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

5020 Daylight Reception Report

DAYLIGHT RECEPTION IN HABITABLE ROOMS WITHIN THE PROPOSED DEVELOPMENT

ORCHARD GATE SHD

RESIDENTIAL APARTMENT DEVELOPMENT

KENNELSFORT ROAD UPPER
PALMERSTOWN
CO DUBLIN

AAI Palmerstown Ltd

DKP-M70-5020-P4
2021-11-29

Document control

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Planning consultants	HW Planning		☑	☑	☑	☑
Landscape architects	Ilsa Rutgers Arcitecture					

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P	Planning
C	Concept
D	Design
G	General information
T	Tender
W	Works/construction
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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 within the proposed 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 as 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 Policy and building regulation requirements

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".

2 Executive summary

2.1 Analysis conducted

This report details the achieved calculated daylight reception in habitable rooms within the new 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 in habitable rooms within the proposed development under the BRE, CIBSE and BS EN17037/EN17037 is calculated using the 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).
- British European Standard BS EN17037/EN17037 Day lighting standards and contains guidance on the minimum recommended levels of interior day lighting.
- CIBSE guide 10 Day light and lighting for buildings.

2.4 Technical analysis

The amount of daylight received in a room is calculated and expressed as a daylight factor. This calculated daylight factor is then compared with the BRE recommended room daylight factor to ensure sufficient daylight reception. Calculations were conducted in accordance with the BRE guidelines to determine the average day light factor in a number of selected rooms within the new development. These selected rooms are generally in (daylight) challenging locations typically based at the lowest (ground floor) levels given that these would receive the least amount of day light. Once the ground floor rooms achieve compliance all other rooms at higher levels with similar room/window configurations and parameters will also achieve compliance as the vertical daylight impact angle will improve increasing the daylight reception typically 0.3%-0.5% per floor level (3m).

2.5 Daylight reception in rooms within the new development conclusion

The BRE report recommends as a methodology for assessing sufficient daylight reception in a habitable room, that the calculated average daylight factor (ADF) of a habitable room to be in excess of the BRE bench marks of a kitchen at 2%, a living room at 1.5%, a bedroom at 1% and a living room/bedroom at 1.5%.

From the results table we note the calculated ADF are all above minimum guidelines or are equal to the guidelines of the BRE design guide 'site layout and planning for daylight and sunlight - a guide to good practice'. Summary of results findings are as follows; (see images 5.1 and 5.2 for receptor locations):

Level 00
Block A: N/A, no habitable rooms on ground floor.
Block B: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block C: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block D: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.

Level 01
Block A: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block B: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block C: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block D: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.

Level 02, and all other levels*:* All floors above the first floor apartments are further deemed compliant as they naturally would have an improved vertical daylight impact angle thus increasing the daylight reception factor typically 0.3%-0.5% per floor level.

Given the results and conclusions above we, DKP, deem the proposed project to be in compliance with the recommendations in the BRE design guidelines 'site layout and planning for daylight and sunlight - a guide to good practice'.

2.6 Mitigation measures/actions

No mitigation measures required.

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.

Image 3.1 Approximate proposed development site

4 Approach and methodology

4.1 General approach

This report covers the day light reception of habitable rooms within the new proposed development. The day light reception is expressed as the average day light factor (ADF) in the following rooms:
- Bed rooms within dwellings
- Living rooms/dining rooms
- Kitchens
- Any combination of the above

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 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.
- British European Standard BS EN17037 / EN17037 Day Lighting for buildings.
  BS EN17037/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, BS EN17037/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 flexibly 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. Table 4.1 below details the BRE assessment criteria for daylight reception within the proposed development.

Analysis	Description	Acceptable parameters
Daylight reception criterion	Average daylight factor (ADF)	Habitable rooms to have ADF factors between 1% and 2% pending room type

Table 4.1

There are also recommendations with regards to minimum proposed glazed area in facades in relation to the available sky view component angle. BS EN17037/EN17037 gives guidance on the minimum glazed area with different virtual sky component angles to maintain sufficient daylight reception. Table 4.2 presents the minimum glazed areas fractions relative to the available sky view angle.

