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RIALTO STUDENT ACCOMMODATION

DAYLIGHT RECEPTION

DAYLIGHT RECEPTION IN HABITABLE ROOMS WITHIN THE NEW DEVELOPMENT

SOUTH CIRCULAR ROAD
RIALTO
DUBLIN

SHIPSEY/BARRY

DKP-J79-6061-1P
2019-06-28

Document control

Document ID : **DKP-K00-6061-01** Part 1 of 1

Circular		Issue >	1P
Clients	Kealan McCluskey		*V*
Architects	Shipsey/Barry		*V*
Planning consultants	Tom Philips & Ass		*V*
Structural/civil engineer	MMOS		*V*
Quantity surveyor			

Issue		
1P	2019-06-28	Issue for pre planning

Status

N	No status
G	General Information
P	Planning
O	Outline/sketch design
S	Scheme design
D	Detail design
T	Tender
C	Construction
B	Build / Constructed

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Contents

1 Introduction

1.1 Report purpose.

This report gives information on the daylight reception in the student rooms within the proposed development.

1.2 Introduction.

DKPartnership (DKP) have been commissioned by Kealan McLuskey and Shipsey/Barry to carry out the analysis and report for the proposed development at South Circular road, Rialto, Dublin.

1.3 Development details.

This report is in lieu of proposed student accommodation development located in South Circular Road, Rialto Dublin and consists of 313 student rooms and other social spaces spread over 6 floors including a basement level. There are no habitable/student rooms proposed in the basement.

1.4 Policy and building regulation requirements.

There are no particular building regulations in relation day light / shadow effect standards other then recommendations outlined or referred to in the CIBSE lighting guide 10, BS 8206 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 Project general.

The project is a student accommodation block with an average of 6 student bedrooms and a common kitchen/dining/living space in a typical cluster (apartment).

2.2 Analysis conducted.

In this report the amount of daylight received in the student rooms within the new proposed development have been analysed due to their semi permanent occupation.

2.3 Guideline / 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 Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for day lighting. BS 8206:2008 contains guidance on the minimum recommended levels of interior day lighting.
- CIBSE guide 10 Day light and lighting for buildings.

2.4 Technical analysis.

Calculations were conducted in accordance with the BRE guidelines to determine the average day light factor in a number of selected rooms in dwellings generally in challenging locations typically based at ground floor levels given that these receive the least amount of day light.
Once the ground floor units achieve compliance all other rooms at higher levels subject to maintaining the same glazed area and parameters will achieve compliance as the vertical daylight impact angle will improve increasing the daylight reception typically 0.3%-0.5% per level (3m).
In basic terms the average room day light factor guidelines per BRE report state that the following rooms should have an ADF of at least : living / dining rooms 1.5%, bed room 1% and kitchens 2%.
A further illuminance calculation was carried out (5.2) on an angled (assisted) room on the ground floor showing in excess of an average of 350lx and enough to perform general tasks without the need of artificial lighting.

2.5 Conclusion.

Based on the calculation results we conclude that the habitable/student rooms in the proposed development all have an average day light factor in excess of 2% and are comfortable over and above the BRE recommended average daylight guidelines and therefore receive sufficient day light.

