DKPartnership Dublin Cork London
T : 01-813-1930 T : 064-664-1686
E : post@dkpartnership.com

5025 Effects on Daylight Reception Analysis

EFFECTS ON DAYLIGHT RECEPTION IN EXISTING NEIGHBOURING BUILDINGS

ORCHARD GATE SHD

RESIDENTIAL APARTMENT DEVELOPMENT

KENNELSFORT ROAD UPPER
PALMERSTOWN
CO DUBLIN

AAI Palmerstown Ltd

DKP-M70-5025 ¦ P4
2021-11-29

Document control

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ING Gerard (Craig) van Deventer CEng., BE(mech)., HDip CIOB, MCIBSE

M : [00] 353 (0)87 260 8080
E : gerard@dkpartnership.com

DKPartnership
70 Main Street, Applewood , Swords, Co. Dublin, Ireland
Reen Kenmare Co. Kerry

post@dkpartnership.com
www.dkpartnership.com

T : [00] 353 (0) 1813 1930
T : [00] 353 (0)64664 1686

Contents

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 AAI Palmerstown Ltd to carry out the analysis and report for the proposed Orchard Gate residential development described below.

1.3 Development detail

The development is located at the former warehouse facility at units 54 & 65, Cherry Orchard Industrial Estate. The site presents a gateway location at the western junction of Kennelsfort Road Upper and Cherry Orchard Industrial Estate Road. This location represents the start of the lands zoned 'REGEN'continuing to the east.

The proposal is for 144 no. 'build to sell' apartments and associated facilities with a mix of 72 no. one bedroom apartments and 72 no. 2 bedroom apartments. The development is set out in 4 no. five storey buildings enclosing a raised podium courtyard with the junction corner building having a 9-storey gateway feature element. On-site parking of 65 no. resident spaces is contained within a landscaped podium element with 2 no. on street care share spaces provided.

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 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 0.80. From the calculation results we note that the effects on daylight reception on the houses / receptors to the East of the proposed new development are all comfortably within the maximum allowable change factor of the BRE guide. The calculated change in daylight reception in all of the analysed neighbouring receptors of the proposed development achieved a change factor ranging from 0.84 to 0.95. Summarized result findings are as follows (see image 5.1 for receptor locations):

- Receptors A and B (Palmerstown Ct): These are residential dwellings with ground floor windows. These dwellings were examined and resulted in a change factor of 0.94 and 0.95. These receptors are comfortably within the guidelines.
- Receptors C to J (Palmers Cres): These are residential dwellings with ground floor/first floor windows. These dwellings were examined and resulted in a change factor ranging from 0.84-0.95. These receptors are all within the guidelines.
- Receptors K and L (Palmers Park): These are residential dwellings with ground floor windows. These receptors were examined and resulted in a change factor of 0.87. These receptors are also within the guidelines.
- Receptors M and N (Industrial estate): These are offices/commercial space with ground floor windows. These receptors were examined and resulted in a change factor of 0.86 and 0.94. These receptors are comfortably within the guidelines.

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 shows the approximate location of the site with proposed development approximately outlined in the area site map.

Image 3.1 Approximate proposed development site

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.

