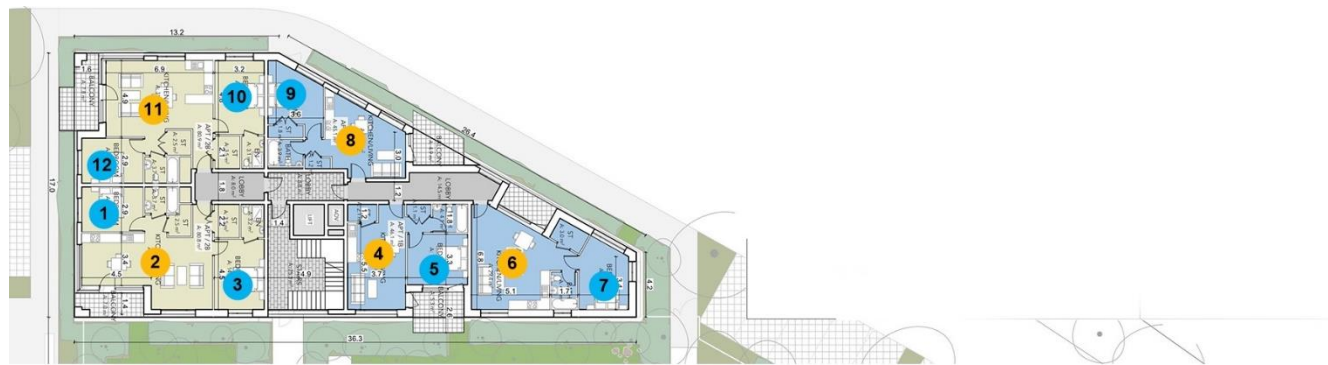


1EF		Average Daylight Factor					
For all habitable rooms							
ADF Values from radiance 3D m Yes							
Room	Ref	Type	Calc ADF	Relaxed Min	Check	Strict Min	Check
1	1EF01	Bedroom	2.6	1.0	Pass	1.0	Pass
2	1EF02L	Living Room	4.9	1.5	Pass	2.0	Pass
3	1EF03	Bedroom	2.3	1.0	Pass	1.0	Pass
4	1EF04L	Living Room	2.8	1.5	Pass	2.0	Pass
5	1EF05	Bedroom	1.9	1.0	Pass	1.0	Pass
6	1EF06L	Living Room	1.5	1.5	Pass	2.0	Fail
7	1EF07	Bedroom	2.4	1.0	Pass	1.0	Pass
8	1EF08	Bedroom	1.8	1.0	Pass	1.0	Pass
9	1EF09L	Living Room	2.3	1.5	Pass	2.0	Pass
10	1EF10	Bedroom	2.1	1.0	Pass	1.0	Pass
11	1EF11	Bedroom	2.0	1.0	Pass	1.0	Pass
12	1EF12	Bedroom	2.0	1.0	Pass	1.0	Pass
13	1EF13	Bedroom	2.6	1.0	Pass	1.0	Pass
14	1EF14	Bedroom	1.8	1.0	Pass	1.0	Pass
15	1EF15L	Living Room	1.8	1.5	Pass	2.0	Fail
16	1EF16	Bedroom	0.9	1.0	Marginal	1.0	Fail
17	1EF17	Bedroom	1.1	1.0	Pass	1.0	Pass
18	1EF18L	Living Room	1.8	1.5	Pass	2.0	Fail
19	1EF19	Bedroom	1.3	1.0	Pass	1.0	Pass
20	1EF20	Bedroom	1.5	1.0	Pass	1.0	Pass
21	1EF21	Bedroom	3.7	1.0	Pass	1.0	Pass
22	1EF22L	Living Room	5.1	1.5	Pass	2.0	Pass
23	1EF23	Bedroom	5.1	1.0	Pass	1.0	Pass
24	1EF24	Bedroom	3.1	1.0	Pass	1.0	Pass
25	1EF25	Bedroom	3.6	1.0	Pass	1.0	Pass
26	1EF26L	Living Room	3.5	1.5	Pass	2.0	Pass
27	1EF27	Bedroom	3.9	1.0	Pass	1.0	Pass
28	1EF28	Bedroom	2.1	1.0	Pass	1.0	Pass
29	1EF29L	Living Room	4.6	1.5	Pass	2.0	Pass
30	1EF30	Bedroom	3.4	1.0	Pass	1.0	Pass
31	1EF31	Bedroom	2.7	1.0	Pass	1.0	Pass
32	1EF32L	Living Room	3.0	1.5	Pass	2.0	Pass
33	1EF33L	Living Room	2.6	1.5	Pass	2.0	Pass
34	1EF34	Bedroom	3.2	1.0	Pass	1.0	Pass
35	1EF35L	Living Room	2.4	1.5	Pass	2.0	Pass
36	1EF36	Bedroom	1.0	1.0	Pass	1.0	Pass
37	1EF37	Bedroom	2.2	1.0	Pass	1.0	Pass
38	1EF38L	Living Room	2.6	1.5	Pass	2.0	Pass
39	1EF39	Bedroom	1.7	1.0	Pass	1.0	Pass
40	1EF40	Bedroom	1.8	1.0	Pass	1.0	Pass
41	1EF41L	Living Room	3.8	1.5	Pass	2.0	Pass
42	1EF42	Bedroom	2.5	1.0	Pass	1.0	Pass
			Pass		41		38
			Count		42		42
			Percentage		98%		90%

ADF Check - Summary

Average ADF for the tested living rooms is 3.0% and for bedrooms 2.4%

1st Floor Layout - Naming Convention - G

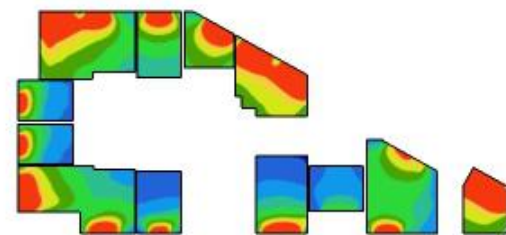


Legend for radiance plots:

Daylight Factor [DF] %



1st Floor Analysis - G



1G Average Daylight Factor							
For all habitable rooms							
ADF Values from radiance 3D m Yes							
Room	Ref	Type	Calc ADF	Relaxed Min	Check	Strict Min	Check
1	1G01	Bedroom	2.6	1.0	Pass	1.0	Pass
2	1G02L	Living Room	4.1	1.5	Pass	2.0	Pass
3	1G03	Bedroom	1.7	1.0	Pass	1.0	Pass
4	1G04L	Living Room	2.4	1.5	Pass	2.0	Pass
5	1G05	Bedroom	1.3	1.0	Pass	1.0	Pass
6	1G06L	Living Room	3.0	1.5	Pass	2.0	Pass
7	1G07	Bedroom	7.7	1.0	Pass	1.0	Pass
8	1G08L	Living Room	6.7	1.5	Pass	2.0	Pass
9	1G09	Bedroom	5.3	1.0	Pass	1.0	Pass
10	1G10	Bedroom	3.7	1.0	Pass	1.0	Pass
11	1G11L	Living Room	5.3	1.5	Pass	2.0	Pass
12	1G12	Bedroom	2.5	1.0	Pass	1.0	Pass
					Pass	12	12
					Count	12	12
					Percentage	100%	100%

ADF Check - Summary

Average ADF for the tested living rooms is 4.3% and for bedrooms 3.5%

Summary for all blocks 1st Floor

	Relaxed BRE			Strict BRE		
	Pass	Rooms		Pass	Rooms	
AB	32	32		29	32	
CD	37	38		33	38	
DE	41	42		38	42	
G	12	12		12	12	
Total	122	124	98%	112	124	90%

**1 of the 124 rooms tested at 1st floor level 98% pass the relaxed requirements and the and the 2 that don't are marginal. Given the scale of the project this represents careful design which we can see from the high average overall ADF for the living rooms of 3.2% and 2.5% for bedrooms. These results will only improve at higher floor levels. There are specific constraints relating to these two rooms which limit light access.