Room depth	VSC <=25°	VSC >=25° <=45°	VSC >=45° <=65°	VSC >=65°	Comments
1 to 8	20%	20% - 31%	31% - 35%	35% - 40%	
8 – 11	25%	25% - 40%	40% - 44%	44% - 50%	
11 – 14	30%	30% - 47%	47% - 53%	53% - 60%	
14 - 20	35%	35% - 54%	54% - 61%	61% - 70%	

Table 4.2

4.5 ADF or Average day light factor

The average day light assessment is the amount of day light received by the habitable rooms in the proposed development only. Whereas there are no standards applied for day light factors there are recommendations published in the CIBSE guides and BRE documents in relation to the percentage and minimum area of the room/area to conform to same. Table 4.4 below represents recommended minimum day light factors.

Habitable room types		Minimum day light factor	Minimum floor area cover
Multi-residential buildings	Kitchen	2%	75%
Multi-residential buildings	Living rooms, dining rooms,	1.50%	70%
Multi-residential buildings	Bedrooms	1%	50%

Table 4.3

4.6 ADF or Average Daylight Factor calculation method

The average daylight factor provides a useful technique for assessing the daylight potential of interior spaces under standard overcast conditions. The average daylight factor *df* is defined as;

$df = TAw\ q / [A\ (1-R^2)]\ \%$

where,
T is the diffuse visible transmittance of the glazing, including corrections for dirt on glass
Aw is the net glazed area of the window (m^2)
A is the total area of the room surfaces: ceiling, floor, walls and windows (m^2)
R is their average reflectance of the ceiling, walls and floor surfaces
q is the angle of visible sky in degrees (VSC)

4.7 Project ADF calculation parameters

The following calculation parameters have been applied. For T (Em), the overall maintained light transmittance into the room we applied a conservative 0.66. Current triple glazed elements can now be supplied with light emittance in excess of 0.70 effecting/improving the final resultant ADF by a further 0.3% to 0.5%.

Glass light emittance	0.72
Glazing maintenance factor	8%
Maintained light emittance Em	0.66

For R (Rf), the average reflectance of the walls, ceiling and floor we have used an overall average figure 0.59 representing a dark floor, medium dark walls and a light ceiling. R can also be significantly improved to 0.66 – 0.69 by implementing lighter colours on the walls and floor effecting/improving the ADF by 0.5% to 0.7%.

Ceiling	0.8	95%	Light
Walls	0.6	80%	Medium dark
Floor	0.3	70%	Dark
Combined Rf	0.59		

For q, the vertical sky component angle we use the combined calculated vertical sky component over the full visual horizontal plane from the relevant window/room point. i.e. at each obstacle in the general 180° horizontal view plane the vertical sky component is measured and combined to form the overall resultant VSC. The illustration 4.1 below shows the room analysed to be effected by 3 different vertical sky component angles A, B and C on its horizontal plane. The resultant VSC is a calculated combination of all three VSC angles.