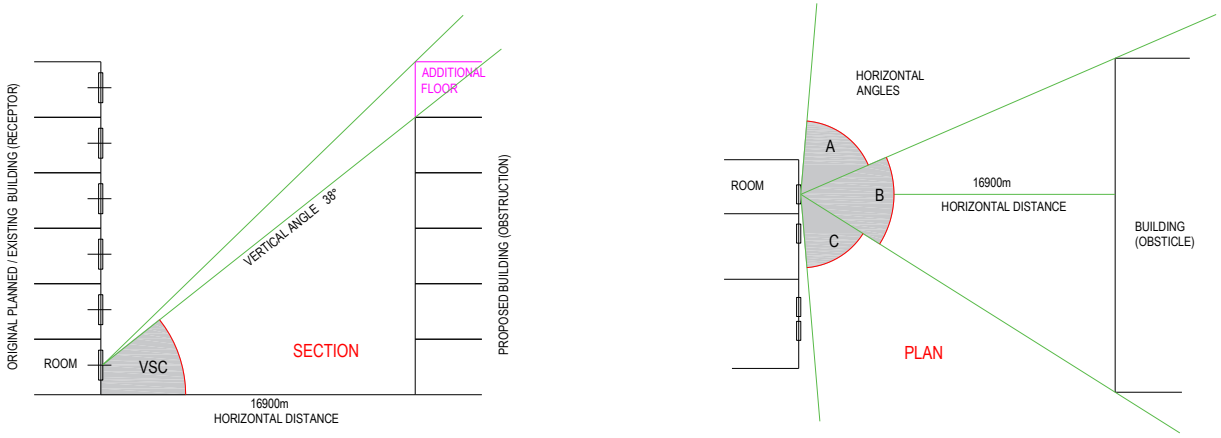
4.5 Day light reception analysis, Sky view component

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 neighbouring buildings are listed below and also shown in image 5.1.