ADF Check - Summary

ADF (average daylight factors) for 98% tested rooms on the 1st floor comply with the relaxed requirements and the two that do not are marginal.

The development shows excellent average ADF results.

90% comply with the strict BRE requirements.

Average ADF for all tested living rooms in all blocks is an excellent is 3.2% and for bedrooms 2.5%

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

Development Performance - Sunlight into living spaces

Proposed Development - Sunlight Annual & Winter

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 relatively 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 1st Floor

1st Floor		Sunlight APSH - Living rooms					
V3		Annual > 25%		Winter > 5%			
Block	Floor	Ref	APSH		WPSH		
AB	F1	W2	69.8	Pass	17.6	Pass	
AB	F1	W5	27.4	Pass	8.5	Pass	
AB	F1	W7	51.3	Pass	17.8	Pass	
AB	F1	W9	15.2	Fail	4.4	Marginal	
AB	F1	W11	49.6	Pass	16.2	Pass	
AB	F1	W12	35.7	Pass	13.4	Pass	
AB	F1	W15	9.9	Fail	5.1	Pass	
AB	F1	W17	17.9	Fail	2.1	Fail	
AB	F1	W21	27.1	Pass	6.7	Pass	
AB	F1	W28	7.1	Fail	1.6	Fail	
AB	F1	W31	29.0	Pass	9.2	Pass	
CD	F1	W2	59.7	Pass	6.1	Pass	
CD	F1	W4	9.2	Fail	4.0	Marginal	
CD	F1	W6	13.7	Fail	2.7	Fail	
CD	F1	W9	25.0	Pass	7.5	Pass	
CD	F1	W11	12.3	Fail	1.3	Fail	
CD	F1	W14	1.9	Fail	0.0	Fail	
CD	F1	W16	6.8	Fail	0.8	Fail	
CD	F1	W19	12.1	Fail	0.8	Fail	
CD	F1	W21	12.5	Fail	1.9	Fail	
CD	F1	W24	27.9	Pass	6.9	Pass	
CD	F1	W27	30.4	Pass	7.8	Pass	
CD	F1	W31	19.7	Marginal	2.9	Fail	
CD	F1	W34	22.2	Marginal	5.0	Pass	
CD	F1	W37	25.0	Pass	5.7	Pass	
EF	F1	W2	61.2	Pass	7.3	Pass	
EF	F1	W4	23.8	Marginal	7.5	Pass	
EF	F1	W6	6.6	Fail	3.6	Fail	
EF	F1	W9	18.4	Fail	3.8	Fail	
EF	F1	W15	26.7	Pass	8.2	Pass	
EF	F1	W18	25.0	Pass	8.5	Pass	
EF	F1	W22	18.0	Fail	0.6	Fail	
EF	F1	W26	12.1	Fail	0.6	Fail	
EF	F1	W29	37.5	Pass	5.8	Pass	
EF	F1	W32	30.1	Pass	3.3	Fail	
EF	F1	W33	11.1	Fail	0.0	Fail	
EF	F1	W35	17.2	Fail	3.7	Fail	
EF	F1	W38	19.2	Marginal	7.3	Pass	
EF	F1	W41	17.9	Fail	2.2	Fail	
G	F1	W2	59.6	Pass	7.4	Pass	
G	F1	W4	20.7	Marginal	7.5	Pass	
G	F1	W6	17.2	Fail	7.1	Pass	
G	F1	W8	27.0	Pass	2.7	Fail	
G	F1	W11	19.7	Marginal	1.7	Fail	

3rd Floor		Sunlight APSH - Living rooms					
V3		Annual > 25%		Winter > 5%			
Block	Floor	Ref	APSH		WPSH		
AB	F3	W2	75.4	Pass	22.5	Pass	
AB	F3	W5	28.7	Pass	9.8	Pass	
AB	F3	W7	52.4	Pass	18.9	Pass	
AB	F3	W9	16.1	Fail	5.3	Pass	
AB	F3	W11	50.3	Pass	16.9	Pass	
AB	F3	W12	36.0	Pass	13.8	Pass	
AB	F3	W15	10.0	Fail	5.2	Pass	
AB	F3	W17	25.1	Pass	4.3	Marginal	
AB	F3	W21	37.2	Pass	9.9	Pass	
AB	F3	W28	14.1	Fail	2.5	Fail	
AB	F3	W31	34.0	Pass	13.9	Pass	
CD	F3	W2	71.8	Pass	17.3	Pass	
CD	F3	W4	9.0	Fail	5.0	Pass	
CD	F3	W6	19.4	Marginal	4.0	Marginal	
CD	F3	W9	32.4	Pass	10.7	Pass	
CD	F3	W11	17.9	Fail	4.7	Marginal	
CD	F3	W14	2.8	Fail	0.3	Fail	
CD	F3	W16	8.2	Fail	2.2	Fail	
CD	F3	W19	11.7	Fail	0.4	Fail	
CD	F3	W21	18.9	Fail	4.4	Marginal	
CD	F3	W24	37.2	Pass	9.7	Pass	
CD	F3	W27	39.2	Pass	10.6	Pass	
CD	F3	W31	27.1	Pass	4.2	Marginal	
CD	F3	W34	32.2	Pass	8.1	Pass	
CD	F3	W37	30.1	Pass	11.0	Pass	
EF	F3	W2	73.3	Pass	18.5	Pass	
EF	F3	W4	32.7	Pass	12.2	Pass	
EF	F3	W6	8.7	Fail	4.0	Marginal	
EF	F3	W9	28.2	Pass	7.7	Pass	
EF	F3	W15	32.9	Pass	11.2	Pass	
EF	F3	W18	28.1	Pass	12.0	Pass	
EF	F3	W22	18.0	Fail	0.6	Fail	
EF	F3	W26	7.5	Fail	0.6	Fail	
EF	F3	W29	39.2	Pass	7.5	Pass	
EF	F3	W32	33.1	Pass	5.2	Pass	
EF	F3	W33	13.9	Fail	0.0	Fail	
EF	F3	W35	24.8	Marginal	5.4	Pass	
EF	F3	W38	28.9	Pass	9.1	Pass	
EF	F3	W41	23.9	Marginal	7.7	Pass	
G	F3	W2	70.1	Pass	15.7	Pass	
G	F3	W4	27.9	Pass	10.0	Pass	
G	F3	W6	23.9	Marginal	9.2	Pass	
G	F3	W8	27.5	Pass	3.2	Fail	
G	F3	W11	29.4	Pass	10.9	Pass	

**1 All windows receive some sunlight and the number that face North are small. The orientation of these blocks is set by the granted Phase 1 design.