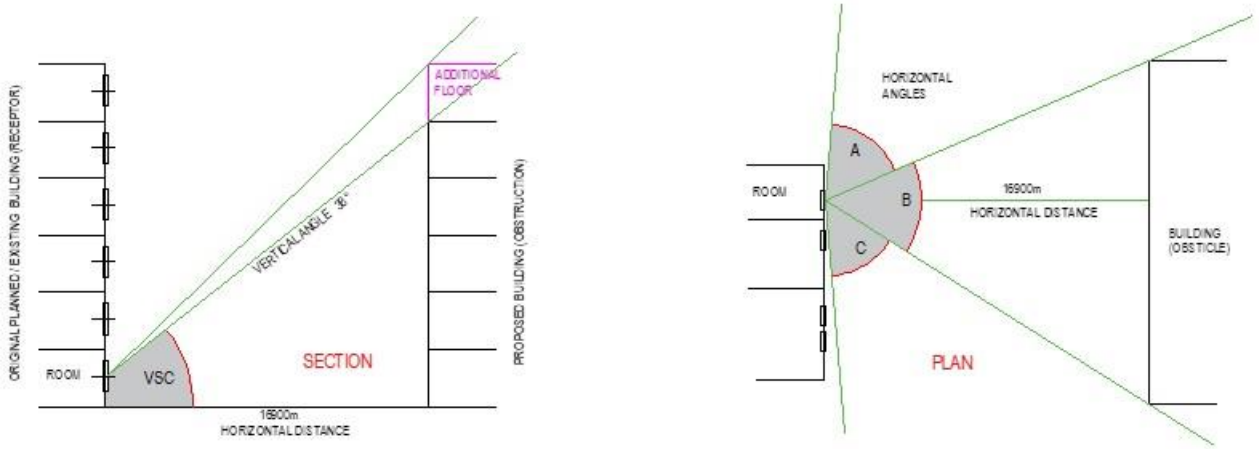

Image 4.1

5 Basis of receptor selection of habitable rooms within the development and Calculation results

5.1 Basis of receptor (room) selection

The daylight reception assessment has been targeted to habitable rooms which are perceived to receive less day light i.e. ground floor rooms and rooms facing close-by large obstacles. Once a (lowest level) room is compliant, rooms at higher levels with similar configuration/parameters are deemed compliant on the basis that the room daylight factor would have improved due to the better vertical sky view angle of higher located rooms. A total of 54 room locations have been selected on the basis that these locations are more daylight challenging. Image 5.1 and 5.2 below show the locations of the rooms chosen for the ADF analysis.

Image 5.1: Level 00 selected habitable rooms (all ground floor habitable rooms examined)

