ASSESSMENT OF DAYLIGHT AMENITY ASSOCIATED WITH A PROPOSED DEVELOPMENT ON MILL ROAD, COLP WEST, DROGHEDA

Prepared for Shannon Homes Drogheda Limited
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Revision 01

BPG3.

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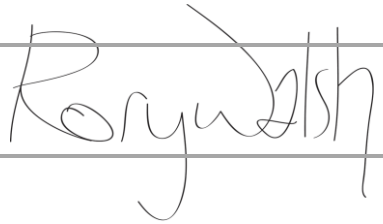
signature	
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Glossary

Average Daylight Factor	ratio of total daylight flux incident on a reference area to the total area of the reference area, expressed as a percentage of outdoor illuminance on a horizontal plane due to an unobstructed sky of assumed or known luminance distribution
Annual Probable Sunlight Hours (APSH)	the long-term average of the total number of hours during the year in which direct sunlight reaches the unobstructed ground (when clouds are considered)
Daylight	combined sunlight and skylight
Daylight Factor	the ratio of the illuminance at a particular point within an enclosure to the simultaneous unobstructed outdoor illuminance under the same sky conditions, expressed as a percentage
Skylight	part of solar radiation that reaches the earth's surface as a result of scattering in the atmosphere
Sunlight	part of solar radiation that reaches the earth's surface as parallel rays after selective attenuation by the atmosphere
Winter Probable Sunlight Hours (WPSH)	the long-term average of the total number of hours between the 21st of September and the 21st of March in which direct sunlight reaches the unobstructed ground (when clouds are considered)
Working Plane	horizontal, vertical or inclined plane in which a visual task lies. Normally the working plane may be taken to be horizontal, 0.85m above the floor in houses and factories, 0.7 m above the floor in offices.

INTRODUCTION

BPG3 have been engaged by Shannon Homes Drogheda Ltd to assess the levels of daylight amenity which would be provided within the apartments blocks which are being proposed as part of a larger residential development on Milll Road, Colp West, Drogheda.

As mandated in Irish planning policy[1] all assessments have been carried out with regard to the methods outlined in the BRE (Building Research Establishment) guide *'Site layout planning for daylight and sunlight - A guide to good practice'* 2nd Edition and BS 8206-2: 2008 – *'Lighting for Buildings – Part 2: Code of Practice for Daylighting'*, British Standards Institute, 2008.

The levels of daylight amenity provided within this development have been assessed with regard to three separate studies. These studies are outlined as follows:

Study A: Assessment of skylight amenity available within proposed accommodation: An assessment of the skylight amenity which would be provided within the accommodation which is being proposed as part of this development.

Study B: Assessment of sunlight access available to proposed accommodation: An assessment of the sunlight access which would be available to the accommodation which is being proposed as part of this development.

Study C: Assessment of sunlight amenity available within proposed outdoor recreation areas: An assessment of the degree to which the potential for good sunlighting exists within the new recreation spaces which are being proposed as part of this development.

As recommended in the BRE guide, a quantitative approach to the assessment of daylight conditions has been adopted in this study. Numeric calculations have been carried out to predict the sunlight, skylight and daylight levels which would be available at a number of test points and areas. The results of these calculations are presented in tables.

The quantitative assessment has been carried out using computational methods. Three-dimensional computer models of the proposed development have been generated and simulated under appropriate sky conditions in order to obtain accurate predictions.

Information relating to the proposed development and the surrounding areas has been supplied to BPG3 by DDA Architects in electronic format. The study assumes that the information provided is accurate and that no omissions have been made. The particular information sources which have

[1] Please refer to Appendix A: Policy Basis for Daylight Standards

been used to develop the models used in this study are outlined in Appendix C: Source Material.

It is important to note that whilst the methods presented in the BRE guide provide designers and planners with a clear and objective way of assessing the sunlight and daylight levels associated with a new development, the particular performance targets which are included in the guide are intended to be used with a degree of discretion and flexibility. Within the introductory section of the BRE guide the following advice is provided:

"The advice given here is not mandatory and this document 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 because natural lighting is only one of many factors in site layout design. In special circumstances, the developer or the planning authority may wish to use different target values".

This approach is supported in Irish Planning Policy; see Appendix B: Policy basis for flexibility in applying daylight standards .

Study A: Assessment of skylight amenity available within proposed accommodation

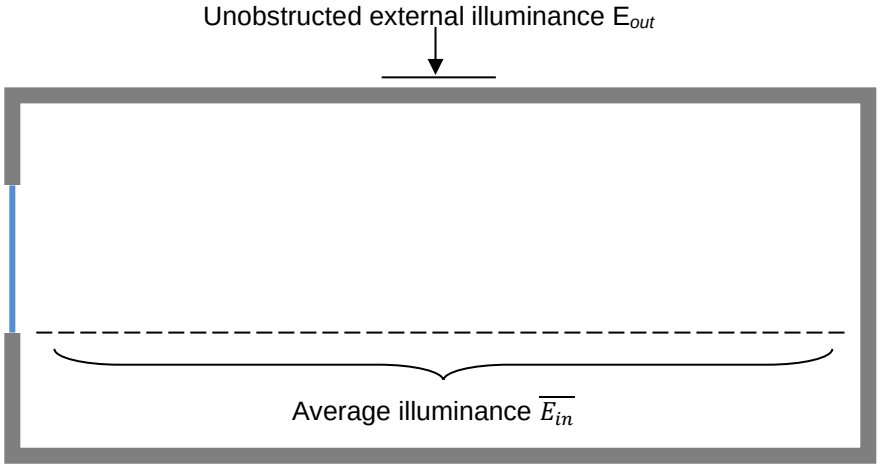
Skylight amenity relates to the general impression of brightness which is provided within a room. For the purpose of this study, it relates to the general illumination achieved within a room as a consequence of the diffuse light which enters, either directly or indirectly, from an overcast sky.

Skylight amenity is assessed with respect to a parameter called the average daylight factor[2]. Rooms with a high average daylight factor are capable of accepting a relatively large proportion of the diffuse skylight which is available outside; BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting', British Standards Institute, 2008 advises that a predominantly daylit appearance can generally be achieved in rooms with an average daylight factor above 2%.

Study A: Assessment Approach

The Average Daylight Factor (ADF) assessment is carried out with regard to the methodology outlined in BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting', British Standards Institute, 2008.

The ADF is a measure of the overall amount of daylight in a space. It is defined as the average illuminance on the working plane in a room, divided by the illuminance on the unobstructed horizontal surface outdoors; see below.



$$ADF = \frac{\overline{E_{in}}}{E_{out}} \times 100\% \qquad \text{equation 2.}$$

When the unobstructed outdoor illuminance level is 10,000 lux and the average internal daylight level is 200 lux within a given room, then the average daylight factor for that room will be 2%.

For a given room the daylight factor is a permanent factor, which occurs on days with overcast skies. The daylight factor is calculated under a standard overcast sky, which means that the calculation is per definition independent of window orientation.

[2] Regrettably the terms skylight and daylight are used interchangeably within BS 8206 and the BRE Guide. While daylight is defined within the glossary at the start of the BRE guide as an umbrella term which covers both skylight and sunlight, the average daylight factor test presented in this section actually only considers skylight.

BS 8206-2 recommends that a minimum average daylight factor of 2%, 1.5% and 1% should be sought for kitchens, living rooms and bedrooms respectively. The guide recommends that no analysis need be carried out for bathroom, ancillary or circulatory spaces.

While BS 8206-2 recommends that in situations where an open plan space includes both a living room and a kitchen, the room should be assessed against the higher of the two thresholds, this stipulation is often challenging to satisfy. This is found to be particularly true when applied to typical apartment layouts. In cases like this it is considered reasonable for open plan spaces to be assessed against the target associated with the rooms predominant use. This is the convention which has been adopted in this study. A more detailed rationale for this approach is provided in Appendix D: Rationale for revised average daylight factor target.

In order to obtain an average daylight factor figure for each room, the daylight factor at an array of points within the room is assessed first. This exercise has been carried out by computational means.

As the average daylight factor approach takes account of light which has been reflected from both external and internal surfaces, care has been taken to attribute reasonable reflectance values to all of the surfaces which are present within the computational model. The particular reflectance values adopted for different building elements in this study are outlined in Table 1.

Table 1 Reflectance values adopted in the calculation of average daylight factors.

Surface Type	Assumed Finish	Reflectance / (Diffuse Transmittance)	Source
Interior Wall	Light Grey (00A01)	0.68	BS 8206
Exterior Wall	Mid Grey (00A05)	0.45	BS 8206
Interior Floor	Wood (Medium Colours)	0.2	BS 8206
Interior Ceiling	Pale Cream (BS 10C31)	0.81	BS 8206
Neighbouring Context	Mid Grey (00A05)	0.45	BS 8206
Ground	Paving	0.2	BS 8206
Balcony Enclosures	Light Grey (00A01)	0.68	BS 8206
Glazing	Clear Double Glazing	0.1 / (0.65)	BS 8206

Study A: Assessment Zones

The levels of skylight amenity which can be anticipated within the proposed accommodation is assessed with respect to a representative sample of 20 individual rooms, see Figure 2, Figure 3 and Figure 4. These rooms are all located within Apartment Block 5.