If we include the marginal results then:

1st Floor **57%** pass the Annual APSH requirements and **57%** pass the WPSH

3rd Floor **70%** pass the Annual APSH requirements and **82%** pass the WPSH

The results on these higher floors are closer to the guidelines example of “careful layout” design 80%.

Sunlight to Living rooms - Summary

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

If we include the marginal results then:

1st Floor **57%** pass the Annual APSH requirements and **57%** pass the WPSH

3rd Floor **70%** pass the Annual APSH requirements and **82%** pass the WPSH

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

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.

- Private balconies
- Shared amenity spaces

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

1st Floor	Shadow / Sunlight Amenity			
	>50% receives 2 hours of sunlight on 21st March)			
V3		Ref	% 2hr Sunlight	Check
AB	F1	A2	89%	Pass
AB	F1	A5	93%	Pass
AB	F1	A7	79%	Pass
AB	F1	A9	81%	Pass
AB	F1	A11	74%	Pass
AB	F1	A12	22%	Fail
AB	F1	A15	42%	Marginal
AB	F1	A17	0%	Fail
AB	F1	A21	6%	Fail
AB	F1	A28	2%	Fail
AB	F1	A31	97%	Pass
CD	F1	A2	87%	Pass
CD	F1	A4	70%	Pass
CD	F1	A6	17%	Fail
CD	F1	A9	19%	Fail
CD	F1	A11	34%	Fail
CD	F1	A14	0%	Fail
CD	F1	A16	10%	Fail
CD	F1	A19	0%	Fail
CD	F1	A21	0%	Fail
CD	F1	A24	34%	Fail
CD	F1	A27	68%	Pass
CD	F1	A31	58%	Pass
CD	F1	A34	77%	Pass
CD	F1	A37	95%	Pass
EF	F1	A2	83%	Pass
EF	F1	A4	71%	Pass
EF	F1	A6	37%	Fail
EF	F1	A9	33%	Fail
EF	F1	A15	41%	Marginal
EF	F1	A18	86%	Pass
EF	F1	A22	46%	Marginal
EF	F1	A26	64%	Pass
EF	F1	A29	100%	Pass
EF	F1	A32	76%	Pass
EF	F1	A33	43%	Marginal
EF	F1	A35	0%	Fail
EF	F1	A38	71%	Pass
EF	F1	A41	95%	Pass
G	F1	A2	81%	Pass
G	F1	A4	21%	Fail
G	F1	A6	43%	Marginal
G	F1	A8	66%	Pass
G	F1	A11	76%	Pass

3rd Floor	Shadow / Sunlight Amenity			
	>50% receives 2 hours of sunlight on 21st March)			
V3		Ref	% 2hr Sunlight	Check
AB	F3	A2	98%	Pass
AB	F3	A5	95%	Pass
AB	F3	A7	88%	Pass
AB	F3	A9	81%	Pass
AB	F3	A11	74%	Pass
AB	F3	A12	26%	Fail
AB	F3	A15	65%	Pass
AB	F3	A17	40%	Marginal
AB	F3	A21	13%	Fail
AB	F3	A28	61%	Pass
AB	F3	A31	99%	Pass
CD	F3	A2	94%	Pass
CD	F3	A6	63%	Pass
CD	F3	A9	58%	Pass
CD	F3	A11	61%	Pass
CD	F3	A14	49%	Fail
CD	F3	A16	60%	Pass
CD	F3	A19	0%	Fail
CD	F3	A21	43%	Fail
CD	F3	A24	64%	Pass
CD	F3	A27	81%	Pass
CD	F3	A31	79%	Pass
CD	F3	A34	71%	Pass
CD	F3	A37	95%	Pass
EF	F3	A2	97%	Pass
EF	F3	A4	78%	Pass
EF	F3	A9	60%	Pass
EF	F3	A15	61%	Pass
EF	F3	A18	91%	Pass
EF	F3	A22	46%	Fail
EF	F3	A26	63%	Pass
EF	F3	A29	99%	Pass
EF	F3	A32	83%	Pass
EF	F3	A33	76%	Pass
EF	F3	A35	19%	Fail
EF	F3	A38	64%	Pass
EF	F3	A41	97%	Pass
G	F3	A2	97%	Pass
G	F3	A4	53%	Pass
G	F3	A8	66%	Pass
G	F3	A11	99%	Pass

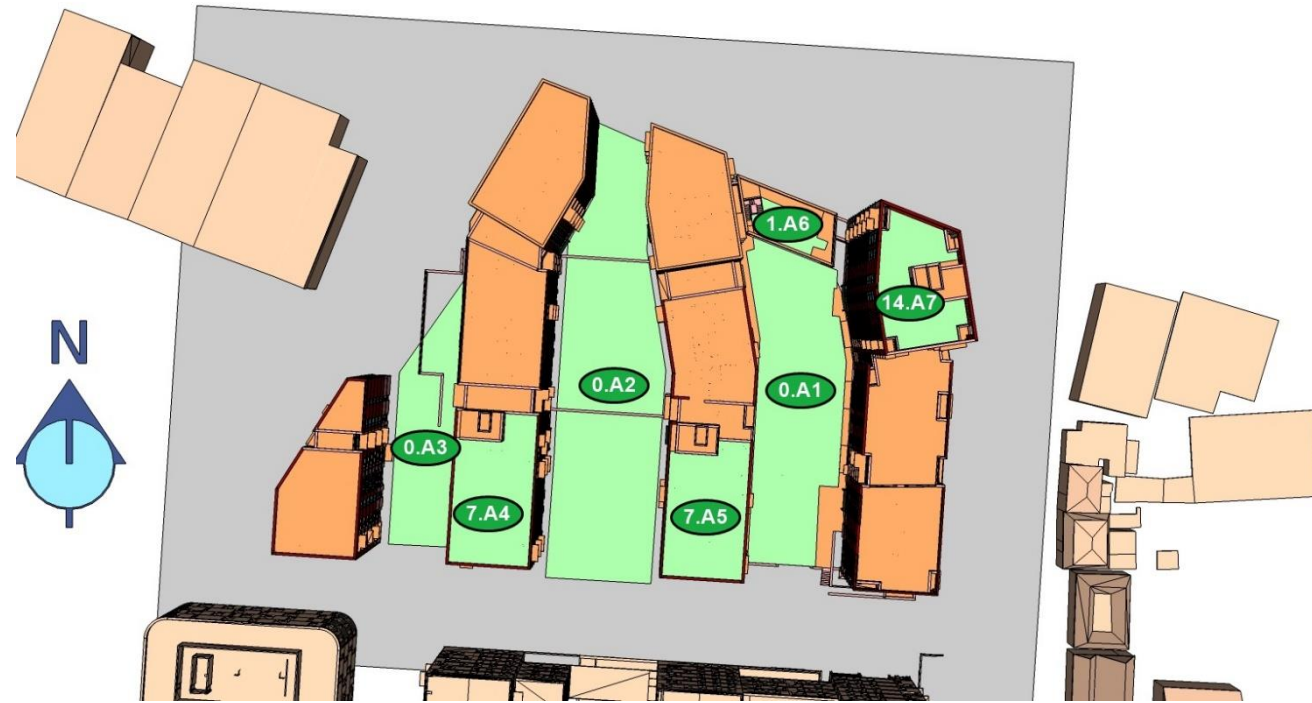
If we include the marginal results then:

1st Floor **64%** pass the shadow requirements.