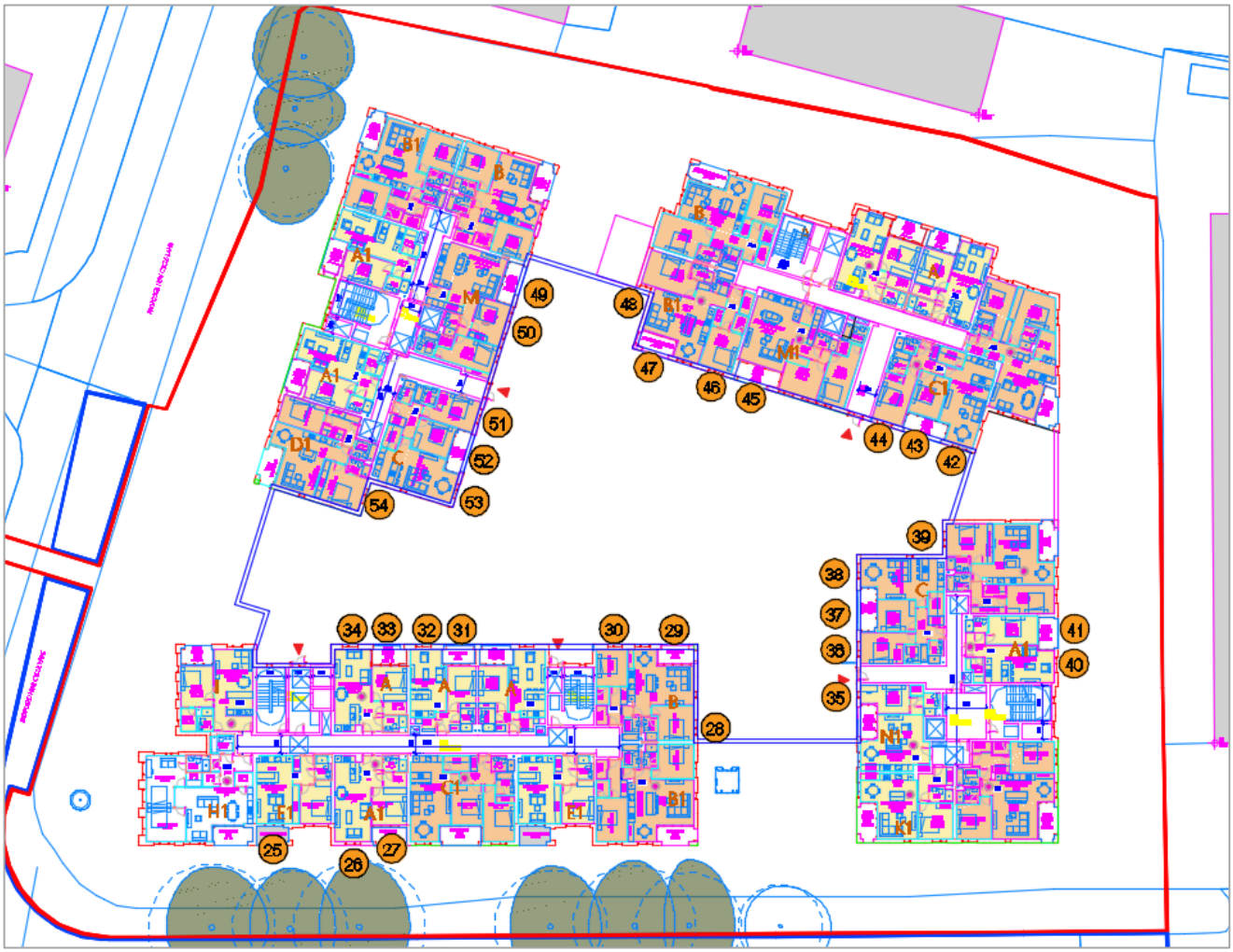

Image 5.2: Level 01 with selected rooms

5.2 Assessment approach and colour indicators

The tables below provide the full calculation results of the selected rooms including the overall calculated vertical sky component together with the 'to-be-achieved' BRE minimum daylight factor standards. Note: The ADF 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 ADF calculation results