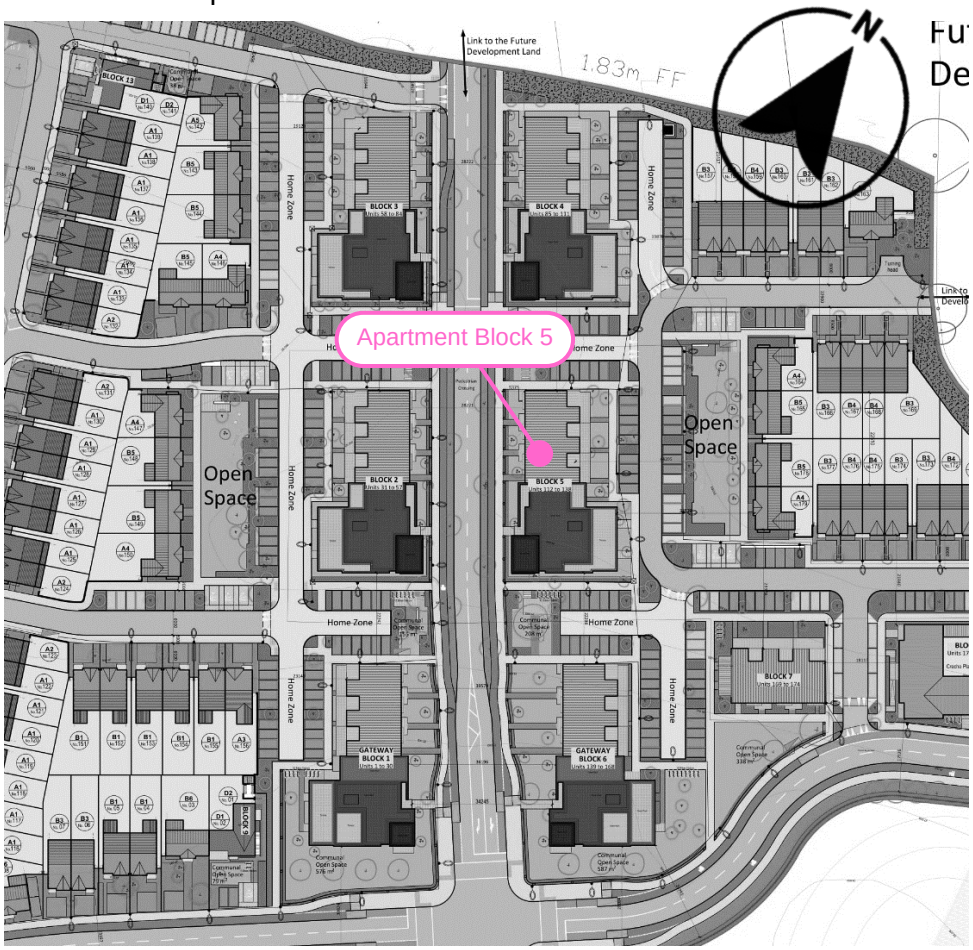


Figure 1 Site plan with Apartment Block 5 identified

Table 2 Rooms where average daylight factor has been assessed

Room ID	Block	Level	Room Type	Proposed Minimum ADF Target (%)
1	5	0	Kitchen / Dining / Living	1.5
2	5	0	Bedroom	1
3	5	0	Kitchen / Dining / Living	1.5
4	5	0	Bedroom	1
5	5	0	Kitchen / Dining / Living	1.5
6	5	0	Bedroom	1
7	5	0	Kitchen / Dining / Living	1.5
8	5	0	Bedroom	1
9	5	2	Kitchen / Dining / Living	1.5
10	5	1	Bedroom	1
11	5	1	Kitchen / Dining / Living	1.5
12	5	1	Bedroom	1
13	5	1	Kitchen / Dining / Living	1.5
14	5	1	Bedroom	1
15	5	1	Kitchen / Dining / Living	1.5
16	5	1	Bedroom	1
17	5	1	Kitchen / Dining / Living	1.5
18	5	1	Bedroom	1
19	5	1	Kitchen / Dining / Living	1.5
20	5	1	Bedroom	1

Figure 2 Rooms assessed at Level 00 within Apartment Block 5

Figure 3 Rooms assessed at Level 01 within Apartment Block 5

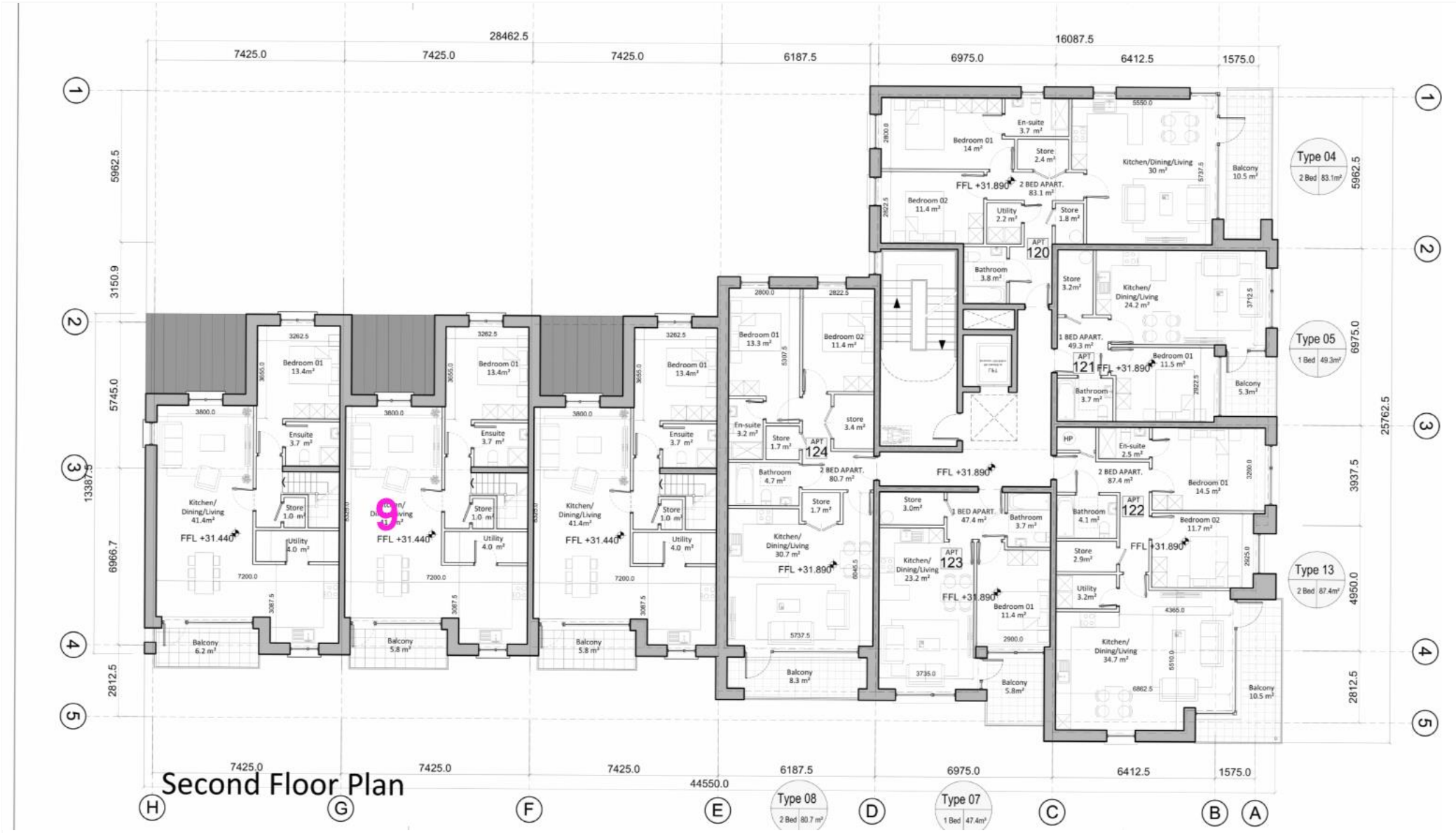


Figure 4 Rooms assessed at Level 02 within Apartment Block 5

On the basis that the accommodation located in the other Blocks which make up this development is substantially similar to that present within Block 5, it is reasonable to propose that the results obtained from the assessment of this sample will provide results which can be extrapolated to the wider development.

The 20 rooms located within Block 5 have been selected in order to capture the worst-case lighting conditions which would be encountered. On the basis that acceptable results are obtained for these rooms it should be possible to conclude, by extension, that acceptable levels of internal skylight amenity would be available within the wider development.

Study A: Results

The level of skylight amenity which would be provided within the accommodation which is being proposed as part of this development has been assessed with respect to a representative sample of 20 rooms. These rooms have been selected for analysis as they are considered to experience the most constrained access to natural light. The Average Daylight Factors (ADFs) calculated in each case are presented in Table 3, the associated daylight factor distribution diagrams are presented in Figure 5, Figure 6 and Figure 7.

The results of this study demonstrate that substantial levels of compliance with target values would be achieved. Of the 20 rooms assessed in his study it has been possible to show that the adopted targets have been satisfied in 19 cases.

In the singular instance where ADF levels are predicted to fall short of target (Room 14) a number of mitigating factors are present. In the first instance it is reasonable to propose that the departure registering in this case is relatively modest; when expressed in absolute terms a departure of 0.2% ADF is calculated. It is also important to recognise that the room in question is a bedroom and that good levels of internal skylight amenity are predicted for the associated living room (an ADF of 2.3% is predicted for Room 13). Additionally, it is worth noting that the departure registering in this case is more than likely caused by the balconies which serve these rooms. In this regard, it is reasonable to propose that these balconies contribute in their own way to the amenity of these rooms and that on balance their inclusion would be welcomed by the future occupants of these apartments. When assessed in the round it is reasonable to conclude that acceptable levels of internal skylight amenity would be available to the occupants of this apartment unit.

On the basis that substantial levels of compliance with target values have been identified for this sample of worst-case accommodation, it is possible to conclude that substantial levels of compliance would also be achieved within the remaining accommodation located within this block. Further to this, as the accommodation present within this apartment block is very similar to the accommodation which is present within the remaining blocks it is possible to conclude, by extension, that substantial levels of compliance would be achieved within the wider development.

