



Effects on Daylight Reception Analysis



EFFECTS ON DAYLIGHT RECEPTION IN EXISTING NEIGHBOURING BUILDINGS

The Green Quarter

Proposed Strategic Housing Development

Cartrontroy, Kilnafaddoge Lissywollen and Ardnaglug (townlands), Athlone Co. Westmeath

Avenir Homes Limited

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1 Introduction

1.1 Report purpose

This report gives information on the level of achieved daylight reception in habitable rooms in existing neighbouring buildings before and after the introduction of the new development.

1.2 Instruction

DKPartnership (DKP) have been commissioned by Avenir Homes Limited to carry out the analysis and report for the proposed development at Cartrontroy, Kilnafaddoge, Lissywollen and Ardnaglug (townlands), Athlone, Co. Westmeath.

1.3 Development description

Avenir Homes Limited. intend to apply to An Bord Pleanála for permission for a strategic housing development at Cartrontroy, Kilnafaddoge, Lissywollen and Ardnaglug (townlands), Athlone, Co. Westmeath. The development will consist of:

The construction of a mixed use residential development of 122 no. residential units with ancillary creche, 46 no. student apartments consisting of 283 bed spaces, and all associated site development works. The proposed development makes provision for 60 no. dwelling houses comprising 38 no. 2-storey 3-bed townhouses, 7 no. 2-storey 4-bed townhouses, 7 no. 3-storey 4-bed townhouses, 6 no. 2 storey 4-bed semi-detached and 2 no. 2 storey 4-bed detached. The proposed development includes 62 no. apartments / duplexes to be provided as follows: Block R1 containing 38 no. apartments (16 no. 1 bed units and 22 no. 2 bed units) in a 3-6 storey building, and Block R2 containing 20 no. duplex units (10 no. 2 bed units and 10 no. 3 bed units) over 4 storeys with 4 no. apartments (4 no. 2 bed units) in one 5th storey feature area. The proposed student accommodation makes provision for 283 no. bed spaces in 3 no. blocks to be provided as follows: Block S1 containing 18 apartments with 117 bed spaces over 5-6 storeys, Block S2 containing 16 apartments with 107 bed spaces over 6-7 storeys, and Block S3 containing 12 apartments with 59 bed spaces over 4-5 storeys.

The proposed development will provide for two new vehicular accesses as well as pedestrian entrances onto Lissywollen Avenue east-west access road (as permitted under An Bord Pleanála Reference ABP-309513-21). Minor modifications to ABP-309513-21 are proposed to cater for these access points, alterations to cycle/pedestrian paths, the removal of a central island to facilitate the south-eastern entrance, and provision of bus stop infrastructure. Ancillary site works include public and communal open spaces, hard and soft landscaping, pedestrian / cycleways, car parking, cycle parking, bin storage, public lighting, solar panels, ESB substation and supporting distribution kiosks, and all other ancillary works above and below ground. The proposal includes pedestrian and cycle linkages onto the Old Rail Trail Greenway to the south and Blackberry Lane (L40061) to the west.

In addition to the above specified works within the red-line boundary, Westmeath County Council are facilitating some offsite works to support the project for which the applicant has confirmed written consent. These include:

Resurfacing Blackberry lane along the western extent of the site. A special development contribution has been agreed with the applicant for such purposes.

Facilitating works to complete connections to the Old Rail Trail Greenway, including

Completion of pedestrian/cycle path between Blocks R1 and S1 to the surfaced area of the greenway to the south, and;

Replacement of existing gated access between the greenway and Blackberry Lane (southwest of the site) with a revised arrangement with dedicated cycle/pedestrian access. Final works to be agreed with Westmeath County Council.

1.4 Statutory requirement

There are no particular building regulations in relation day light/shadow effect standards other than recommendations outlined or referred to in the CIBSE lighting guide 10, BS EN17037/EN17037 and the BRE document" Site layout planning for daylight and sun light". The aforementioned documents do refer to a" right to a sky view" relating to existing buildings facing a new adjacent development in so far that it compares an existing sky view with the sky view when the new development is constructed. The difference, if any, must be within a certain acceptable threshold.

2 Executive summary

2.1 Analysis conducted

This report details the achieved calculated daylight reception in selected rooms in neighbouring buildings before and after the introduction of the new proposed development and compares these for compliance with the recommendations of the relevant guidelines and standards.