Receptor	Location	Block	Receptor Level	Room / type	Hor Sec a Hor ∟°	Hor Sec a Vert ∟°	Hor Sec b Hor ∟°	Hor Sec b Vert ∟°	Hor Sec c Hor ∟°	Hor Sec c Vert ∟°	Hor Sec d Hor ∟°	Hor Sec d Vert ∟°	Σ Hor ∟	Σ VSC ∟	glass area m2	Room width m	Room depth m	Room height m	Room ADF %	BRE ADF %
1	B.02	B	00	Living - Kitchen	46	76	52	41	36	7	46	76	180	16%	9.09	6.40	5.50	3.30	2.40	2.00
2	B.02	B	00	Bed room	26	3	50	9	59	7	45	6	180	35%	2.73	3.50	3.60	3.30	3.27	1.00
3	B.01	B	00	Bed room	25	3	58	9	49	7	48	6	180	35%	2.73	3.50	4.20	3.30	2.93	1.00
4	B.01	B	00	Living - Kitchen	54	75	31	17	49	6	46	75	180	19%	8.69	6.50	5.80	3.30	2.52	2.00
5	B.01	B	00	Bed room	31	12	65	6	68	20	16	22	180	32%	2.73	3.00	4.30	3.30	2.92	1.00
6	C.02	C	00	Living - Kitchen	59	75	75	22	46	75			180	16%	7.69	6.40	4.50	3.30	2.28	2.00
7	C.02	C	00	Bed room	55	8	105	22	20	6			180	31%	2.73	3.70	3.20	3.30	3.03	1.00
8	C.02	C	00	Bed room	57	75	54	22	37	6	32	20	180	23%	2.73	3.00	3.20	3.30	2.58	1.00
9	C.01	C	00	Living - Kitchen	24	17	34	6	101	29	21	7	180	29%	4.09	3.30	7.60	3.30	2.41	2.00
10	C.01	C	00	Bed room	56	76	74	27	50	76			180	15%	3.36	3.10	3.60	3.30	1.79	1.00
11	C.04	C	00	Bed room	56	76	74	27	50	76			180	15%	3.36	3.50	3.50	3.30	1.68	1.00
12	C.04	C	00	Living - Kitchen	31	8	112	32	21	5	16	12	180	28%	4.09	3.30	7.60	3.30	2.33	2.00
13	C.03	C	00	Bed room	54	11	99	27	27	9			180	30%	2.73	3.40	3.50	3.30	2.88	1.00
14	C.03	C	00	Living - Kitchen	47	75	29	6	48	26	56	75	180	17%	7.96	6.20	5.10	3.30	2.35	2.00
15	C.03	C	00	Bed room	83	84	29	5	41	13	27	3	180	20%	2.00	4.35	3.40	3.30	1.22	1.00
16	D.02	D	00	Bed room	68	5	65	20	38	13	9	27	180	32%	2.73	3.50	3.50	3.30	3.07	1.00
17	D.02	D	00	Living - Kitchen	52	76	31	8	47	7	50	76	180	19%	8.69	6.50	5.60	3.30	2.58	2.00
18	D.02	D	00	Bed room	88	6	22	9	70	5			180	35%	2.73	3.10	4.00	3.30	3.32	1.00
19	D.01	D	00	Living - Kitchen	65	6	40	9	75	6			180	35%	2.73	3.00	6.50	3.30	2.32	2.00
20	D.01	D	00	Bed room	46	76	58	9	15	8	61	76	180	18%	3.15	2.80	4.30	3.30	1.90	1.00
21	D.04	D	00	Bed room	68	7	28	9	84	7			180	35%	2.73	3.00	6.50	3.30	2.30	1.00
22	D.04	D	00	Bed room	46	76	78	8	56	76			180	19%	3.15	2.80	4.30	3.30	2.00	1.00
23	D.03	D	00	Living	6	15	93	9	81	7			180	34%	2.52	2.80	4.20	3.30	3.06	1.50
24	D.03	D	00	Living - Kitchen	53	76	27	9	47	7	53	76	180	18%	7.09	5.80	5.45	3.30	2.26	2.00
25	A.1.9	A	01	Living - Kitchen	41	76	34	3	90	6	15	65	180	27%	3.38	3.60	6.20	2.85	2.24	2.00
26	A.1.8	A	01	Living - Kitchen	64	3	79	6	37	3			180	36%	3.19	3.50	7.80	2.85	2.38	2.00
27	A.1.8	A	01	Bed room	54	76	84	6	42	76			180	20%	3.38	3.40	3.60	2.85	2.54	1.00
28	A.1.4	A	01	Bed room	42	22	82	34	38	3	18	5	180	29%	2.59	3.50	3.50	2.85	2.84	1.00
29	A.1.4	A	01	Living - Kitchen	23	2	56	26	69	25	32	25	180	28%	7.58	6.40	5.30	2.85	3.95	2.00
30	A.1.4	A	01	Bed room	25	2	58	26	67	25	30	25	180	29%	2.59	3.10	3.70	2.85	2.95	1.00
31	A.1.2	A	01	Bed room	95	80	54	38	31	21			180	14%	3.18	2.80	4.20	2.85	1.71	1.00
32	A.1.2	A	01	Living - Kitchen	58	3	61	41	41	17	20	17	180	29%	3.35	3.60	6.40	2.85	2.34	2.00
33	A.1.1	A	01	Bed room	51	76	74	37	55	76			180	13%	3.18	3.50	3.50	2.85	1.54	1.00
34	A.1.1	A	01	Living - Kitchen	59	3	68	39	53	15			180	29%	3.63	3.50	7.60	2.85	2.28	2.00
35	B.1.5	B	01	Bed room	46	4	59	38	43	17	32	25	180	29%	1.59	2.70	4.70	2.85	1.66	1.00
36	B.1.6	B	01	Bed room	54	4	51	38	39	18	36	26	180	29%	2.59	3.00	4.10	2.85	2.84	1.00