Table 3 Average Daylight Factor Results

Room ID	Block	Level	Room Type*	Average Daylight Factor		Target Satisfied?
				Minimum Target	Predicted Level	
1	5	0	Kitchen / Dining / Living Room	1.5	3.3	Yes
2	5	0	Bedroom	1	1.5	Yes
3	5	0	Kitchen / Dining / Living Room	1.5	2.0	Yes
4	5	0	Bedroom	1	1.8	Yes
5	5	0	Kitchen / Dining / Living Room	1.5	1.8	Yes
6	5	0	Bedroom	1	1.6	Yes
7	5	0	Kitchen / Dining / Living Room	1.5	3.4	Yes
8	5	0	Bedroom	1	4.1	Yes
9	5	2	Kitchen / Dining / Living Room	1.5	2.7	Yes
10	5	1	Bedroom	1	1.2	Yes
11	5	1	Kitchen / Dining / Living Room	1.5	1.6	Yes
12	5	1	Bedroom	1	2.3	Yes
13	5	1	Kitchen / Dining / Living Room	1.5	2.3	Yes
14	5	1	Bedroom	1	0.8	No
15	5	1	Kitchen / Dining / Living Room	1.5	3.5	Yes
16	5	1	Bedroom	1	1.9	Yes
17	5	1	Kitchen / Dining / Living Room	1.5	2.6	Yes
18	5	1	Bedroom	1	1.7	Yes
19	5	1	Kitchen / Dining / Living Room	1.5	3.1	Yes
20	5	1	Bedroom	1	4.2	Yes

Figure 5 Rooms assessed at Level 00 within Apartment Block 5

Figure 6 Rooms assessed at Level 01 within Apartment Block 5

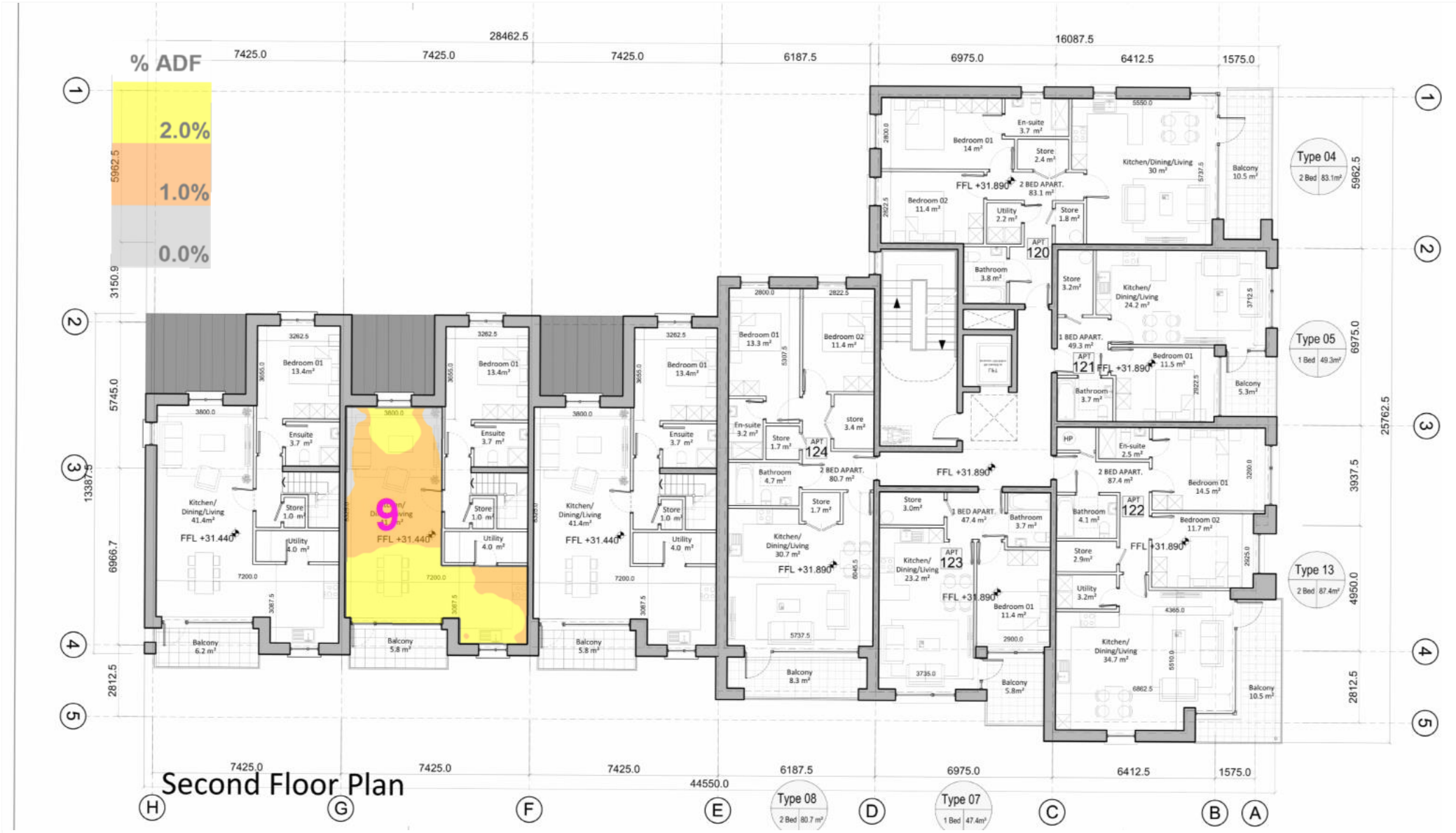


Figure 7 Rooms assessed at Level 02 within Apartment Block 5

Study B: Assessment of direct sunlight access available to proposed accommodation

Sunlight, within the meaning of BS 8206 and the BRE Guide, is understood to relate to the visible portion of direct beam radiation; it is the visible light which travels directly from the sun as parallel rays.

From an amenity point of view, direct sunlight is generally welcomed for its ability to enliven the appearance of an interior (direct sunlight creates dynamic patches of brilliant light on walls, floors and furniture) but also for its ability to provide warmth and heat to a space.

In Ireland, due to the prevalence of overcast conditions, the availability of direct sunlight is typically limited to a small number of hours in the day. Over the course of a typical year, the average daily duration when direct sunlight is available in Dublin is approximately four hours[3]. The number of hours in a day when sunlight can enter a given window will be much lower as a consequence of its particular orientation and the presence of occluding obstructions.

It is on this basis that sunlight cannot be relied upon to provide basic daylighting within interior spaces. Basic daylighting within interior spaces is provided by diffuse light from the sky[4], which while not as bright as direct sunlight, is always available during daytime hours.

Following from this, it is reasonable to propose that in Ireland the daylight amenity within a space is not as critically reliant on the presence of sunlight as it is on the presence of skylight. Stated another way, a room which receives good levels of skylight, but poor levels of sunlight, can still be expected to maintain a pleasant and bright appearance for most parts of the day; in contrast, a room which receives good levels of sunlight, but poor levels of skylight, is likely to present as gloomy and unpleasant for extended periods.

In recognition of the secondary importance which sunlight plays in the provision of internal daylight amenity, it is reasonable to propose that a lenient and flexible approach should be adopted in its assessment. This approach is advocated within both the BRE Guide and BS 8206.

[3] https://www.met.ie/climate-ireland/1981-2010/dublin.html

[4] The degree to which the spaces in this development would be lit by diffuse light from the sky has been assessed in Study A.

Study B: Assessment Approach

Sunlight access is assessed with respect to a measure called Annual Probable Sunlight Hours (APSH). This measure relates to the total number of hours in the year that the sun is typically expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.

According to the BRE guide 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% annual probable sunlight hours, including at least 5% of annual probable sunlight hours in winter months (taken to fall between the 21st of September and the 21st of March).

As these particular criteria are often challenging to meet the BRE advocates that the assessment criteria should be applied with a degree of flexibility.

Adopting a flexible approach in the assessment of sunlight amenity is necessary as the performance targets recommended in BS 8206 and the BRE Guide can be challenging to meet in many circumstances. The performance targets for sunlight provision are particularly challenging to meet in urban locations where neighbouring buildings and site orientation can often conspire to restrict access to direct sunlight. Guidance on this matter is provided within Section 5.3 of the British Standards, BS 8206:

> *"The degree of satisfaction is related to the expectation of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary."*

Further to this the BRE advise that, in cases where it is not possible to demonstrate full compliance with sunlight targets at living room windows, it is possible to conclude that occupants would maintain access to sufficient sunlight in scenarios where the targets can be satisfied at a window serving an alternative room within the dwelling[5]. This facility has been adopted in this study.

[5] The validity of this approach is confirmed within section 5.5 of review document which was prepared by the author of the BRE guide (PJ Littlefair) in support of the planning application which was lodged for the ESB Headquarters on Lower Fitzwilliam Street, DCC Reg. Ref.: 3052/14.

Study B: Assessment Points

The levels of sunlight amenity which can be expected within this development has been assessed with regard to a sample of 20 rooms located within Apartment Block 5. This particular block has been selected for assessment as it is considered to capture the worst-case conditions which could register within the wider development[6].

As recommended in BS 8206 and the BRE Guide sunlight access has been assessed at a window serving the main living room; a total of ten main living spaces are assessed in his study. Supplementary analysis has been carried out on a number of associated bedrooms; a total of ten bedrooms are assessed. In a small number of cases sunlight access has been assessed for balcony areas. The particular points which have been assessed in this study are detailed in Table 4, Figure 8, Figure 9 and Figure 10.

These particular points have been selected in order to capture the worst-case lighting conditions which could be encountered within this block. On the basis that acceptable results are obtained for these windows it should be possible to conclude, by extension, that acceptable levels would be available at the remaining locations (generally located at higher levels with less overshadowing) present within this block. On the basis that the accommodation located in the other blocks which make up this development is substantially similar to that present within Block 5, it is reasonable to propose that the results obtained from the assessment of this sample will provide results which can be extrapolated to the wider development.

Table 4 Points where APSH has been assessed; primary points in yellow.