2.6 Mitigation measures / actions.

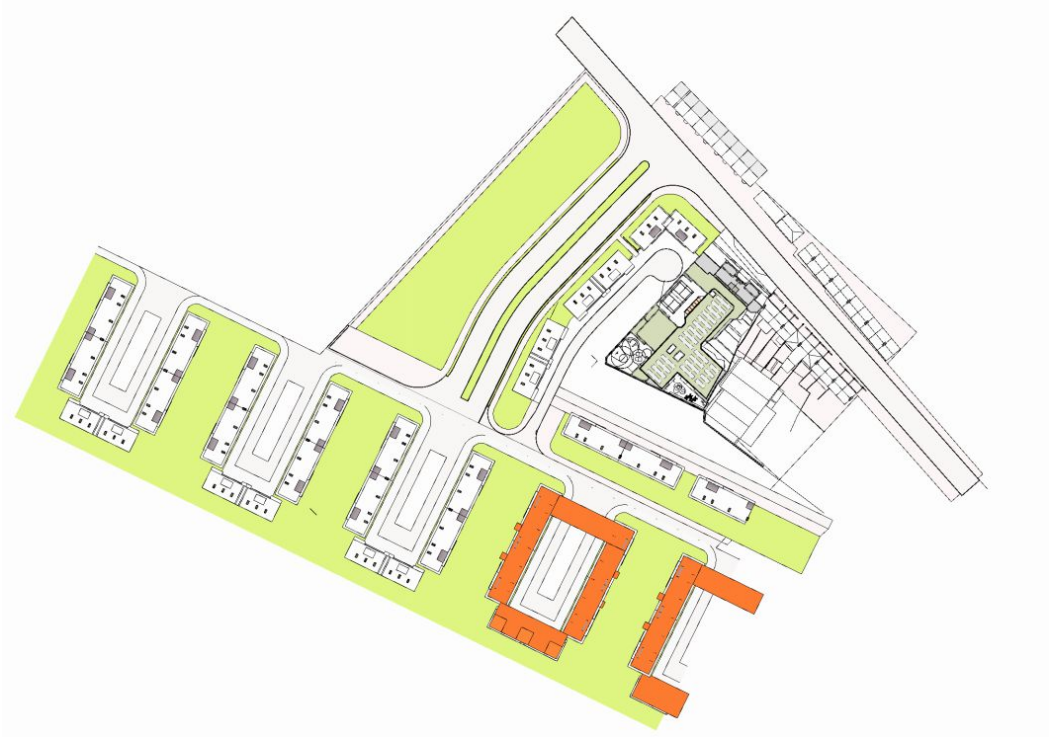
There are no actions or mitigation measures required on the proposed development based on the findings of this report.

3 Geographical overview

3.1 Project site / site location overview.

The site map below is a basic over view of the project location on the South Circular Road with the a) exiting building and b) new proposed building.

Site with existing cinema building



Site with new proposed building

4 Approach and methodology

4.1 General approach.

This report covers the effects of the proposed development on day light reception in neighbouring habitable rooms. Daylight reception is in first instance analysed using the BRE average daylight factor and when issue's arise or a second calculation is warranted a 3D illuminance assessment is carried out.

4.2 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 Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for day lighting.
BS 8206:2008 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 8206 contains guidance on the minimum recommended levels of interior day lighting and introduces recommended day light levels for general buildings.

4.3 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 for achieving suitable levels of daylight.
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.

There are also recommendations with regards to minimum proposed glazed area in facades in relation to the available sky view component angle.
BS 8205 gives guidance on the minimum glazed area with different virtual sky component angles to maintain sufficient daylight reception.

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 4.1

4.4 Day light reception analysis, Average day light factor (ADF).

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 4.2 below represent 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%