3rd Floor **90%** pass the shadow requirements.

The results on these higher floors are compatible with the guidelines example of “careful layout” design 80%.

Shared Amenity Spaces, Ground and upper floors



Proposed



The results are tabulated below:

Shadow / Sunlight Amenity				
>50% receives 2 hours of sunlight on 21st March)				
V3		Ref	% 2hr Sunlight	Check
AS	F0	A1	95%	Pass
AS	F0	A2	96%	Pass
AS	F0	A3	70%	Pass
AS	F7	A4	99%	Pass
AS	F7	A5	99%	Pass
AS	F1	A6	86%	Pass
AS	F14	A7	87%	Pass

All shared amenity spaces receive excellent sunlight.

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

Provided shared and public amenity were tested against the BRE requirement relating to the area receiving 2 hours of sunlight on the 21st of March > 50%.

If we include the marginal results, then:

- 1st Floor 64% of private spaces pass the shadow requirements.
- 3rd Floor 90% of private spaces pass the shadow requirements.

All Shared Spaces receive excellent and compliant sunlight results

The tested spaces comply with the requirements of the BRE guidelines.

Development Solar Orientation

The design is constrained as an extension of the Phase 1 regeneration development, by the site shape and orientation. The scheme has a number of competing design constraints and objectives it is specifically covered by clause 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities – amended Dec 2020:

6.6 Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision.

6.7 Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution.

Details of Architect's Compensatory Measures / Justification

We accept that some balconies and living rooms may not meet the BRE recommendations for sun lighting in certain locations at the lower levels of the development, however, a high level of residential amenity will be delivered for all the residents of this scheme, such as:

- a) In this urban infill site, a strong emphasis was placed on catering for high-quality sun lit areas such as the public and communal spaces, as well as private amenity spaces, which ensures that sunlit spaces will be accessible to all residents within the development and not just those with more favourably orientated apartments. A wide variety of communal amenity areas are also provided for within the scheme at the Ground, First, Seventh and Fourteenth floors. Furthermore, there is an overprovision of communal amenity space, of over 860sq.m, which can be likened to a compensatory measure for certain apartments receiving below the BRE recommendations. All amenity spaces surpass the sun-lighting requirement by substantial margins.
- b) The design of the private balconies has been influenced by the necessity to provide shelter and protection from the wind in addition to any sunlighting requirement. In this regard, all balconies are fully or partially recessed into the block, and we recognize that these recessed balconies will naturally reduce sunlight exposure, but they will ultimately contribute to a more user-friendly and comfortable private amenity space for residents. It should also be noted, however, that a high proportion of balconies are substantially larger than the required areas for private open space, thus affording increased residential amenity for future residents of the development.
- c) 98 % of the apartments receive above the required levels of daylighting and the analysis shows that all private spaces and living rooms also receive sunlight. There are no single north-facing single-aspect apartments within the entire scheme of 350 no. dwellings.
- d) In order to improve sun lighting to ground floor units, the floor to ceiling height has been set at a generous 3m height and ground floor windows will be 2.7m high, which is substantially higher than the 2.1m standard height.

Future occupants will enjoy great levels of both daylight and sunlight within the proposed units and while having access to a number of amenity areas that are capable of receiving excellent levels of sunlight. The site is also directly opposite Santry Demesne Park which has large areas of open space and additional amenities. The results find that any impact on the sunlight received by individual apartments would be minimal in the overall context of the urban setting of the proposed development. There is a sufficient good quality of daylight in the apartments analysed and the amenity areas all have sufficient sunlight to be bright and pleasant spaces.

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.