Block ID	Room ID	Point ID	Room Type
B5	1	W1	Kitchen/ Living/ Dining
B5	2	W1	Bedroom
B5	2	B1	Balcony Serving Bedroom
B5	3	W1	Kitchen/ Living/ Dining
B5	3	B1	Kitchen/ Living/ Dining
B5	4	W1	Bedroom
B5	5	W1	Kitchen/ Living/ Dining
B5	6	W1	Bedroom
B5	7	W1	Kitchen/ Living/ Dining
B5	8	W1	Bedroom
B5	9	W1	Kitchen/ Living/ Dining
B5	9	W2	Kitchen/ Living/ Dining
B5	10	W1	Bedroom
B5	11	W1	Kitchen/ Living/ Dining
B5	11	B1	Balcony to Kitchen/ Living/ Dining
B5	12	W1	Bedroom
B5	13	W1	Kitchen/ Living/ Dining
B5	14	W1	Bedroom
B5	15	W1	Kitchen/ Living/ Dining
B5	15	B1	Balcony to Kitchen/ Living/ Dining
B5	16	W1	Bedroom
B5	17	W1	Kitchen/ Living/ Dining
B5	18	W1	Bedroom
B5	19	W1	Kitchen/ Living/ Dining
B5	20	W1	Bedroom

[6] Block 5 experiences the least favourable sunlight access both by virtue of its orientation and it position relative to neighbouring blocks.