2.2 Daylight reception and building orientation

Day light reception under the BRE, CIBSE and BS 8206 is calculated using the room area of the glazed element, the room depth/height ratio, the room light reflection capability and the amount of direct or blocked/partially blocked daylight it receives. i.e. building orientation is not relevant to day light reception or daylight reception calculations. In other words day light factor analysis is equal to all orientations. This note is for clarity as day light is often confused with sunlight or sunlight energy which is effected by orientation.

2.3 Guidelines and standards applied

For this report we applied the recommendations and guideline of the following:

- The Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight a guide to good practice (referred to as the BRE Report).
- European/British Standard EN17037/BS EN17037 Lighting for buildings code of practice for day lighting. EN17037/BS EN17037 contains guidance on the minimum recommended levels of interior day lighting.
- CIBSE guide 10 Day light and lighting for buildings.

2.4 Technical analysis

Initially the daylight reception is assessed using the vertical sky component factor and where this is marginally in excess of the maximum allowable change under the BRE recommendations the daylight reception is calculated using the more in-depth daylight factor calculation analysis. The calculated daylight factor is then compared with the BRE recommended room daylight factor to ensure sufficient daylight reception. In basic terms the change in sky views/day light reception between the original and current proposed should not be more than 0.8 its previous value unless other measures (increased glazed areas) have been taken to maintain sufficient day light reception.

2.5 Daylight reception in neighbouring habitable rooms/buildings conclusion

The BRE Report suggests a VSC of 27% or more should be achieved if a room is to have adequate daylight. It also recommends that the effects of a new development on daylight reception should not affect any existing VSC by more than 20% or have a maximum change factor in excess of 0.8. From the calculation results we note all selected neighbouring habitable receptors are effected to some degree with regards to daylight reception due to the introduction of the proposed development in their respective habitable rooms facing the proposed development, however, the calculated change in daylight reception in all of the analysed neighbouring receptors of the proposed development achieved a change factor ranging from 0.87 to 0.99. Summary of findings are as follows (see image 5.1 for receptor locations):

- North receptor: Receptor A is a residential dwelling with ground floor windows. This dwelling was examined and resulted in a change factor of 0.88. The result is well within the guidelines.
- South receptors: Receptors B to J are residential dwellings with ground floor/first floor windows. These dwellings
 were examined and resulted in a change factor ranging from 0.87-0.99. These receptors are all comfortably within
 the guidelines.
- East receptors: Receptor K is a residential dwelling with ground floor windows. This dwelling was examined and resulted in a change factor of 0.95. The result is well within the guidelines. Receptor L although not strictly habitable we have treated as such. This receptor is well within the guidelines with a change factor of 0.96.

We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms are all within the constraints and recommendations of the BRE Report – "Site Layout and Planning for Daylight and Sunlight and we therefore deem the development to be compliant with this element.

2.6 Mitigation measures/actions

No mitigation measures anticipated.

3 Geographical overview

3.1 Project overview

Image 3.1 the (google maps) site map below indicates the location of the site, approximately outlined.



Image 3.1 proposed development site area outline

4 Approach and methodology

4.1 General approach

This report covers the day light reception in habitable rooms in existing neighbouring buildings. The day light reception is applied as the vertical sky component (angle) but where found to be marginally in excess of the maximum allowable change a second more in depth analysis in the form of an average day light factor calculation is conducted to ensure sufficient levels of daylight is being received.

4.2 The nature and effects of day light and sun light

When assessing the effects of proposed building projects on the potential to cause issues relating to light, it is important to recognise the distinction between daylight and sunlight. Daylight is the combination of all direct and indirect sunlight during the daytime, whereas sunlight (for the purposes of this report) comprises only the direct elements of sunlight. For example, on a cloudy or overcast day diffused daylight still comes in through windows, even when sunlight is absent. Any development within a built-up area has the potential to alter the amount of daylight and direct sun received by nearby residential properties.

Care should be taken when designing new buildings in built-up areas, especially when the proposed development is relatively tall or situated to the south of existing buildings, because in the northern hemisphere the majority of the sunlight comes from the south. In Ireland (and other northern hemisphere countries) south-facing facades will in general, receive the most sunlight, while the north facing facades will receive sunlight on only a handful of occasions, specifically early mornings and late evenings during the summer months. It is therefore important to ensure that new buildings to the south of any development do not cause over shadowing to existing dwellings and therefore reduce their capacity to receive sunlight.