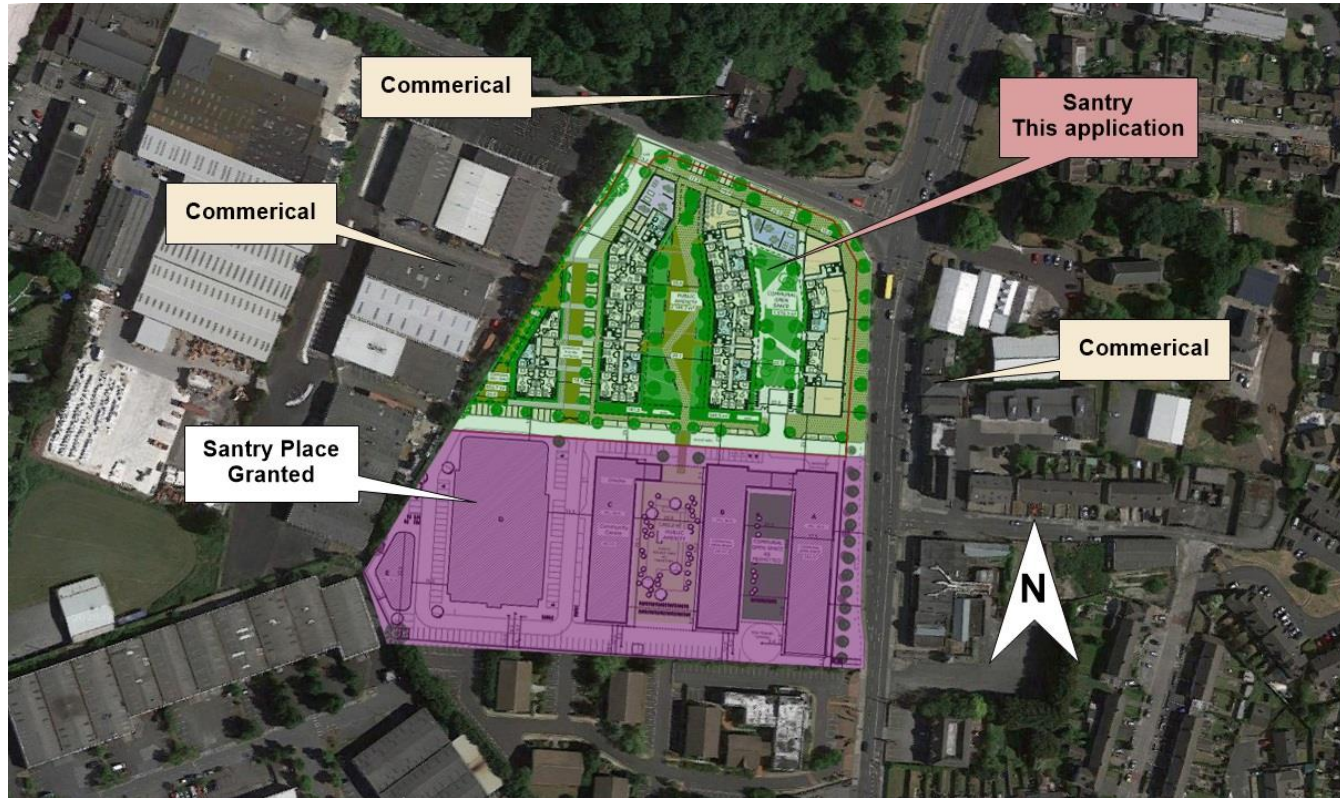
Performance of the proposed design

- **Light Distribution ADF** - ADF (average daylight factors)
 - The development generally shows excellent ADF results.
 - 98% tested rooms on the 1st floor comply with the relaxed requirements.
 - The two that don't are just marginal.
 - 90% comply with the strict BRE requirements.
 - Average high ADFs for all tested living rooms is 3.2% and for bedrooms 2.5%
 - A supplementary ADF analysis for the Ground Floor is also provided in Appendix 1.
- **Sunlight to Living rooms:** All windows were tested for Annual APSH and Winter WPSH
 - All Living rooms receive some sunlight over the course of the year.
 - If we include the marginal results then:
 - 1st Floor 57% pass the Annual APSH requirements and 57% pass the WPSH
 - 3rd Floor 70% pass the Annual APSH requirements and 82% pass the WPSH
 - This is in generally in accordance with what the guidelines define as "careful layout" design 80%.
- **Shadow:** Provided shared and public amenity were tested against the BRE requirement relating to the area receiving 2 hours of sunlight on the 21st of March > 50%.
 - Private amenity spaces, if we include the marginal results then:
 - 1st Floor 64% of private spaces pass the shadow requirements.
 - 3rd Floor 90% of private spaces pass the shadow requirements.
 - This is in generally in accordance with what the guidelines define as "careful layout" design 80%.
 - All the main shared spaces receive excellent and compliant sunlight results.
- Please see Architects comments on alternative, compensatory design solutions 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.

Impact on Neighbours

The proposed development generally sits amid commercial and retail buildings.



- **North:** To the North is a single storey commercial building in the heavily forested section of Santry Park.
- **West:** Commerical, office and warehouse buildings lie to the West.
- **East:** Across the relatively wide Swords Road lies retails and commercial buildings.
- **South:** Finally, to the South in line with each of the proposed blocks lies the permitted Santry Place, mixed use development.

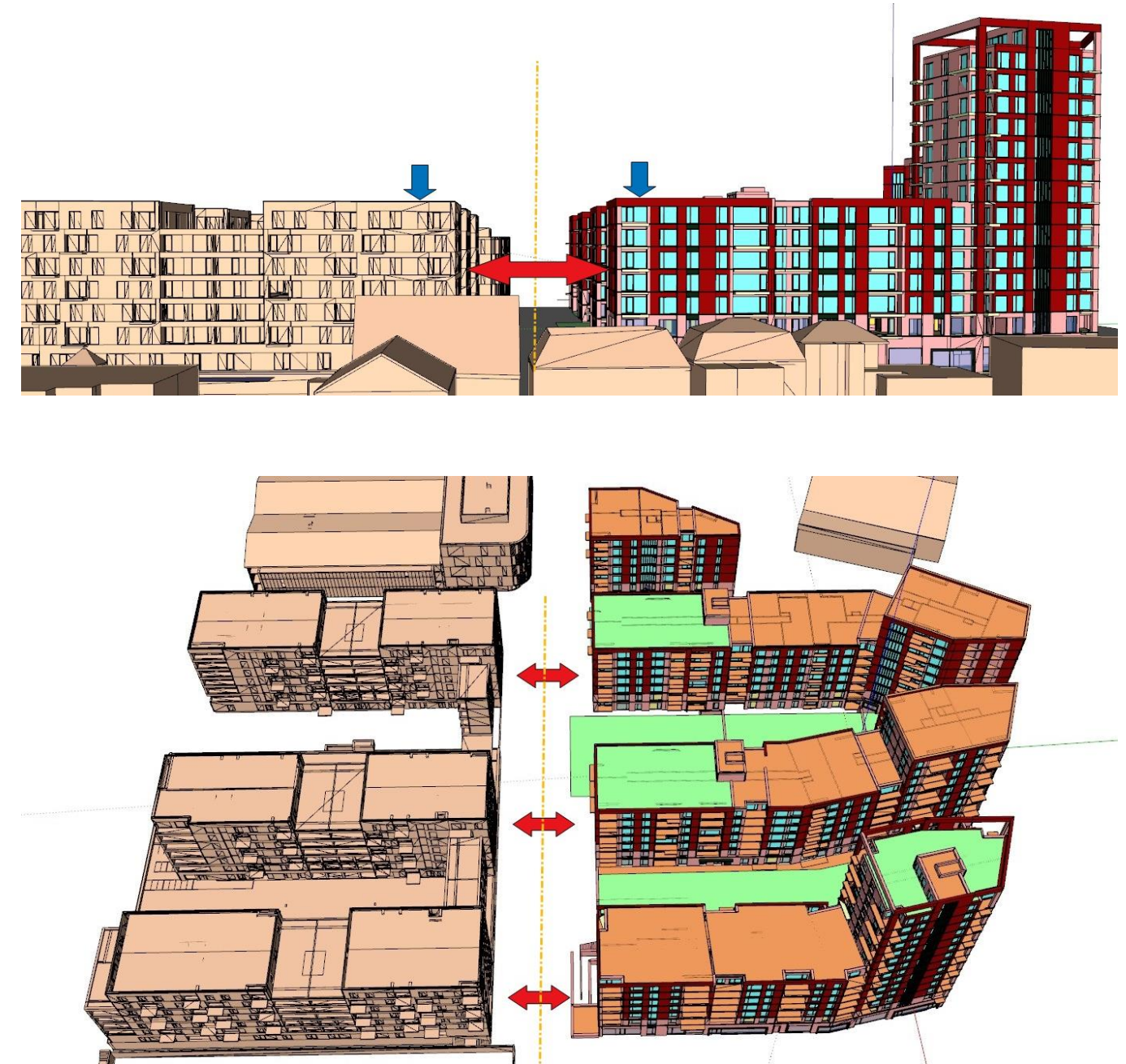
Impact is only considered for residential neighbours and thus we only need to look South in this case at the adjacent apartments permitted in the Santry place development.

Since the current proposal sits directly to the North of Santry Place, there can be no impact on sunlight and no shadows can be cast this direction.

Particular care has been taken by the Architect to ensure good separation of the inline blocks in both the permitted development to the south and the current proposal to the north of same.

Mirrored Development.

This proposal Phase 2 along the interface line is a mirrored development of the permitted and constructed Phase 1 design. The proposed design extends the existing blocks in height and location along the interface. The design of both Phase 1 and Phase 2 were cognisant of the neighbouring proposals and development potential.



Appendix F provides clarity on how adjacent and mirrored developments should be examined clause F5 applies

F5 A similar approach may be adopted in cases where an existing building has windows that are unusually close to the site boundary and taking more than their fair share of light. Figure F3 shows an example, where side windows of an existing building are close to the boundary. To ensure that new development matches the height and proportions of existing buildings, the VSC and APSH targets for these windows could be set to those for a 'mirror-image' building of the same height and size, an equal distance away on the other side of the boundary.