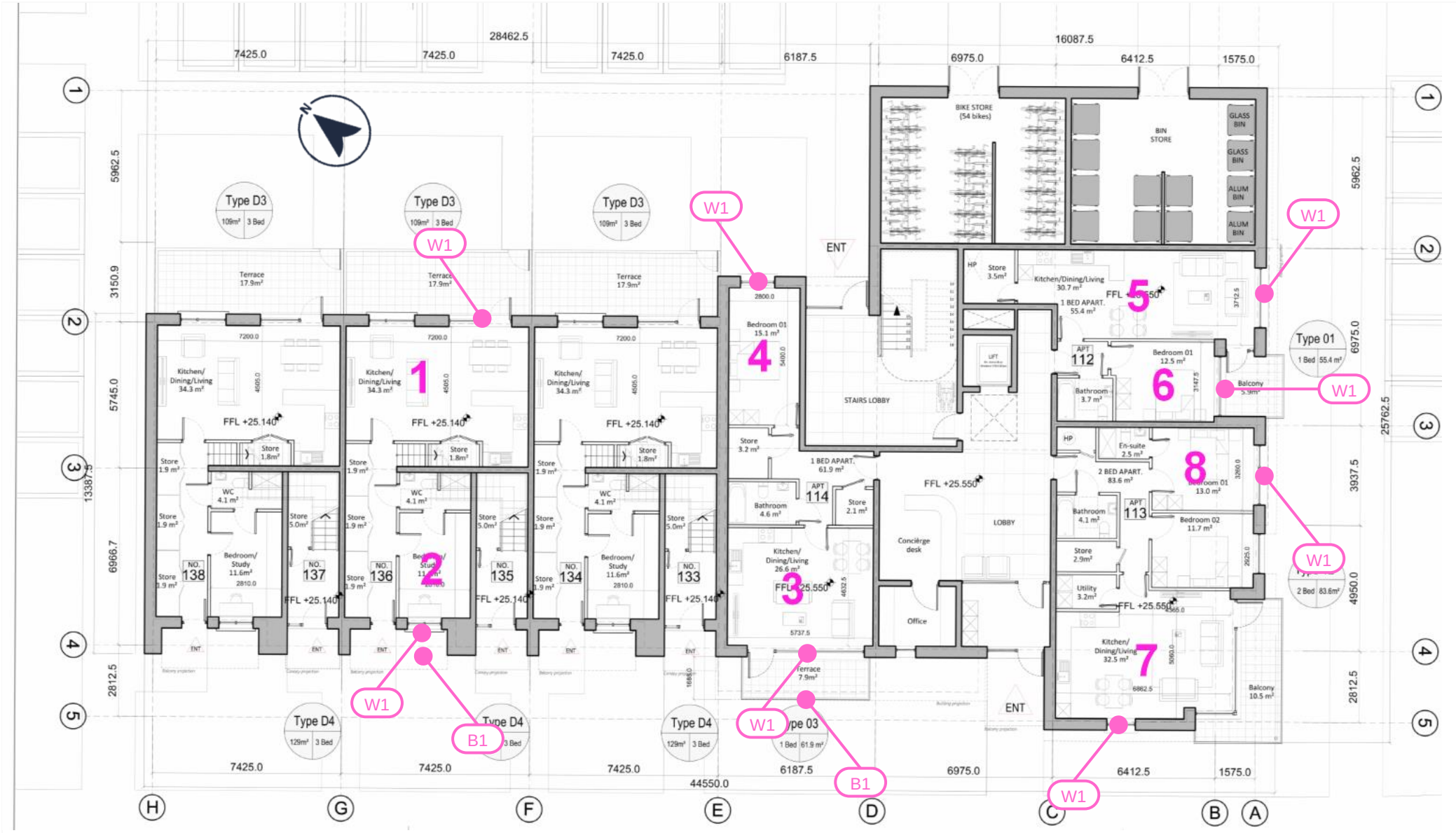


Figure 8 Points where sunlight access has been assessed on Level 00

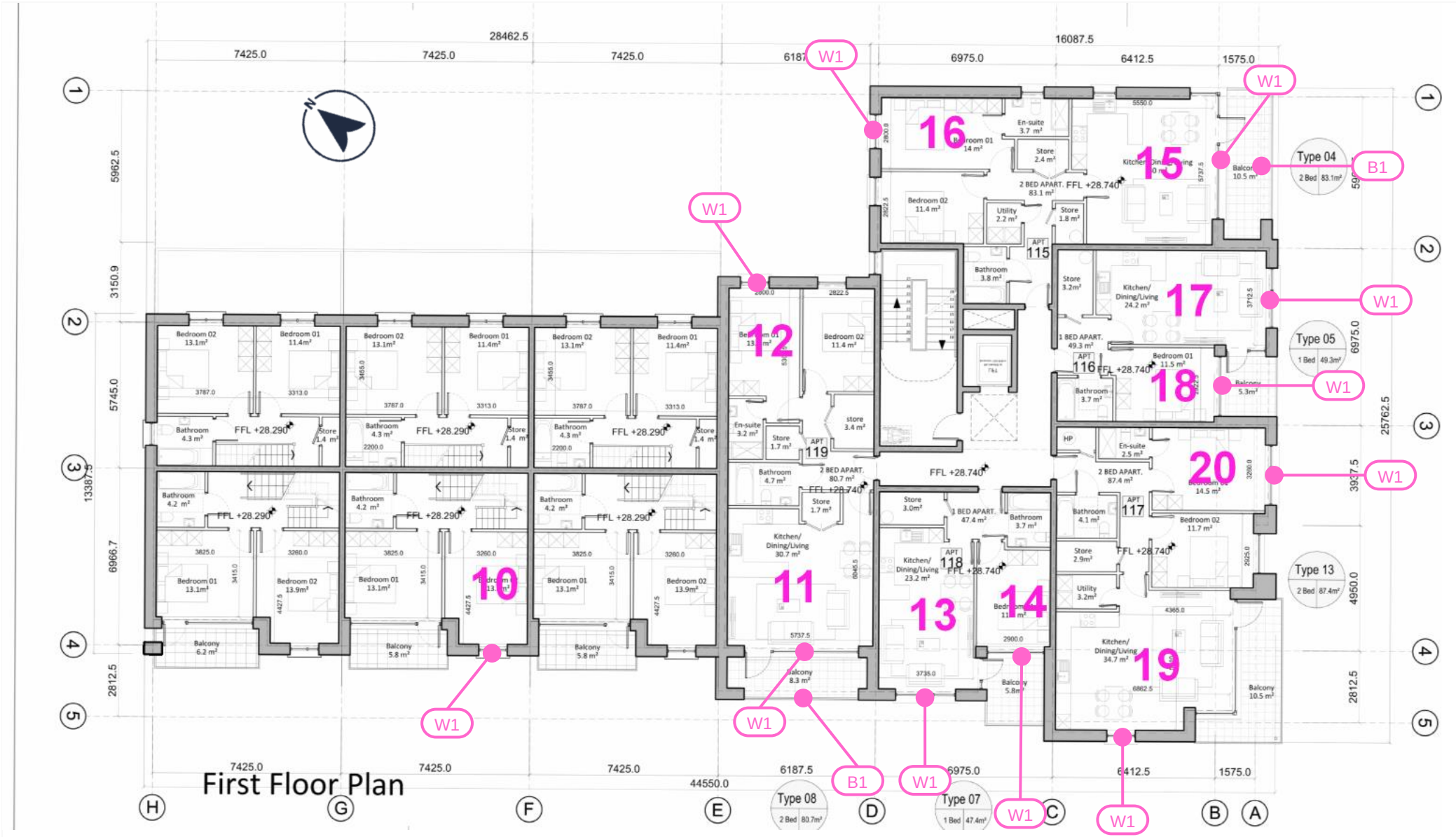


Figure 9 Points where sunlight access has been assessed on Level 01

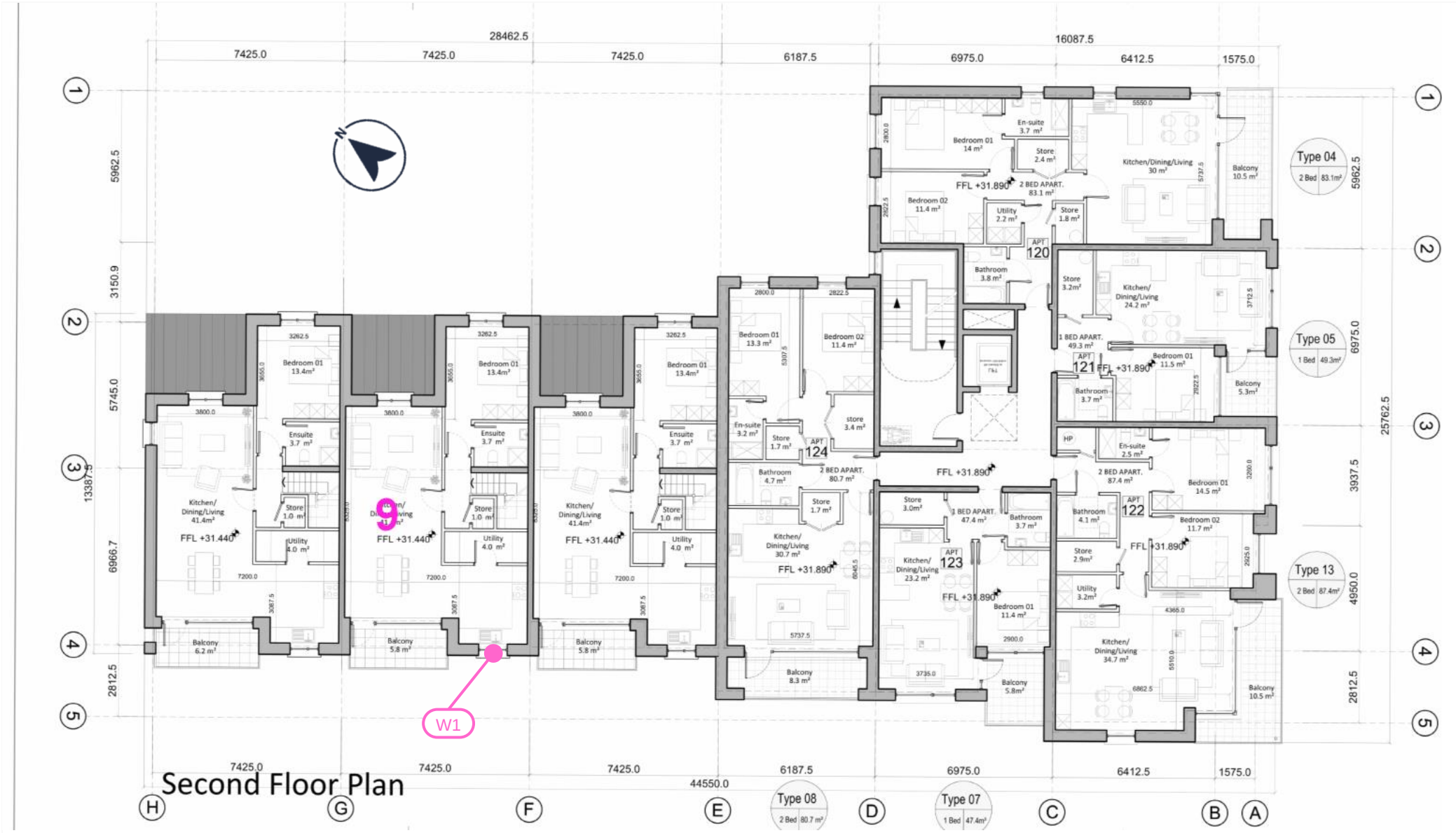


Figure 10 Points where sunlight access has been assessed on Level 02

Study B: Results

The level of sunlight access available to the accommodation which is being proposed as part of this development has been assessed in the first instance with respect to a sample of 10 main living rooms. These particular rooms have been selected for analysis as they are considered to experience the most restricted access to direct sunlight.

As recommended in the BRE guide and BS 8206, sunlight access has been assessed with respect to the Annual Probable Sunlight Hours (APSH) registering on particular windows. The APSH results obtained in this study are presented in Table 5.

Of the 10 main living rooms assessed in this study (Rooms 1, 3, 5, 7, 9, 11, 13, 15, 17 & 19), six of them (Rooms 5, 7, 9, 13, 17 & 19) have been found to fully satisfy the numeric targets recommended by the BRE for sunlight access during both annual and winter periods. It follows that acceptable levels of sunlight amenity can be anticipated for these units.

In the remaining cases (Rooms 1, 3, 11 & 15) some departures from guideline targets have been identified. The particular departures which have been identified are considered in more detail in the following paragraphs.

The level of sunlight access available to Room 1 is predicted to fall short of advisory targets by an absolute margin of 6% APSH over the course of the year and 4% over winter months. In assessing the significance of this finding, it is important to recognise that additional levels of sunlight access would be available at alternate locations within this apartment. Supplementary analysis indicates that a bedroom located within this apartment (Room 2) would be capable of receiving an additional 15% APSH annually and an additional 2% APSH during winter months. When sunlight access levels are aggregated at an apartment level an APSH figure which exceeds the advisory target recommended by the BRE for living rooms is obtained. Further to this, very good levels of sunlight access are predicted for the defensible space which attends Room 2; 49% APSH annually and 12% APSH during winter months. It is on this basis that it is possible to conclude that acceptable levels of sunlight amenity would be available to the occupants of this apartment.

The level of sunlight access available to Room 3 is predicted to fall short of advisory targets by an absolute margin of 11% APSH over the course of the year. Having regard to the particular layout of this room it is clear that the identified shortfall is principally caused by the occluding effect of the balconies which serve these rooms. On review, it is reasonable to propose that the balconies in question contribute in their own way to the amenity of these apartments and that on balance their inclusion would be welcomed by future occupants. Further to this it should be recognised that while their presence does restrict the amount of direct sunlight which can reach the interior space of this living room; very high levels of sunlight access would be available to the balcony spaces; an annual sunlight access level of 49% APSH is predicted for the balcony which attends Room 3. When assessed

in the round it is possible to conclude that acceptable levels of sunlight amenity would be available to the occupants of this apartment.

The level of sunlight access available to Room 11 is predicted to fall short of guideline targets by an absolute margin of 15% APSH over the course of the year and 2% APSH during winter months. Having regard to the particular layout of this room it is clear that the identified shortfall is principally caused by the occluding effect of the balconies which serve these rooms. On review, it is reasonable to propose that the balconies in question contribute in their own way to the amenity of these apartments and that on balance their inclusion would be welcomed by future occupants. Further to this it should be recognised that while their presence does restrict the amount of direct sunlight which can reach the interior space of this living room, very high levels of sunlight access would be available to the balcony spaces; an annual sunlight access level of 54% APSH is predicted for the balcony which attends Room 11. A winter sunlight access level of 14% APSH is predicted. It is on this basis that it is possible to conclude that acceptable levels of sunlight amenity would be available to the occupants of this apartment.

The level of sunlight access available to Room 15 is predicted to fall short of guideline targets by an absolute margin of 4% APSH over the course of the year. Having regard to the particular layout of this room it is clear that the identified shortfall is principally caused by the occluding effect of the balconies which serve these rooms. On review, it is reasonable to propose that the balconies in question contribute in their own way to the amenity of these apartments and that on balance their inclusion would be welcomed by future occupants. Further to this it should be recognised that while their presence does restrict the amount of direct sunlight which can reach the interior space of this living room; very high levels of sunlight access would be available to the balcony spaces; an annual sunlight access level of 74% APSH is predicted for the balcony which attends Room 15. When assessed in the round it is possible to conclude that acceptable levels of sunlight amenity would be available to the occupants of this apartment.

The results of this study demonstrate that acceptable levels of sunlight amenity would be available within this sample of apartments. On the basis that the particular apartments assessed in this study are likely to represent the worst case conditions that could be encountered within this development it is possible to conclude, by extension, that acceptable levels of sunlight access can also be expected within the other apartments (generally located at higher levels with a better view of the sun) which are located within this block. Further to this, as the accommodation present within this apartment block is very similar to the accommodation which is present within the remaining blocks it is possible to conclude, by extension, that substantial levels of compliance would be achieved within the wider development.

Table 5 Annual probable sunlight hours predicted (principal assessment points highlighted in yellow – secondary points shown in grey).

Block ID	Room ID	Window ID	Room Type	Annual Probable Sunlight Hours (%APSH)		Advisory Target Satisfied ?	Annual Probable Sunlight Hours During Winter Months (%APSH)		Advisory Target Satisfied ?
				Advisory Minimum Target	Predicted Level		Advisory Minimum Target	Predicted Level	
B5	1	W1	Kitchen/ Living/ Dining	25	19	No	5	1	No
B5	2	W1	Bedroom	25	15	No	5	2	No
B5	2	B1	Balcony Serving Bedroom	25	49	Yes	5	12	Yes
B5	3	W1	Kitchen/ Living/ Dining	25	14	No	5	5	Yes
B5	3	B1	Kitchen/ Living/ Dining	25	49	Yes	5	12	Yes
B5	4	W1	Bedroom	25	5	No	5	0	No
B5	5	W1	Kitchen/ Living/ Dining	25	60	Yes	5	20	Yes
B5	6	W1	Bedroom	25	11	No	5	10	Yes
B5	7	W1	Kitchen/ Living/ Dining	25	38	Yes	5	13	Yes
B5	8	W1	Bedroom	25	54	Yes	5	20	Yes
B5	9	W1	Kitchen/ Living/ Dining	25	47	Yes	5	12	Yes
B5	10	W1	Bedroom	25	44	Yes	5	10	Yes
B5	11	W1	Kitchen/ Living/ Dining	25	10	No	5	3	No
B5	11	B1	Balcony to Kitchen/ Living/ Dining	25	54	Yes	5	14	Yes
B5	12	W1	Bedroom	25	6	No	5	0	No
B5	13	W1	Kitchen/ Living/ Dining	25	47	Yes	5	11	Yes
B5	14	W1	Bedroom	25	0	No	5	0	No
B5	15	W1	Kitchen/ Living/ Dining	25	21	No	5	14	Yes
B5	15	B1	Balcony to Kitchen/ Living/ Dining	25	74	Yes	5	26	Yes
B5	16	W1	Bedroom	25	0	No	5	0	No
B5	17	W1	Kitchen/ Living/ Dining	25	69	Yes	5	25	Yes
B5	18	W1	Bedroom	25	9	No	5	9	Yes
B5	19	W1	Kitchen/ Living/ Dining	25	44	Yes	5	13	Yes
B5	20	W1	Bedroom	25	65	Yes	5	25	Yes

Study C: Assessment of sunlight amenity available to proposed recreation areas

According to the BRE sunlight in the spaces between buildings has an important impact on the overall appearance and ambience of a development. It is valuable for a number of reasons, to:

- Provide attractive sunlit views (all year)
- Make outdoor activities like sitting out and children's play more pleasant (mainly warmers months)
- Encourage plant growth (mainly spring and summer)
- Dry out the ground, reducing moss and slime (mainly colder months)
- Melt frost, ice and snow (in winter)
- Dry clothes (all year)

Study C: Assessment Approach

According to the BRE guide, a garden or amenity area will appear adequately sunlit throughout the year if at least half of it can receive at least two hours of sunlight on the 21st of March.