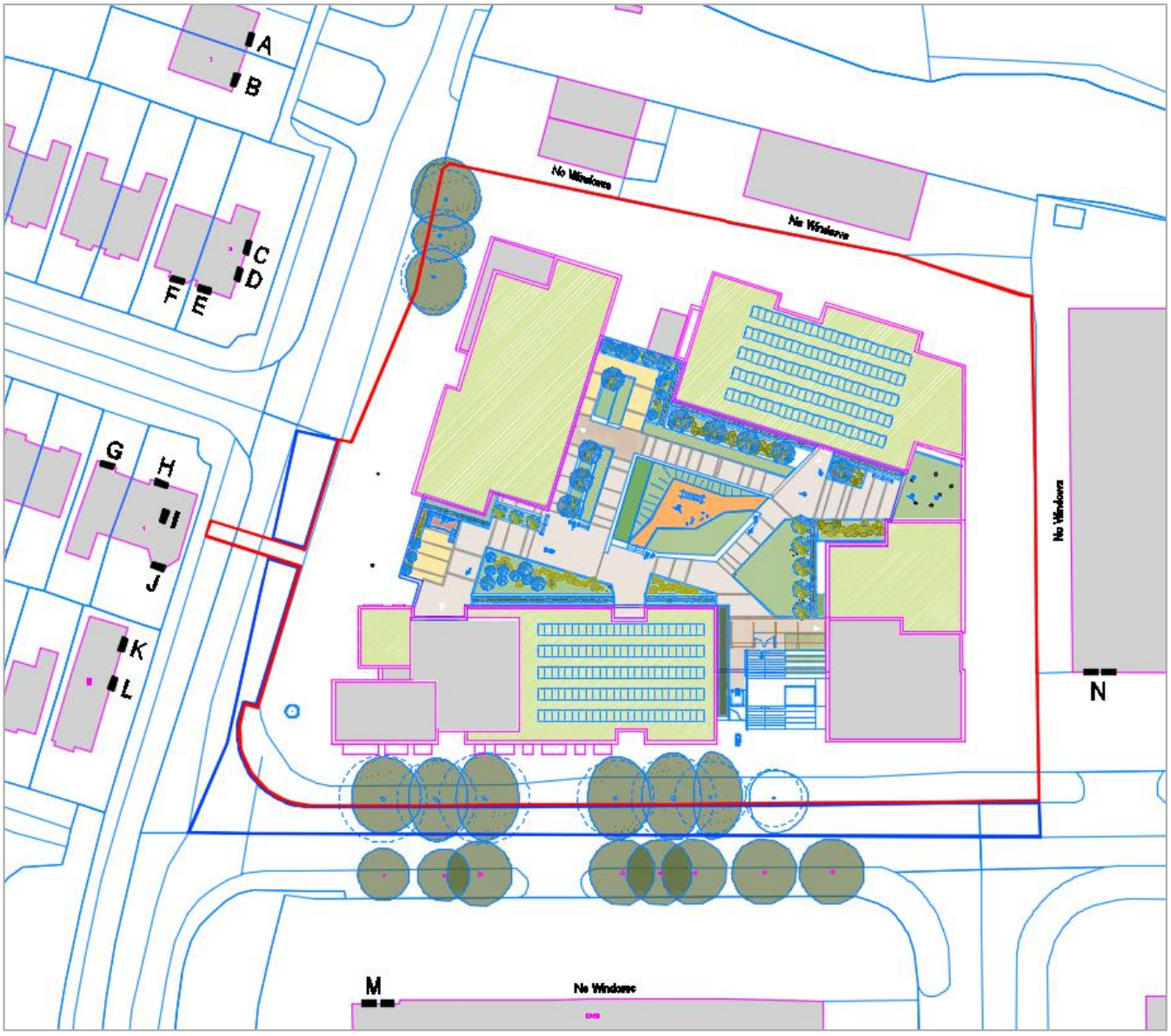


Image 5.1: Neighbouring receptors selected for analysis

Receptor	Address	Level description
A	2 Palmerstown Ct, Ballyfermot Upper, Dublin	Ground floor window - Living space
B	1 Palmerstown Ct, Ballyfermot Upper, Dublin	Ground floor window - Living space
C	2 Palmers Cres, Palmerstown Manor, Dublin	Ground floor window - Living space
D	2 Palmers Cres, Palmerstown Manor, Dublin	First floor window - Living space
E	2 Palmers Cres, Palmerstown Manor, Dublin	Ground floor window - Living space
F	4 Palmers Cres, Palmerstown Manor, Dublin	Ground floor window - Living space
G	3 Palmers Cres, Palmerstown Manor, Dublin	Ground floor window - Living space
H	1 Palmers Cres, Palmerstown Manor, Dublin	Ground floor window - Living space
I	1 Palmers Cres, Palmerstown Manor, Dublin	First floor window - Living space
J	1 Palmers Cres, Palmerstown Manor, Dublin	Ground floor window - Living space
K	10 Palmers Park, Palmerstown Manor, Dublin	Ground floor window - Living space
L	10 Palmers Park, Palmerstown Manor, Dublin	Ground floor window - Living space
M	Industrial Estate - Cawleys Furniture	Ground floor window – Office space
N	Industrial Estate – Deli Meat Supplies	Ground floor window – Office space

Table 5.1: Neighbouring receptors selected for analysis

5.2 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

☑	0%	Over /equal to
☑	5%	Within
!!	10%	Within
x	10%	In excess of

5.3 VSC calculation results

DAYLIGHT RECEPTION ANALYSIS

Receptor A	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 44m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	80	4	14	5	68	8	18	22	180	34%	80	4	14	5	68	21	18	22	180	32%	0.94

Receptor B	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 42m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	28	22	12	3	51	8	89	5	180	34%	28	22	21	21	40	20	91	5	180	32%	0.95

Receptor C	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 34m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	6	11	40	4	57	10	77	5	180	35%	6	11	92	5	29	29	54	27	181	31%	0.89

Receptor D	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 32m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window FF	49	3	56	6	75	5			180	36%	30	3	30	52	57	24	63	5	180	30%	0.84

Receptor E	EXISTING										NEW									
VSC test distance 75 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 50m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	107	13	38	5	35	9			180	33%	107	14	18	5	29	31	26	24	180	30%	0.91

Receptor F	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 59m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	28	9	33	5	92	13	27	12	180	33%	48	28	13	5	92	13	27	12	180	31%	0.93

Receptor G	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 40m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	101	13	33	5	45	9			179	33%	101	13	24	5	55	23			180	31%	0.95

Receptor H	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 38m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	92	13	43	5	45	9			180	33%	92	13	33	5	43	23	12	16	180	31%	0.95

Receptor I	EXISTING										NEW									
VSC test distance 75 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 31m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window FF	72	4	68	7	40	4			180	35%	56	4	43	39	50	21	31	4	180	30%	0.86

Receptor J	EXISTING										NEW									
VSC test distance 75 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 31m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	93	16	44	7	43	5			180	33%	93	16	58	6	29	43			180	30%	0.93