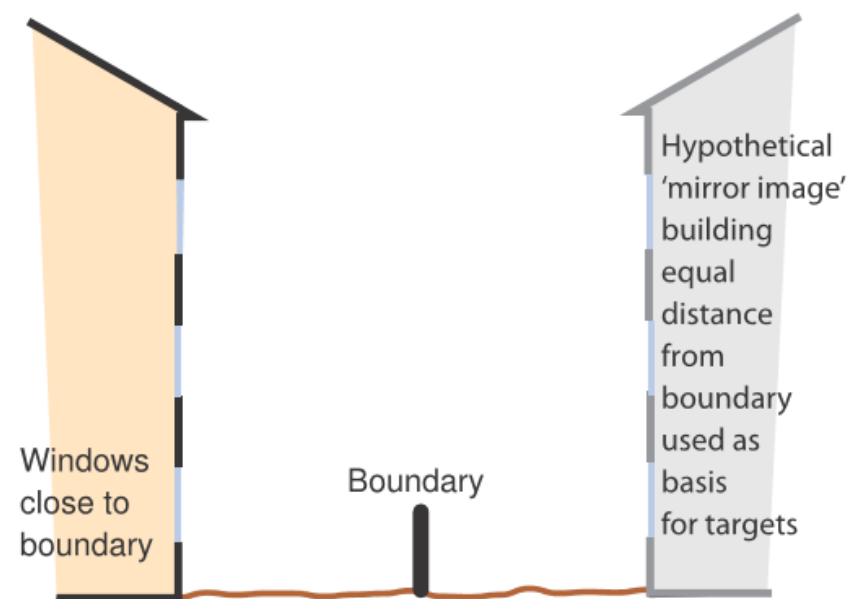


Figure F3: Use of a hypothetical mirror image building to set target daylight values

The layout of the current proposal, if approved, when read with Santry Place, will represent a comprehensive redevelopment of this brownfield condition at the junction of Santry Place & Swords Road. The Phase 2 proposed development (along the interface) is a direct mirror of granted Phase 1 application as it is evident that any impact on the Northern gable façade will be the same as the theoretical mirrored design. The development impact is therefore compliant with the guidelines and Mirrored development approach of Appendix F.

Summary impact Neighbours

- Non-residential buildings sit to the West, North and East of the proposal and do not require testing.
- Phase 1 Santry Place sits to the South of this Phase 2 proposal.
 - Sunlight to amenity and windows of the granted Santry Place cannot be impacted by this current proposal as it sits to the North.
 - In relation to skylight (VSC) this proposal Phase 2 along the interface line is a mirrored development of the permitted and constructed Phase 1 design. Any impact along the closer façades will therefore be compliant with the guidelines and Mirrored development approach of Appendix F.

Appendix 1

Ground Floor Supplementary Analysis ADF

Additional supplementary light distribution for Ground Floor apartments

Requested by Local Authority / ABP

Average Daylight Factor (ADF) only

By Induction higher floors will achieve better results as the windows will have less obstructions to skylight.

GFL Floor Layout - Naming Convention - AB

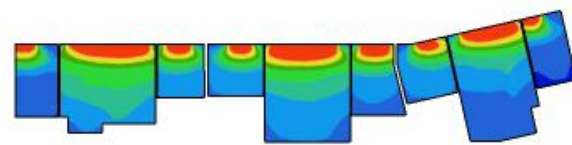


Legend for radiance plots:

Daylight Factor [DF] %



GFL Floor Analysis - AB

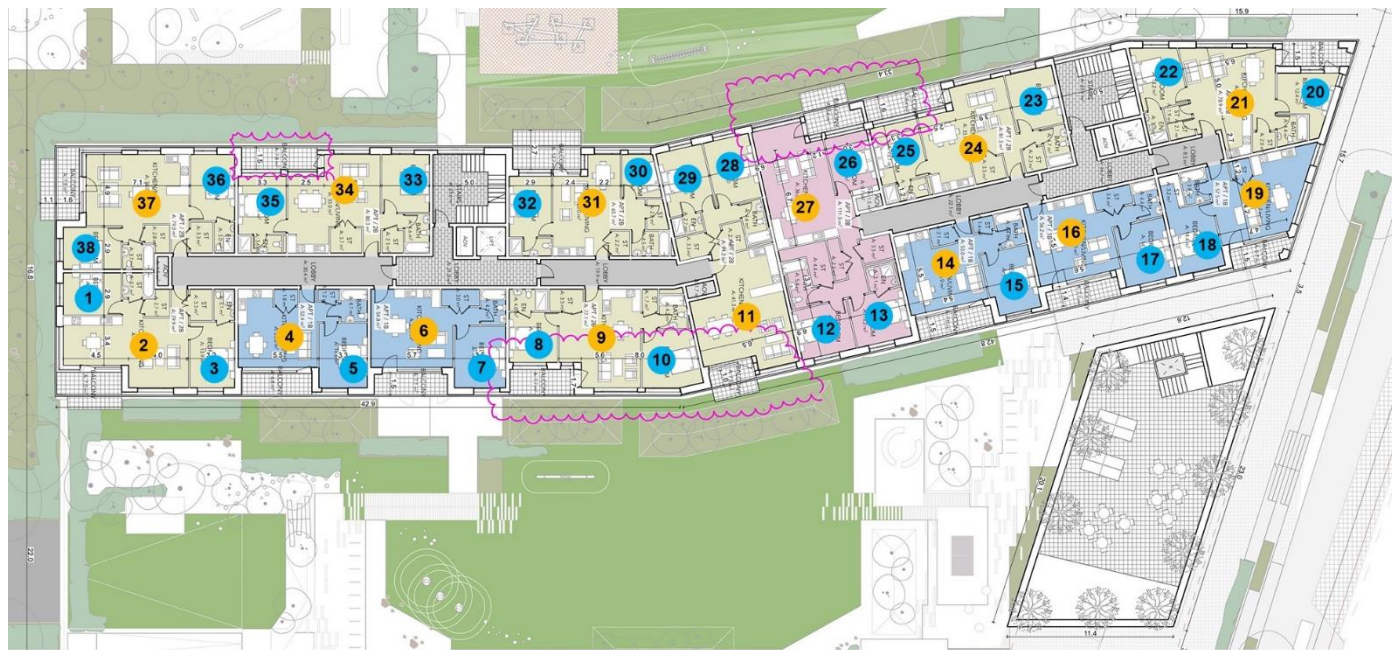


0AB		Average Daylight Factor					
For all habitable rooms							
ADF Values from radiance 3D m Yes							
Room	Ref	Type	Calc ADF	Relaxed		Strict	
				Min	Check	Min	Check
1	0AB01	Bedroom	1.4	1.0	Pass	1.0	Pass
2	0AB02L	Living Room	2.1	1.5	Pass	2.0	Pass
3	0AB03	Bedroom	2.1	1.0	Pass	1.0	Pass
4	0AB04	Bedroom	2.5	1.0	Pass	1.0	Pass
5	0AB05L	Living Room	2.9	1.5	Pass	2.0	Pass
6	0AB06	Bedroom	2.3	1.0	Pass	1.0	Pass
7	0AB07	Bedroom	2.6	1.0	Pass	1.0	Pass
8	0AB08L	Living Room	3.0	1.5	Pass	2.0	Pass
9	0AB09	Bedroom	1.6	1.0	Pass	1.0	Pass
					Pass	9	9
					Count	9	9
					Percentage	100%	100%