In order to assess a particular amenity space an analysis grid is specified across its area. At each point on this grid the cumulative number of sunlight hours which register are calculated for the course of a specified day (21st of March). The percentage area of the analysed area which receives more than 2 hours of sunlight on that day is then obtained.

Study C: Assessment Area

In the interest of economy only one outdoor open space is assessed in this study. The space selected is located immediately north east of Apartment Block 5 (see Figure 11) and is considered to capture the worst case outdoor sunlight conditions which would be encountered within the open space areas present within this development.

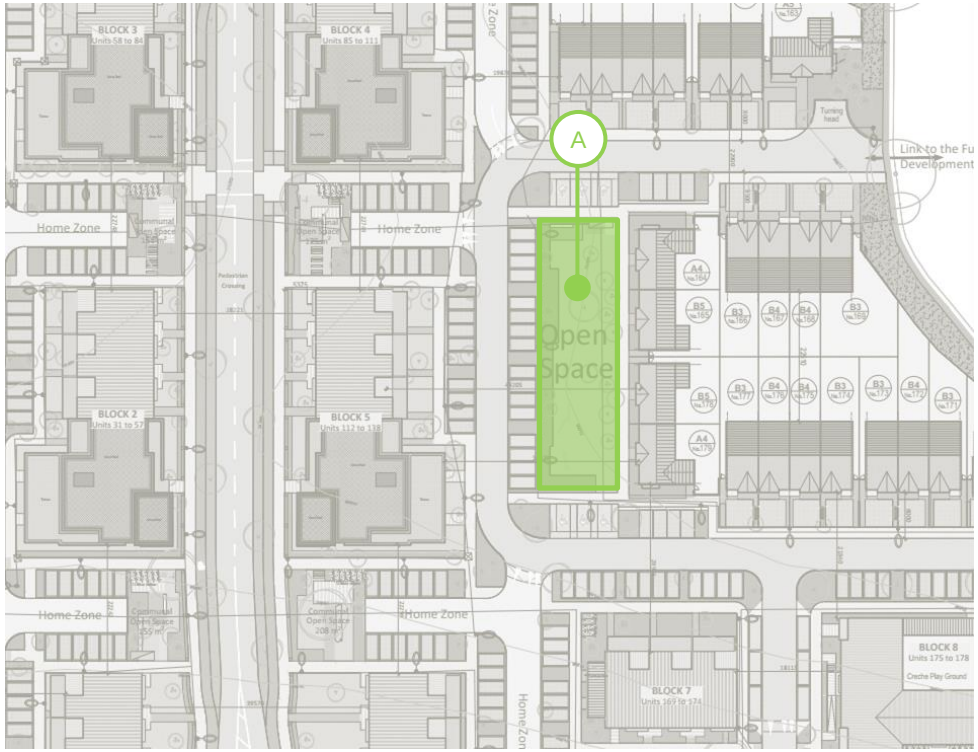


Figure 11 Plan showing the proposed outdoor amenity space assessed in this study

Study C: Results

This study has assessed the levels of sunlight amenity that would be available to an outdoor area which is being proposed as part of this development. The results from this study are presented in Table 6 and Figure 12; the associated shadow casting imagery is presented in Appendix E: Shadow Casting Imagery .

Table 6 Percentage area capable of receiving 2hrs of sunlight on the 21st of March

Area	% Area capable of receiving 2hrs of sunlight on the 21st of March		Compliance with BRE recommendations?
	Minimum Area Recommended by BRE	Predicted Area	
Area A	50%	98%	Yes

The results of this study demonstrate that the open space area assessed in this study would be capable of satisfying the guideline targets recommended by the BRE. Accordingly, it is possible to conclude that full compliance has been demonstrated and that the future residents of this development would have access to good levels of outdoor sunlight amenity.

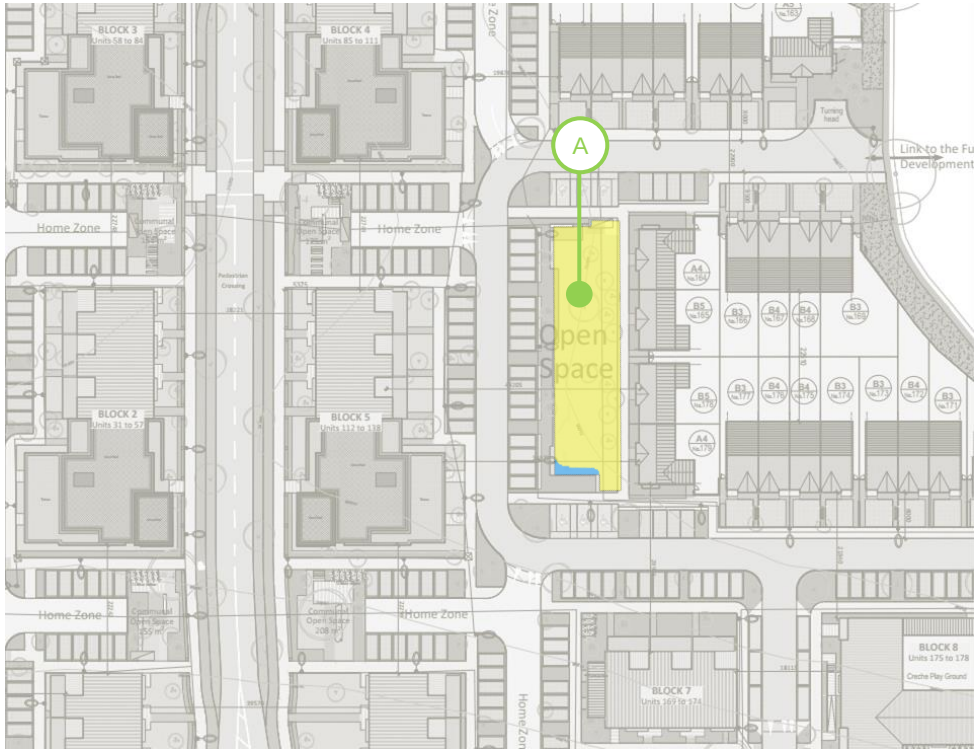


Figure 12 Plan showing the area of open space which would be capable of receiving more than 2hrs of direct sunshine on the 21st of March. The area highlighted in yellow is predicted to receive at least 2hrs of direct sunlight on the 21st of March; areas highlighted in blue receives less than 2hrs.

The Importance of Interpreting Daylight Results Flexibly

As outlined in the BRE guide, the results presented in this report should be assessed with a degree of flexibility. The flexibility available in the BRE guide is outlined in the introductory section as follows:

> *"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical targets these should be interpreted flexibly because natural lighting is only one of many factors in site layout design."*

This approach is recognised within planning guidance which has been published by the Irish Government. On page 43 of the Urban Design Manual 2009 the following advice is provided:

> *"Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths."*

CONCLUSIONS

This report has been prepared to assess the levels of sunlight and skylight amenity that would be provided within the apartment blocks which are being proposed as part of a larger residential development on Milll Road, Colp West, Drogheda.

As mandated in Irish planning policy all assessments have been carried out with reasonable and appropriate regard to the methods outlined in the BRE (Building Research Establishment) guide *'Site layout planning for daylight and sunlight - A guide to good practice'* 2nd Edition and BS 8206-2: 2008 – *'Lighting for Buildings – Part 2: Code of Practice for Daylighting'*, British Standards Institute, 2008.

In assessing the sunlight and skylight predictions which have been obtained for this development it is important to bear a number of factors in mind. In the first instance it is clear that this development conforms to and experiences many of the typical issues which arise when compact urban form is pursued.

Having regard to the governments stated aims to support an increase in housing supply and also to encourage sustainable development patterns, it is reasonable to propose that lands located at close proximity to urban centres must now be developed at higher densities. It is in this regard that it may not now always appropriate to purse full compliance with the guideline

targets recommended in the BRE Guide or BS 8206. While care should be taken to ensure that substantial levels of compliance with the recommendations in these guides are achieved, it is often the case that the particulars of a given site structurally impeded the ability of a development to achieve full compliance at all points of assessment. In this regard it is important to weigh up the isolated cases where full compliance with guideline targets has not been satisfied against the broader benefits which a development can provide to the compactness, vitality and viability of an emerging neighbourhood.

Having completed this assessment it is possible to say that the proposed development produces daylight levels which are substantially in line with the recommendations provided in the BRE guide and BS 8206.

Study A assessed the skylight amenity levels which would be provided within a sample of the apartment accommodation which is being proposed as part of this development. The results of this study demonstrate that substantial levels of compliance with target values would be achieved. On the basis that the rooms assessed capture the worst-case conditions which would be encountered within the wider development and on the basis that the rooms assessed are also representative of the apartments present within the wider development, it is possible to conclude, by extension, that substantial levels of compliance with target values would also be achieved within the other apartment blocks. Following from this it is reasonable to conclude that acceptable levels of internal skylight amenity would be available to the apartments which are being proposed as part of this development.

Study B assessed the sunlight access levels which would be provided within a sample of the apartment accommodation which is being proposed as part of this development. The results of this study indicate that substantial levels of compliance with advisory targets would be achieved. In the small number of instance where the levels of sunlight access available to living room windows are found to fall short of target a number of mitigating factors are present. These factors include the availability of additional sunlight access at alternate locations within the apartments in question and the presence of balconies with very high levels of sunlight access. When assessed in the round it has been possible to conclude that acceptable levels of sunlight amenity would be available to the apartments which have been assessed in this study. On the basis that the rooms assessed capture the worst-case conditions which could be encountered within the wider development and on the basis that the rooms assessed are also representative of the apartments present within the wider development, it is possible to conclude, by extension, that acceptable levels of sunlight amenity would be available to the apartments which are being proposed as part of this development.