Receptor K	EXISTING										NEW									
VSC test distance 75 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 33m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	60	5	51	7	25	4	44	8	180	35%	55	5	51	7	40	43	34	21	180	30%	0.87

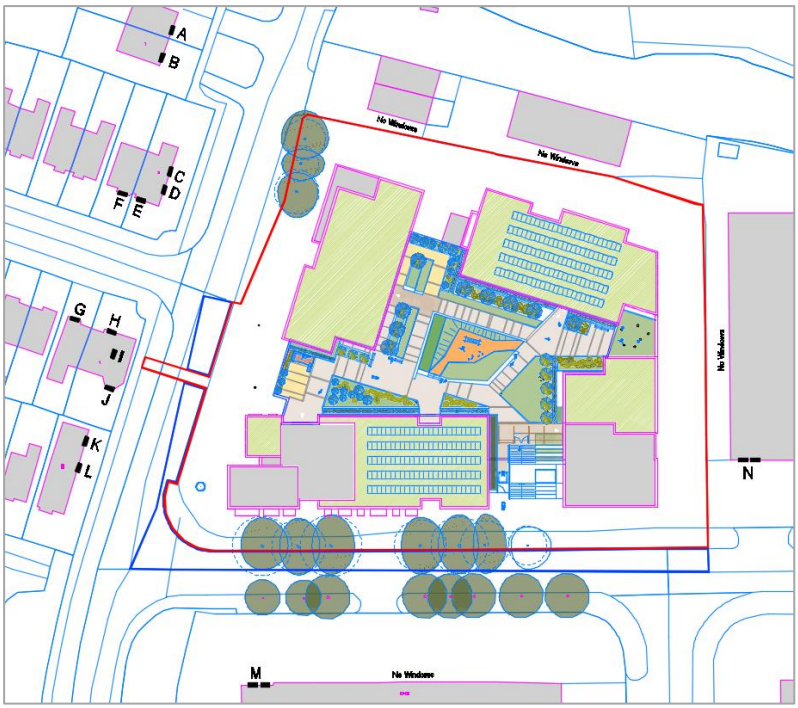
Receptor L	EXISTING										NEW									
VSC test distance 75 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 35m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	65	5	48	7	24	4	43	8	180	35%	60	5	47	7	43	43	30	21	180	30%	0.87

Receptor M	EXISTING										NEW									
VSC test distance 75 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 39m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	40	4	58	7	53	7	29	4	180	35%	65	4	40	7	62	39	13	13	180	30%	0.86

Receptor N	EXISTING										NEW									
VSC test distance 48 m	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	Section 1		Section 2		Section 3		Section 4		∑ Hor (	∑ VSC	
Target distance 21m	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			Hor°	Ver°	Hor°	Ver°	Hor°	Ver°	Hor°	Ver°			change
Window GF	24	4	52	5	104	8			180	35%	25	39	51	5	104	8			180	33%	0.94

5.4 Daylight reception in neighbouring habitable rooms conclusion

The BRE 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 0.80. 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. The calculated change in daylight reception in all of the analysed neighbouring receptors of the proposed development achieved a change factor ranging from 0.84 to 0.95. Summarized result findings are as follows (see image 5.1 for receptor locations):



(For reference) Image 5.1: Neighbouring receptors selected for analysis

- Receptors A and B (Palmerstown Ct): These are residential dwellings with ground floor windows. These dwellings were examined and resulted in a change factor of 0.94 and 0.95. These receptors are comfortably within the guidelines.

- Receptors C to J (Palmers Cres): These are residential dwellings with ground floor/first floor windows. These dwellings were examined and resulted in a change factor ranging from 0.84-0.95. These receptors are all within the guidelines.

- Receptors K and L (Palmers Park): These are residential dwellings with ground floor windows. These receptors were examined and resulted in a change factor of 0.87. These receptors are also within the guidelines.

- Receptors M and N (Industrial estate): These are offices/commercial space with ground floor windows. These receptors were examined and resulted in a change factor of 0.86 and 0.94. These receptors are comfortably within the guidelines.

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.