ADF Check - Summary

Average ADF for the tested living rooms is **2.7%** and for bedrooms **2.1%**

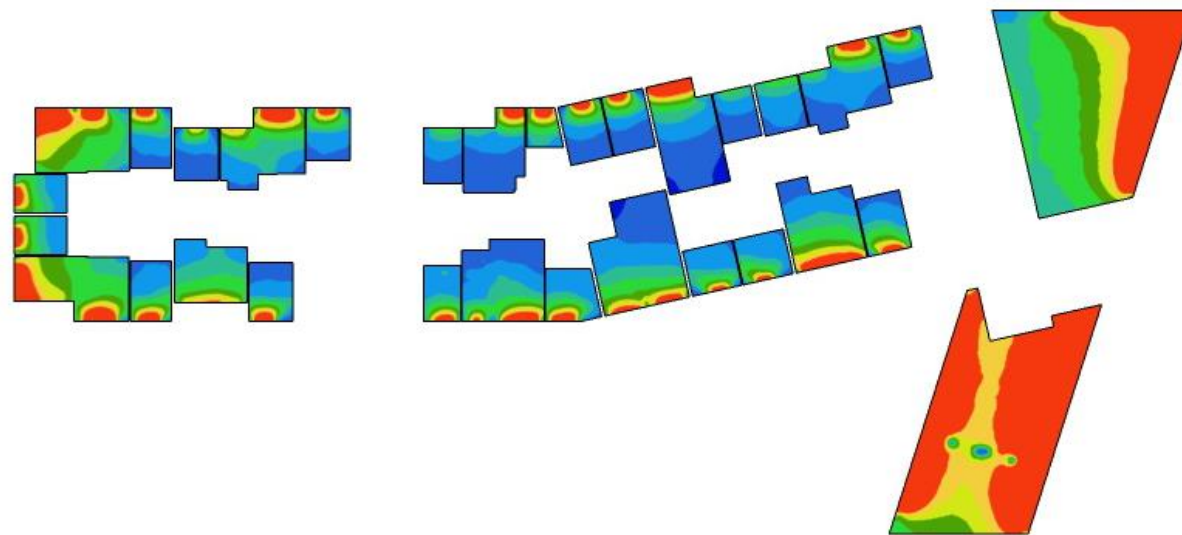
GFL Floor Layout - Naming Convention - CD



Legend for radiance plots:
Daylight Factor [DF] %



GFL Floor Analysis - CD

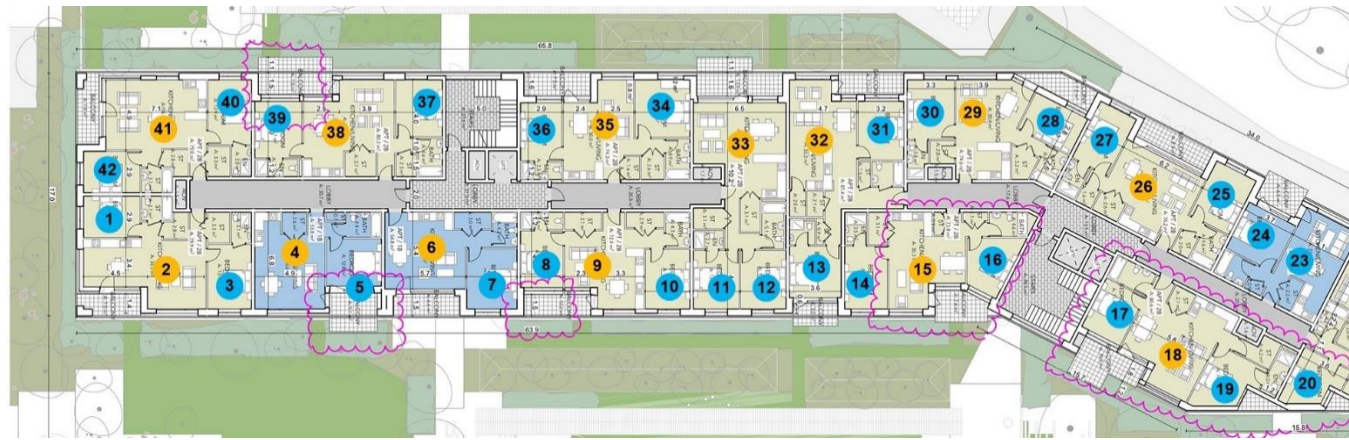


OCD		Average Daylight Factor					
For all habitable rooms							
ADF Values from radiance 3D m Yes							
Room	Ref	Type	Calc ADF	Relaxed Min	Check	Strict Min	Check
1	OCD01	Bedroom	2.7	1.0	Pass	1.0	Pass
2	OCD02L	Living Room	4.4	1.5	Pass	2.0	Pass
3	OCD03	Bedroom	2.4	1.0	Pass	1.0	Pass
4	OCD04L	Living Room	2.2	1.5	Pass	2.0	Pass
5	OCD05	Bedroom	2.1	1.0	Pass	1.0	Pass
6	OCD06	Bedroom	2.3	1.0	Pass	1.0	Pass
7	OCD07L	Living Room	2.0	1.5	Pass	2.0	Pass
8	OCD08	Bedroom	2.3	1.0	Pass	1.0	Pass
9	OCD09L	Living Room	1.9	1.5	Pass	2.0	Fail
10	OCD10	Bedroom	1.8	1.0	Pass	1.0	Pass
11	OCD11	Bedroom	1.9	1.0	Pass	1.0	Pass
12	OCD12L	Living Room	2.8	1.5	Pass	2.0	Pass
13	OCD13	Bedroom	2.2	1.0	Pass	1.0	Pass
14	OCD14L	Living Room	9.1	1.5	Pass	2.0	Pass
15	OCD15L	Living Room	5.5	1.5	Pass	2.0	Pass
16	OCD16	Bedroom	1.8	1.0	Pass	1.0	Pass
17	OCD17L	Living Room	1.8	1.5	Pass	2.0	Fail
18	OCD18	Bedroom	1.4	1.0	Pass	1.0	Pass
19	OCD19	Bedroom	1.1	1.0	Pass	1.0	Pass
20	OCD20L	Living Room	2.0	1.5	Pass	2.0	Pass
21	OCD21	Bedroom	1.9	1.0	Pass	1.0	Pass
22	OCD22	Bedroom	1.9	1.0	Pass	1.0	Pass
23	OCD23	Bedroom	3.4	1.0	Pass	1.0	Pass
24	OCD24L	Living Room	1.6	1.5	Pass	2.0	Fail
25	OCD25	Bedroom	1.2	1.0	Pass	1.0	Pass
26	OCD26	Bedroom	2.1	1.0	Pass	1.0	Pass
27	OCD27L	Living Room	2.8	1.5	Pass	2.0	Pass
28	OCD28	Bedroom	1.2	1.0	Pass	1.0	Pass
29	OCD29	Bedroom	2.2	1.0	Pass	1.0	Pass
30	OCD30L	Living Room	4.5	1.5	Pass	2.0	Pass
31	OCD31	Bedroom	2.7	1.0	Pass	1.0	Pass
					Pass	31	28
					Count	31	31
					Percentage	100%	90%