Study C assessed the levels of sunlight amenity which would be available to one outdoor amenity space which is being proposed as part of this development. The results of this study demonstrate that full compliance with advisory targets would be achieved. On the basis that the open space

assessed in this study represents both a worst case condition and is also representative of other open spaces which are being proposed within the wider development, it is possible to conclude, by extension that acceptable levels of outdoor sunlight amenity would be available future occupants of these apartments.

When assessed in the round, and in relation to the other factors which contribute to the proper planning and sustainable development of this area, it is possible to conclude that the design of the apartments which are being proposed within this development pays reasonable and appropriate regard to the principals outlined in the BRE guide and BS 8206.

Appendix A: Policy Basis for Daylight Standards

The particular provisions which have been made to promote good daylighting in planning guidance are identified as follows:

Sustainable Residential Development in Urban Areas, DoEHLG 2009

Published by the Department of Environment Housing and Local Government in 2009, this guide includes a number of provisions related to daylight. Section 7.9 of the guide is particularly relevant:

> "*7.9 - Overshadowing will generally only cause problems where buildings of significant height are involved or where new buildings are located very close to adjoining buildings. Planning authorities should require that daylight and shadow projection diagrams be submitted in all such proposals. The recommendations of "Site Layout Planning for Daylight and Sunlight: A Guide to good Practice" (BRE 1991) or BS 8206 "Lighting for Buildings, Part 2 1992: Code of Practice for Daylighting" should be followed in this regard."*

Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities

Published by the Department of Environment Housing and Local Government in March 2018, provisions are made to safeguard daylight within Section 6.6 and 6.7:

> "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 a design constraint 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."*

Urban Development and Building Heights – Guidelines for Planning Authorities

Published by the Department of Environment Housing and Local Government in March 2018, provisions are made to safeguard daylight within Section 3.2. The specific guidance is provided within the part of Section 3.2 which deals with development management at the scale of the site/building:

"At the scale of the site/building

- *The form, massing and height of proposed developments should be carefully modulated so as to maximise access to natural daylight, ventilation and views and minimise overshadowing and loss of light.*
- *Appropriate and reasonable regard should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'.*
- *Where a proposal may not be able to fully meet all the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

Appendix B: Policy basis for flexibility in applying daylight standards

The particular provisions which have been made to ensure that a permissive approach can be taken in the assessment of daylight adequacy are identified as follows:

Specific guidance on this matter is provided within Section 4.5 the National Planning Framework[7] (Section 4.5). The guidance provided is as follows:

> *"**To enable brownfield development, planning policies and standards need to be flexible**, focusing on design led and performance-based outcomes, rather than specifying absolute requirements in all cases. Although sometimes necessary to safeguard against poor quality design, **planning standards should be flexibly applied in response to well-designed development proposals that can achieve urban infill and brownfield development objectives** in settlements of all sizes. This is in recognition of the fact that many current urban planning standards were devised for application to greenfield development sites and cannot account for the evolved layers of complexity in existing built-up areas."**[Emphasis added]***

The NPF goes further and introduces the need for tolerances and alternative solutions as a National Policy Objective. National Policy Objective 13 of the NPF is stated as follows:

> *"In urban areas, planning and related standards, including in particular building height and car parking will be based on performance criteria that seek to achieve well-designed high-quality outcomes in order to achieve targeted growth. **These standards will be subject to a range of tolerance that enables alternative solutions to be proposed to achieve stated outcomes,** provided public safety is not compromised and the environment is suitably protected." **[Emphasis added]***

On the basis that this guidance is applicable to daylight standards it is reasonable to propose that a clear basis exists for the adoption of a permissive approach to the assessment of daylight adequacy. Additional support for this facility is provided within the Urban Design Manual published by the Department of Energy Heritage and Local Government, 2009. On page 43 of this manual the following guidance is provided:

> *"Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas **it may not be possible to achieve the specified criteria, and***

[7] *DoHPLG 2018 National Planning Framework*

standards may need to be adjusted locally to recognise the need for appropriate heights or street widths. *" [Emphasis added]*

The need for tolerance and flexibility to be exercised in the application of daylight standards is reflected in the particular wording which has been adopted in recent building height guidelines[8]. Specific guidance on the regard which should be paid to daylight standards is provided within Section 3.2 of the guidelines:

"At the scale of the site/building

- *The form, massing and height of proposed developments should be carefully modulated so as to maximise access to natural daylight, ventilation and views and minimise overshadowing and loss of light.*
- ***Appropriate and reasonable regard*** *should be taken of quantitative performance approaches to daylight provision outlined in guides like the Building Research Establishment's 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting'.*
- ***Where a proposal may not be able to fully meet all the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, in respect of which the planning authority or An Bord Pleanála should apply their discretion, having regard to local factors including specific site constraints and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution." [Emphasis added]***

Accepting that a valid planning basis exists for adopting alternative targets it is also clear that this approach is supported within BR 209[9].

Within the introductory section of the BRE guide the following advice is provided:

"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical targets these should be interpreted flexibly because natural lighting is only one of many factors in site layout design. ***In special circumstances the developer or planning authority may wish to use different target values*** *" [Emphasis added]*

[8] DoHPLG 2018 – Urban Development and Building Heights – Guidelines for Planning Authorities

[9] BRE 2011 – Site layout planning for daylight and sunlight: a guide to good practice otherwise known as BR 209

Additional guidance regarding the facility which exists to use flexibility is provided within Appendix F of the BRE Guide. More specifically, the following advice is provided regarding the particular performance targets recommended by the BRE:

> *"Section 2.1,2.3 and 2.3 give numerical target values in assessing how much light from the sky is blocked by obstructing buildings. These values are purely advisory and different targets may be used based on the special requirements of the proposed development or its location. Such alternative targets may be generated from the layout dimensions of existing development, or they may be derived from considering the internal layout and daylighting needs of the proposed development itself. "*

Appendix C: Source Material

The 3D models used in our analysis were generated using information garnered from the following sources.

Model Elements	Source	Drawing No. / File Name	Title / Description	Date Issued
External Massing of Proposed Development	DDA	19-001-P-1.006 19-001 mill road – shadow model_Apartments	Overall Site Layout Plan 3D model of proposed development	19/09/2019 19/09/2019
Internal Layouts & Glazing Arrangements within Block 5 of Proposed Development	DDA	19_001_P_3.500 19_001_P_3.501 19_001_P_3.502 19_001_P_3.503	Block 5 Ground Floor Plan Block 5 First Floor Plan Block 5 Second Floor Plan Block 5 Third Floor Plan	19/09/2019 19/09/2019 19/09/2019 19/09/2019
Neighbouring Buildings - Site Levels	DDA	19-001-P-1.100	Context Elevations A-A, B-B	04/04/2019

Appendix D: Rationale for revised average daylight factor target

Within BS 8206 a minimum ADF target of 1% is proposed for bedrooms, 1.5% is proposed for living rooms and 2% is proposed for kitchens. Accepting that it is also proposed within BS 8206 that an ADF target of 2% should be pursued in cases where an open plan space includes both a living room and a kitchen, BPG3 respectfully submits that it is reasonable and appropriate to adopt the lower 1.5% target (associated with living rooms) in most cases. A justification for this approach is outlined as follows:

a. As a starting point it is important to recognise that it is challenging for conventional open plan kitchen/living room layouts (deep room with kitchen located on interior wall) to achieve the 2% ADF target proposed in BS 8206. It follows that the requirement to achieve an internal ADF of 2% in open plan kitchen/living rooms, were it to be enforced by a local authority, would immediately curtail developer's ability to adopt conventional apartment typologies in their development proposals. While it would be possible to achieve the 2% ADF target using alternative (shallower) room layouts the cost of delivering such schemes would inevitably increase, with project viability and overall housing supply being affected as a consequence. It is on this basis that it is reasonable to propose that a persuasive reason would need to exist to justify the pursuit of the higher 2% ADF target. It follows that careful consideration should be given to the reasons why a higher ADF of 2% is recommend for kitchens and open plan kitchen/living rooms by extension.
b. While no rationale for the elevated kitchen ADF target is provided within BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting', British Standards Institute, 2008 the origins of the 2% ADF target can be traced back through a number of preceding standards to guidance which is provided in Chapter 1: Part 1 of the British Standard Code of Practice CP3 (1964). Advice provided in this standard indicates that the overriding reason why a higher ADF target of 2% is recommended for kitchens is because the tasks carried out around the cooker, sink and preparation table are thought to be visually demanding.
c. The significance of this finding is that the elevated ADF recommended for kitchens would appear to relate more directly to the execution of functional activities within the room rather than any particular aesthetic requirement which may exist for an elevated daylit appearance.
d. This finding is of consequence because, while artificial lighting cannot be relied upon to recreate the aesthetic qualities of natural light, modern luminaires can be relied upon to provide sufficient lighting to meet the functional requirements of most tasks. By comparison to the artificial lighting which would have existed in 1964, when the ADF target of 2% for kitchens was originally deemed necessary, modern luminaries are capable of providing light of a