37	B.1.6	B	01	Bed room	86	70	37	41	14	4	43	18	180	19%	3.98	3.00	3.70	2.85	2.97	1.00
38	B.1.6	B	01	Living - Kitchen	44	3	53	37	39	18	44	37	180	28%	4.49	3.90	7.60	2.85	2.44	2.00
39	B.1.7	B	01	Bed room	82	73	11	3	30	16	57	41	180	18%	2.59	3.10	4.30	2.85	1.60	1.00
40	B.1.8	B	01	Living - Kitchen	19	4	96	14	39	4	26	3	180	34%	2.59	3.00	6.30	2.85	2.39	2.00
41	B.1.8	B	01	Bed room	95	70	72	13	13	6			180	20%	3.98	2.80	4.20	2.85	3.09	1.00
42	C.1.7	C	01	Living - Kitchen	116	45	32	33	8	3	24	15	180	22%	4.68	4.00	7.50	2.85	2.05	2.00
43	C.1.7	C	01	Bed room	80	70	64	45	36	33			180	16%	3.98	2.90	3.80	2.85	2.49	1.00
44	C.1.7	C	01	Bed room	85	44	17	3	50	35	28	19	180	24%	2.59	3.10	4.10	2.85	2.27	1.00
45	C.1.8	C	01	Living - Kitchen	70	70	24	3	56	36	30	26	180	20%	5.97	4.40	6.50	2.85	2.43	2.00
46	C.1.9	C	01	Bed room	45	31	59	36	27	4	49	24	180	27%	2.59	3.10	3.70	2.85	2.75	1.00
47	C.1.9	C	01	Living - Kitchen	83	70	14	4	58	39	25	36	180	17%	8.44	6.40	5.50	2.85	2.52	2.00
48	C.1.9	C	01	Bed room	81	81	33	25	66	41			180	15%	2.15	4.20	3.50	2.85	1.05	1.00
49	D.1.8	D	01	Living - Kitchen	70	70	59	42	31	12	20	35	180	18%	6.97	4.40	6.20	2.85	2.70	2.00
50	D.1.8	D	01	Bed room	32	5	57	44	40	13	51	39	180	26%	3.34	3.90	3.20	2.85	3.24	1.00
51	D.1.9	D	01	Bed room	23	4	54	37	43	14	60	46	180	25%	2.59	3.10	4.10	2.85	2.41	1.00
52	D.1.9	D	01	Bed room	94	70	17	22	36	14	33	33	180	18%	3.98	3.10	3.70	2.85	2.84	1.00
53	D.1.9	D	01	Living - Kitchen	27	4	49	24	31	14	73	34	180	28%	4.68	3.90	7.60	2.85	2.61	2.00
54	D.1.1(	D	01	Bed room	79	68	19	15	48	32	34	60	180	17%	2.59	3.10	4.30	2.85	1.51	1.00

5.4 Daylight reception in rooms within the new development conclusion

The BRE report recommends as a methodology for assessing sufficient daylight reception in a habitable room, that the calculated average daylight factor (ADF) of a habitable room to be in excess of the BRE bench marks of a kitchen at 2%, a living room at 1.5%, a bedroom at 1% and a living room/bedroom at 1.5%.

From the results table we note the calculated ADF are all above minimum guidelines or are equal to the guidelines of the BRE design guide 'site layout and planning for daylight and sunlight - a guide to good practice'. Summary of results findings are as follows; (see images 5.1 and 5.2 for receptor locations):

Level 00
Block A: N/A, no habitable rooms on ground floor.
Block B: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block C: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block D: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.

Level 01
Block A: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
Block B: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.
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Block D: All selected habitable rooms have achieved an ADF in excess of the recommended BRE guideline.

Level 02, and all other levels*:* All floors above the first floor apartments are further deemed compliant as they naturally would have an improved vertical daylight impact angle thus increasing the daylight reception factor typically 0.3%-0.5% per floor level.

Given the results and conclusions above we, DKP, deem the proposed project to be in compliance with the recommendations in the BRE design guidelines 'site layout and planning for daylight and sunlight - a guide to good practice'.

No mitigation measures required.