4.3 Assessment criteria

National Policy/building regulations: The government does not have an adopted policy on daylight, sunlight and the effects of overshadowing, and does not have targets, criteria or relevant planning guidance in the way it has for other environmental impacts such as noise, landscape or air quality. However, there are a number of guidance documents which are relevant when considering daylight, sunlight and overshadowing in dwellings:

- The Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight a guide to good practice (referred to as the BRE Report).
 Although not Government guidance, this report is commonly referenced as the main guide in Ireland/UK in
- determining the minimum standards of daylight and sunlight and for determining the impact of a development.
 European / British standard EN17037 / BS EN17037 Lighting for buildings: Code of practice for day lighting. EN17037/BS EN17037 contains guidance on the minimum recommended levels of interior day lighting and introduces some of the calculation procedures used in the BRE Report.
- CIBSE guide 10 Day light and lighting for buildings.
 CIBSE lighting guide 10, like BS EN17037 contains guidance on the minimum recommended levels of interior day lighting and introduces recommended day light levels for general buildings.

4.4 The BRE Report – "Site Layout and Planning for Daylight and Sunlight – A Guide to Good Practice"

The BRE report contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. The advice provided within the guide is not mandatory and should not be seen as an instrument of planning policy, its aim is to help rather than constrain the designer. Although it gives numerical guidance values, these should be interpreted with flexibility since natural lighting is one of many factors in site layout design. The guidance should be applied appropriately to developments to assist in gaining the best development possible without adverse impacts. As well as advice the report contains a methodology to assess levels of daylight, sunlight and over shadowing and contains criteria to determine the potential impacts of a new development on surrounding buildings. The table below summarises the criteria used to assess the daylight reception in properties.

4.5 Day light reception analysis, Sky view component

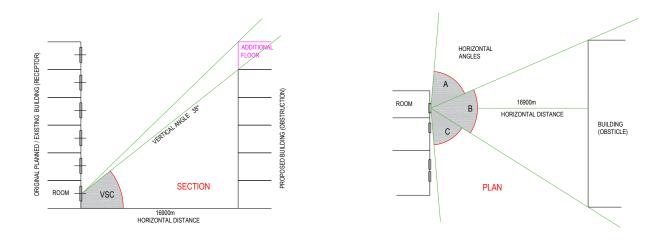
The day light assessment is the effects the proposed development has on adjoining existing buildings. The assessment of daylight is required for windows serving rooms in adjoining dwellings where daylight is required including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be assessed.



The guidelines also apply to any room that may have a reasonable expectation of daylight, including schools, hospitals, hotels and some offices. When assessing daylight, the numerical criteria must be viewed with flexibility and should be considered against other site layout constraints. In addition, it is important to consider whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and not taking more than its fair share of light.

The assessment takes on several specific stages:

- The distance test: loss of light to windows need not be analysed if the distance from the existing window to the development is three or more times its height above the centre of the existing window;
- The 25° rule: loss of light to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25° (an angle of 25° equates to a VSC of 27%).
- Daylight assessment: diffuse daylight of an existing building may be adversely affected by a proposed development if either: the vertical sky component measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value; or the area of the working plane which can receive direct skylight is reduced to less than 0.8 times its former value.



4.6 Criteria for daylight reception effects on neighbouring receptors

Table 4.1 details the BRE assessment criteria for daylight reception.

Analysis	Description	Acceptable parameters
Daylight reception criterion	Existing daylight incoming angle	Existing angles should not be effected more then 0.8 time its former value or a maximum loss of 20%.

Table 4.1

If the vertical sky component angles are beyond the maximum allowable change factor a further analysis can be conducted to establish the effects on daylight reception more accurately. The average day light factor can be applied to calculate the amount of day light received before and after the introduction of the new proposed development however this requires more accurate data on the room effected by the relevant window/receptor.

5 Receptor selection and calculation results

5.1 Basis of receptor (room/window) selection

The VSC assessment has been targeted to neighbouring windows/rooms/dwellings that are perceived to be in challenging locations i.e. basement rooms, ground floor rooms and dwellings/rooms in the near vicinity of the new proposed development on the basis that if these rooms pass the minimum requirements all rooms at higher levels will definitely pass the minimum recommendations as a result of the improving vertical sky view angle. Selected 12 no. neighbouring buildings (A to L) are listed below and also shown in image 5.1.