ADF Check - Summary

Average ADF for the tested living rooms is **3.4%** and for bedrooms **2.0%**

GFL Floor Layout - Naming Convention - EF

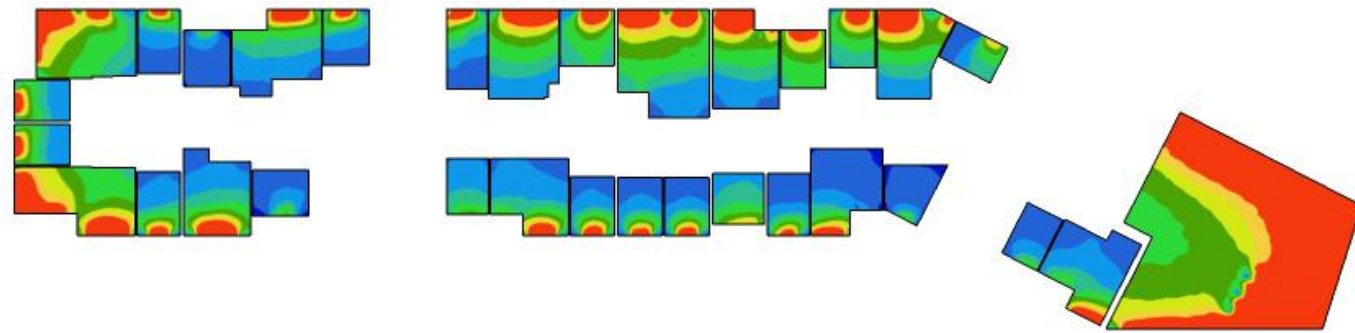


Legend for radiance plots:

Daylight Factor [DF] %



GFL Floor Analysis - EF

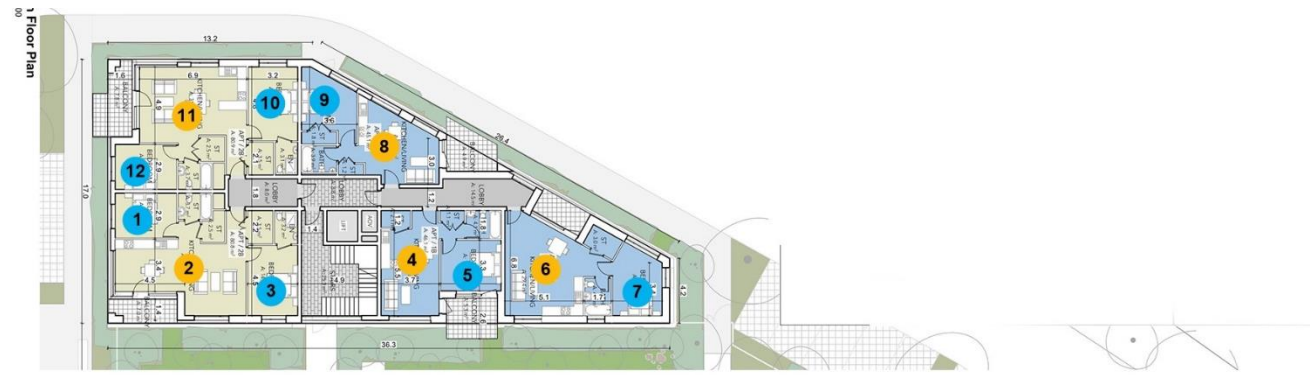


OEF		Average Daylight Factor					
For all habitable rooms							
ADF Values from radiance 3D m Yes							
Room	Ref	Type	Calc ADF	Relaxed Min	Check	Strict Min	Check
1	OEF01	Bedroom	2.6	1.0	Pass	1.0	Pass
2	OEF02L	Living Room	5.4	1.5	Pass	2.0	Pass
3	OEF03	Bedroom	2.2	1.0	Pass	1.0	Pass
4	OEF04L	Living Room	2.7	1.5	Pass	2.0	Pass
5	OEF05	Bedroom	1.0	1.0	Pass	1.0	Pass
6	OEF06	Bedroom	1.6	1.0	Pass	1.0	Pass
7	OEF07L	Living Room	2.1	1.5	Pass	2.0	Pass
8	OEF08	Bedroom	2.1	1.0	Pass	1.0	Pass
9	OEF09	Bedroom	1.9	1.0	Pass	1.0	Pass
10	OEF10	Bedroom	2.0	1.0	Pass	1.0	Pass
11	OEF11	Bedroom	2.2	1.0	Pass	1.0	Pass
12	OEF12	Bedroom	1.6	1.0	Pass	1.0	Pass
13	OEF13L	Living Room	1.5	1.5	Pass	2.0	Fail
14	OEF14	Bedroom	0.8	1.0	Fail	1.0	Fail
15	OEF15	Bedroom	1.0	1.0	Pass	1.0	Pass
16	OEF16L	Living Room	1.9	1.5	Pass	2.0	Fail
17	OEF17L	Living Room	7.9	1.5	Pass	2.0	Pass
18	OEF18	Bedroom	1.7	1.0	Pass	1.0	Pass
19	OEF19L	Living Room	3.9	1.5	Pass	2.0	Pass
20	OEF20	Bedroom	3.5	1.0	Pass	1.0	Pass
21	OEF21	Bedroom	3.6	1.0	Pass	1.0	Pass
22	OEF22L	Living Room	3.4	1.5	Pass	2.0	Pass
23	OEF23L	Living Room	3.4	1.5	Pass	2.0	Pass
24	OEF24	Bedroom	3.3	1.0	Pass	1.0	Pass
25	OEF25L	Living Room	3.5	1.5	Pass	2.0	Pass
26	OEF26	Bedroom	2.1	1.0	Pass	1.0	Pass
27	OEF27	Bedroom	2.0	1.0	Pass	1.0	Pass
28	OEF28L	Living Room	2.3	1.5	Pass	2.0	Pass
29	OEF29	Bedroom	0.8	1.0	Fail	1.0	Fail
30	OEF30	Bedroom	1.7	1.0	Pass	1.0	Pass
31	OEF31L	Living Room	4.2	1.5	Pass	2.0	Pass
32	OEF32	Bedroom	2.6	1.0	Pass	1.0	Pass
					Pass	30	28
					Count	32	32
					Percentage	94%	88%

ADF Check - Summary

Average ADF for the tested living rooms is 3.5% and for bedrooms 2.0%

GFL Floor Layout - Naming Convention - G

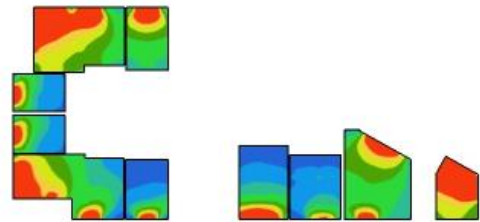


Legend for radiance plots:

Daylight Factor [DF] %



GFL Floor Analysis - G



0G		Average Daylight Factor					
<i>For all habitable rooms</i>							
ADF Values from radiance 3D m Yes							
Room	Ref	Type	Calc	Relaxed	Check	Strict	Check
		Type	ADF	Min		Min	
1	0G01	Bedroom	2.6	1.0	Pass	1.0	Pass
2	0G02L	Living Room	4.2	1.5	Pass	2.0	Pass
3	0G03	Bedroom	1.6	1.0	Pass	1.0	Pass
4	0G04L	Living Room	2.5	1.5	Pass	2.0	Pass
5	0G05	Bedroom	1.5	1.0	Pass	1.0	Pass
6	0G06L	Living Room	3.5	1.5	Pass	2.0	Pass
7	0G07	Bedroom	8.6	1.0	Pass	1.0	Pass
8	0G08	Bedroom	3.9	1.0	Pass	1.0	Pass
9	0G09L	Living Room	6.0	1.5	Pass	2.0	Pass
10	0G10	Bedroom	2.4	1.0	Pass	1.0	Pass
			Pass		10		10
			Count		10		10
			Percentage		100%		100%

ADF Check - Summary

Average ADF for the tested living rooms is **4.0%** and for bedrooms **3.5%**