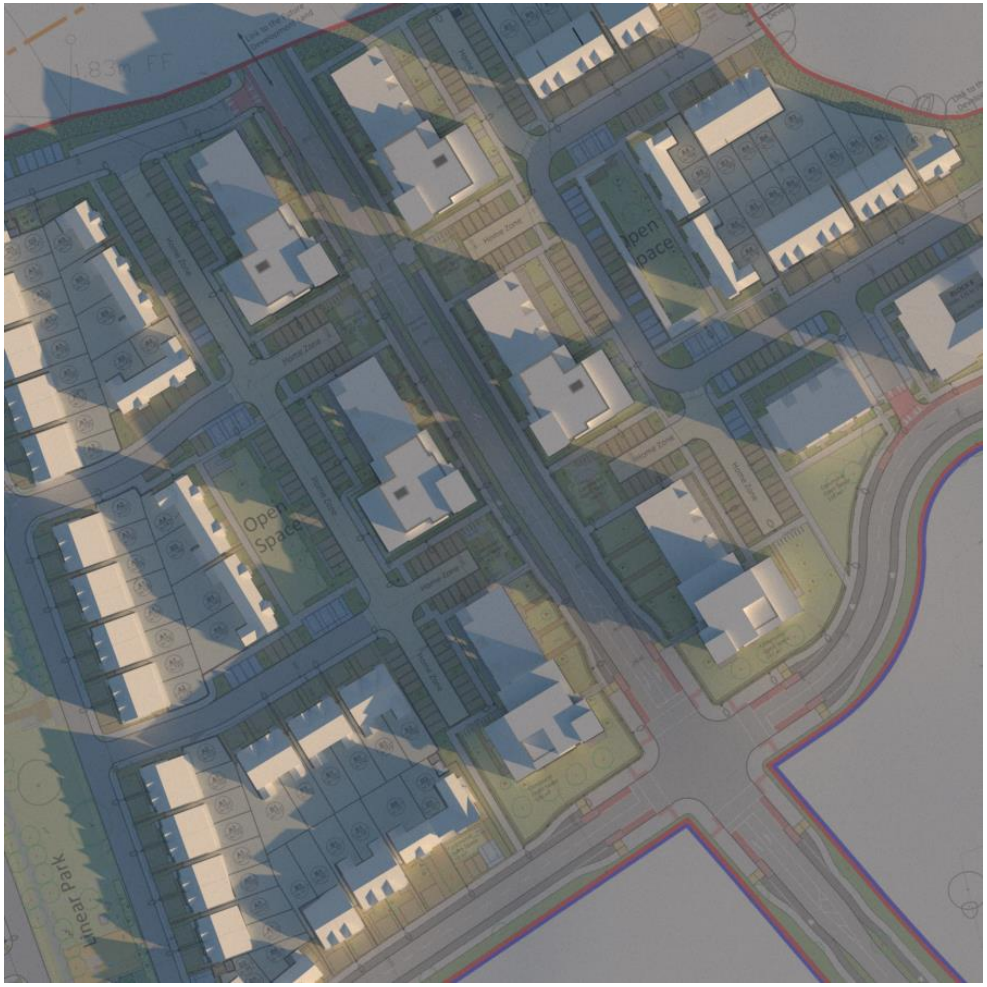
much higher quality; both in terms of the levels of lux delivered, the uniformity of light provided and the degree of colour rendering achieved.

e. It is on this basis, where the higher 2% ADF target recommended for kitchens (and kitchen/living rooms by extension) relates principally to the provision of adequate light to support the functional activities of the space, that it is reasonable to propose that any shortfall from this target can in practice be easily compensated for with artificial lighting.

f. On review, given that the original purpose of the elevated 2% ADF target can be easily achieved using alternative means, BPG3 respectfully submits that a persuasive case does not exist to justify the pursuit of this higher ADF target in all circumstances. This position is found to be particularly true when considered against the significant consequence, the imposition of the higher target, would have for the delivery of conventional apartment typologies in Ireland.

g. Having regard to the above, it is reasonable to proposed that the target recommended in BS 8206 for living rooms (ADF of 1.5%) is an acceptable target to pursue for open plan kitchen/living rooms as it relates more directly to the predominant use within these spaces; further to this it is reasonable to propose that any shortfall from target which may be encountered within the kitchen area of these open plan spaces can be easily addressed using artificial lighting.

Appendix E: Shadow Casting Imagery

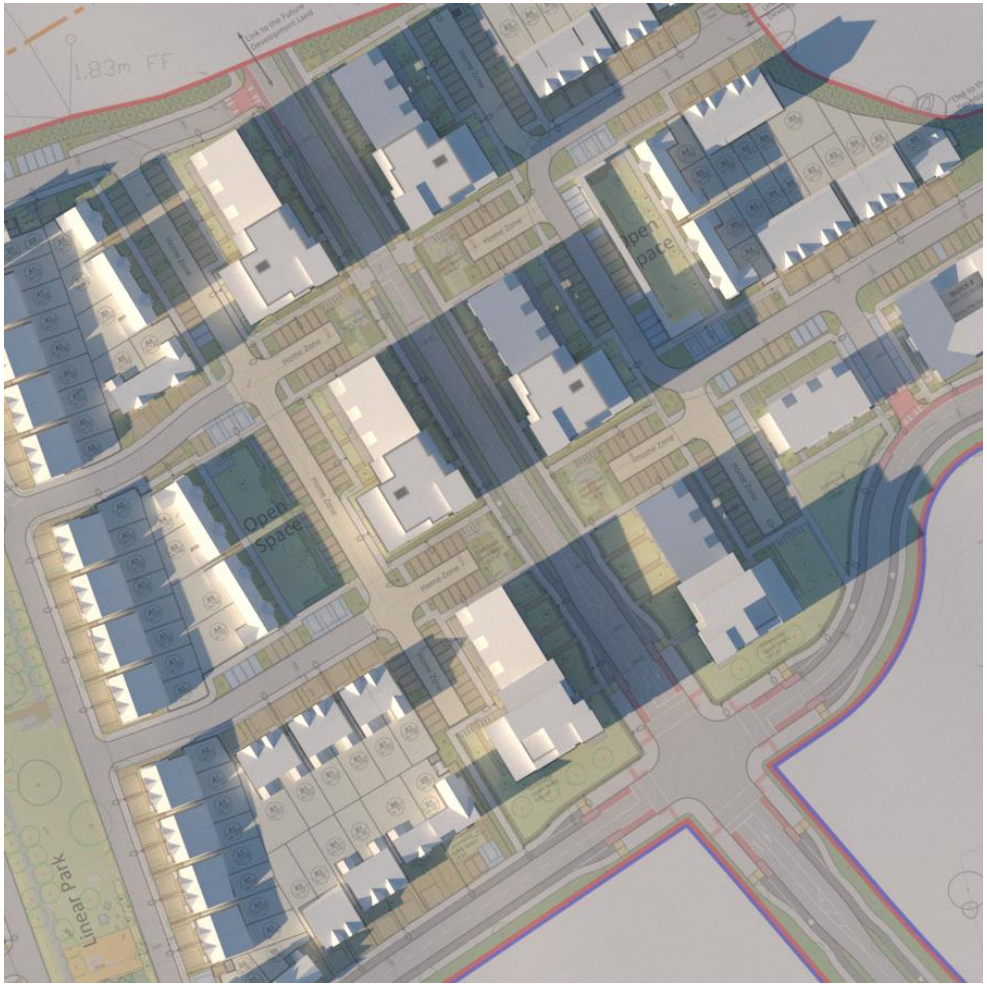


Shadows Cast at 8am (UTC+0) on the 21st March - After Development Scenario

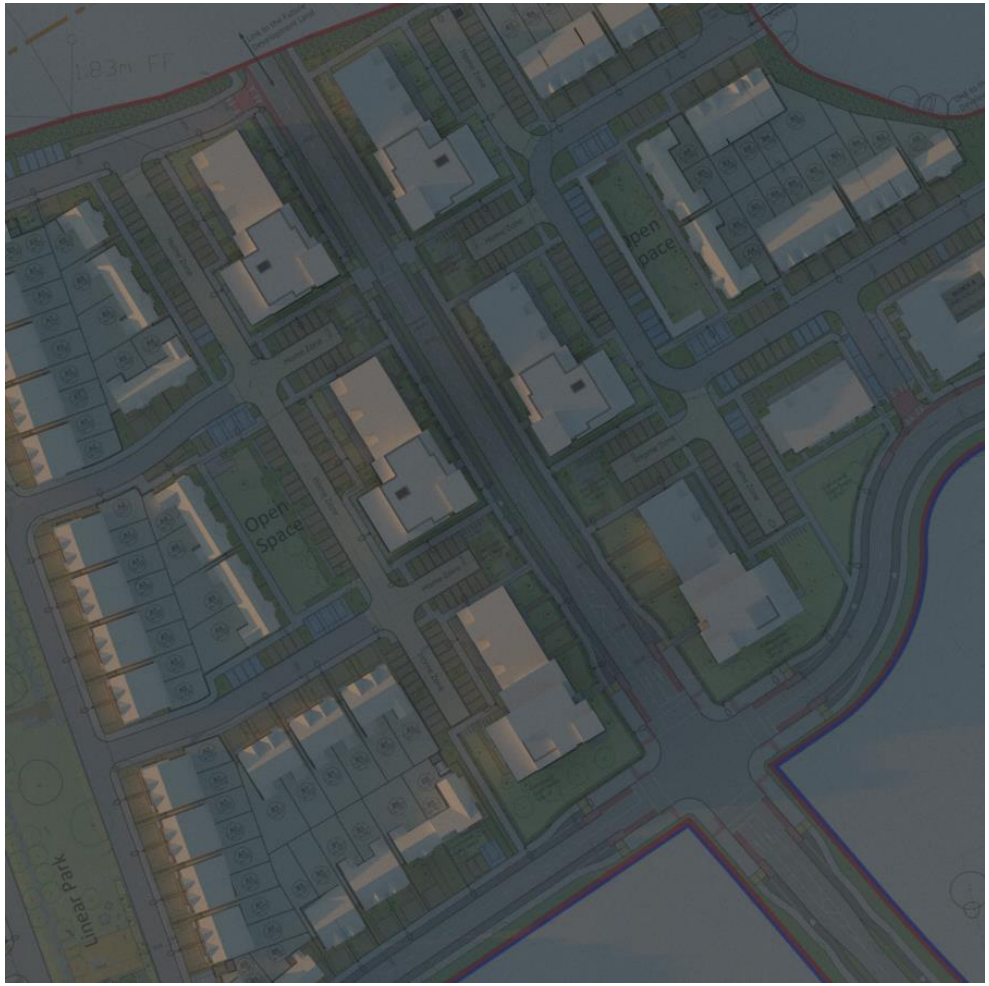
Shadows Cast at 10am (UTC+0) on the 21st March - After Development Scenario

Shadows Cast at 12pm (UTC+0) on the 21st March - After Development Scenario

Shadows Cast at 2pm (UTC+0) on the 21st March - After Development Scenario



Shadows Cast at 4pm (UTC+0) on the 21st March - After Development Scenario



Shadows Cast at 6pm (UTC+0) on the 21st March - After Development Scenario