Image 5.1 Neighbouring receptors

Receptor/ window	Address	Description	Level description
А	Kilnafaddoge, Athlone	Residential	GF living space
В	51 Bóthar an Díthribh, Ardnaglug, Kilnafaddoge	Residential	GF living space
С	52 Bóthar an Díthribh, Ardnaglug, Kilnafaddoge	Residential	GF living space
D	Ashgrove, Cartrontroy, Athlone	Residential	GF living space
E	1 Ashgrove, Kilnafaddoge, Athlone	Residential	FF living space
F	2 Ashgrove, Kilnafaddoge, Athlone	Residential	GF living space
G	Kilnafaddoge, Athlone	Residential	GF living space
Н	Shelmalier House, Cartrontroy, Kilnafaddoge, Athlone	Residential	GF living space
I	Appledoe, Cartrontroy, Kilnafaddoge, Athlone	Residential	GF living space
J	Cartrontroy, Kilnafaddoge, Athlone	Residential	GF living space
K	Garrycastle, Athlone	Residential	GF living space
L	ESB Networks, Athlone	Office/coraporate	GF office
Table E 2. Liet	of aplasted reporters		

Table 5.3: List of selected receptors

5.2 Distance test

We would normally execute a distance test to any selected rooms to determine if any further calculations are required to establish the effects on sky views however despite the fact that in some circumstances the distance test alone would have sufficed, we have executed full VSC calculations for all selected neighbouring buildings habitable rooms.

5.3 Vertical sky component (VSC)

The VSC has been calculated for potentially affected windows within the neighbouring /adjacent properties. When undertaking a daylight assessment, the BRE Report suggests a VSC of 27% or more should be achieved if a room is to have adequate daylight. This level need not be applied to rooms which do not require high levels of natural light such as garages, storage rooms, etc. It also recommends that the effects of a new development on daylight reception should not affect any existing VSC by more than 20% or have a maximum change factor in excess of 0.8. The tables below provide the full calculation results of selected neighbouring locations including the overall calculated vertical sky component before and after the introduction of the new development. Note: The VSC calculation results have been given the following colour code guide depending on its level of resulting compliance.

Compliance guide



5.4 VSC calculation results

DAYLIGHT RECEPTION ANALYSIS

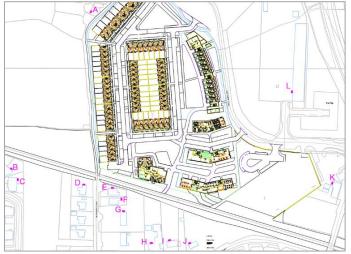
A	EXISTING	
VSC test distanc∉ 26 m	Section 1 Section 2 Section 3 Section 4 $\frac{1}{27}$ Section 1 Section 2 Section 3 Section 4 $\frac{1}{27}$	
Target distance 28m	Hor° Ver°	ge
window GF-living	70 2 22 4 41 2 47 3 180 36% 43 2 95 22 13 15 29 3 180 32% 0.8	88
В	EXISTING	
VSC test distanc∉ 26 m	Section 1 Section 2 Section 3 Section 4 \vec{P} Section 1 Section 2 Section 3 Section 4 \vec{P}	
Target distance 120m	Hor° Ver° Hor° Ver° Hor° Ver° Hor° Ver° Mor° Ver° Hor° Ver°	ge
window GF-living	74 2 34 2 38 3 34 5 180 36% 78 2 54 5 14 5 34 5 180 36% 0.5	99
C	EXISTING	
VSC test distanc∉ 26 m	Section 1 Section 2 Section 3 Section 4 \vec{P} Section 1 Section 2 Section 3 Section 4 \vec{P}	
Target distance 117m	Hor° Ver°	
window GF-living	25 2 49 2 19 3 87 6 180 36% 29 2 50 5 15 6 86 6 180 35% 0.5	99
D	EXISTING NEW	
VSC test distanc∈ 35 m	Section 1 Section 2 Section 3 Section 4 $\frac{1}{9}$ Section 1 Section 2 Section 3 Section 4 $\frac{1}{9}$ Section 1 Section 2 Section 3 Section 4 $\frac{1}{9}$	
Target distance 68m	Hor [°] Ver [°] Ver [°] Hor [°] Ver [°] Ver [°] Hor [°] Ver [°] Hor [°] Ver [°] Hor [°] Ver [°] Ve	
window GF-living	95 2 48 2 17 3 20 3 180 36% 95 2 51 12 34 15 180 34% 0.5	95
E	EXISTING NEW	
VSC test distanc∈ 54 m	Section 1 Section 2 Section 3 Section 4 \vec{y} \vec{y} Section 1 Section 2 Section 3 Section 4 \vec{y} \vec{y}	
Target distance 38m	Hor° Ver° Hor° Ver° Hor° Ver° Hor° Ver° Mor° Ver° Hor° Ver° Hor° Ver° Hor° Ver° Hor° Ver° Hor° Ver° Hor° Ver°	
window FF-living	86 2 53 2 17 3 24 3 180 36% 78 2 55 16 47 35 180 31% 0.8	87
_	I manage II was I	
F	EXISTING NEW	
VSC test distanc∈ 54 m	Section 1 Section 2 Section 3 Section 4 \vec{y} \vec{y} Section 1 Section 2 Section 3 Section 4 \vec{y} \vec{y}	
Target distance 34m	Hor° Ver° N Hor° Ver° Hor° Ver° Hor° Ver° N Hor°	ge
window GF-living	59 2 57 2 17 3 47 6 180 36% 71 29 18 15 44 3 47 6 180 31%	

Lissywollen

G	EXISTING
VSC test distanc∉ 54 m	Section 1 Section 2 Section 3 Section 4 호 양 Section 1 Section 2 Section 3 Section 4 호 양
Target distance 53m	Hor° Ver°
window GF-living	82 2 50 2 17 3 31 3 180 36% 73 2 30 8 43 21 34 13 180 34% 0.93
Н	EXISTING
VSC test distance 54 m	Section 1 Section 2 Section 3 Section 4 호 양 Section 1 Section 2 Section 3 Section 4 호 양
Target distance 77m	Hor° Ver°
window GF-living	67 11 65 2 14 3 34 3 180 35% 67 11 20 5 69 17 24 3 180 33% 0.94
L	EXISTING
VSC test distanc∉ 54 m	Section 1 Section 2 Section 3 Section 4 $\vec{\Sigma}$ Section 1 Section 2 Section 3 Section 4 $\vec{\Sigma}$ Section 4 $\vec{\Sigma}$
Target distance 68m	Hor [°] Ver [°] Hor [°] Ver [°] Hor [°] Ver [°] Hor [°] Ver [°] W w Hor [°] Ver [°] w w change
window GF-living	68 17 74 2 38 3 180 34% 68 17 80 17 32 3 180 31% 0.92
	1 11 1
J	
VSC test distanc∉ 54 m	Section 1 Section 2 Section 3 Section 4 $\frac{1}{5}$ S Section 1 Section 2 Section 3 Section 4 $\frac{1}{5}$ S
Target distance 67m	Hor° Ver°
window GF-living	31 17 28 5 94 2 27 3 180 35% 31 17 28 5 94 17 27 3 180 32% 0.91
К	
VSC test distanc∉ 54 m	Section 1 Section 2 Section 3 Section 4 \vec{E} S Section 1 Section 2 Section 3 Section 4 \vec{E} S
Target distance 120m	Hor [°] Ver [°] [°] Ve
window GF-living	56 18 11 4 64 2 49 5 180 34% 56 18 44 14 31 10 49 5 180 32% 0.95
L	
VSC test distance 54 m	Section 1 Section 2 Section 3 Section 4 호 양 Section 1 Section 2 Section 3 Section 4 호 양
Target distance 96m	Hor° Ver° Hor° V
window GF-living	30 2 37 4 64 3 49 3 180 36% 29 2 43 12 51 11 57 3 180 34% 0.96

5.5 Daylight reception in neighbouring habitable rooms conclusion

The BRE Report suggests a VSC of 27% or more should be achieved if a room is to have adequate daylight. It also recommends that the effects of a new development on daylight reception should not affect any existing VSC by more than 20% or have a maximum change factor in excess of 0.8. From the calculation results we note all selected neighbouring habitable receptors are effected to some degree with regards to daylight reception due to the introduction of the proposed development in their respective habitable rooms facing the proposed development, however, the calculated change in daylight reception in all of the analysed neighbouring receptors of the proposed development achieved a change factor ranging from 0.87 to 0.99. Summary of findings are as follows (see image 5.1 for receptor locations):



(For reference) Image 5.1 Neighbouring receptors

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We conclude that the new proposed development's effect on daylight reception in the neighbouring rooms are all within the constraints and recommendations of the BRE Report – "Site Layout and Planning for Daylight and Sunlight and we therefore deem the development to be compliant with this element.