4.5 The ADF is calculated.

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-R2)] %

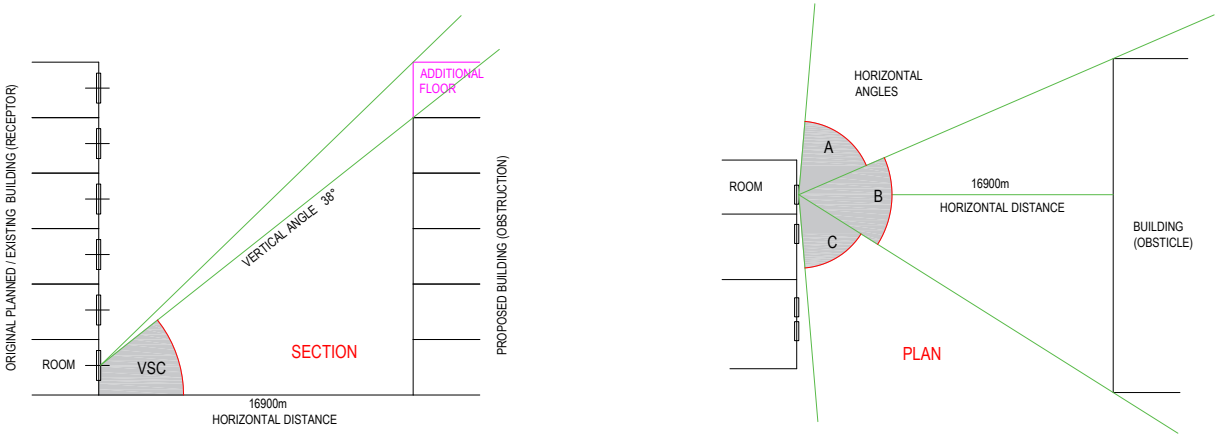
where T is the diffuse visible transmittance of the glazing, including corrections for a maintenance factor.
Aw is the net glazed area of the window (m2). A is the total area of the room surfaces: ceiling, floor, walls and windows (m2). R is their average reflectance of the ceiling, walls and floor surfaces.
q is the angle of visible sky in degrees (VSC).

For T, the overall light transmittance into the room we applied 0.66 in line with the proposed window specification and a 8% maintenance factor.

For R, the average reflectance of the walls, ceiling and floor we have used an overall average of 0.71 representing a 75% very dark floor, 85% light walls and a 95% very light (white) ceiling as specified by the architects.
This can be approved upon by specifying a lighter colour floor surface.

For q, the vertical sky component angle we used to 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 to overall resultant VSC.

The illustration 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.

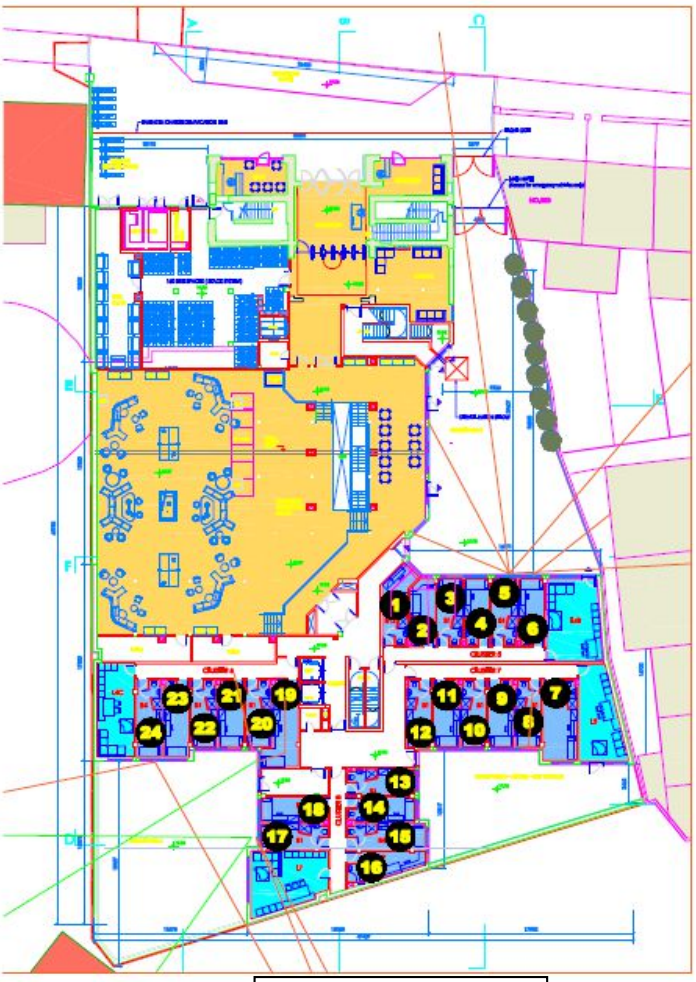


4.6 Basis of room selection.

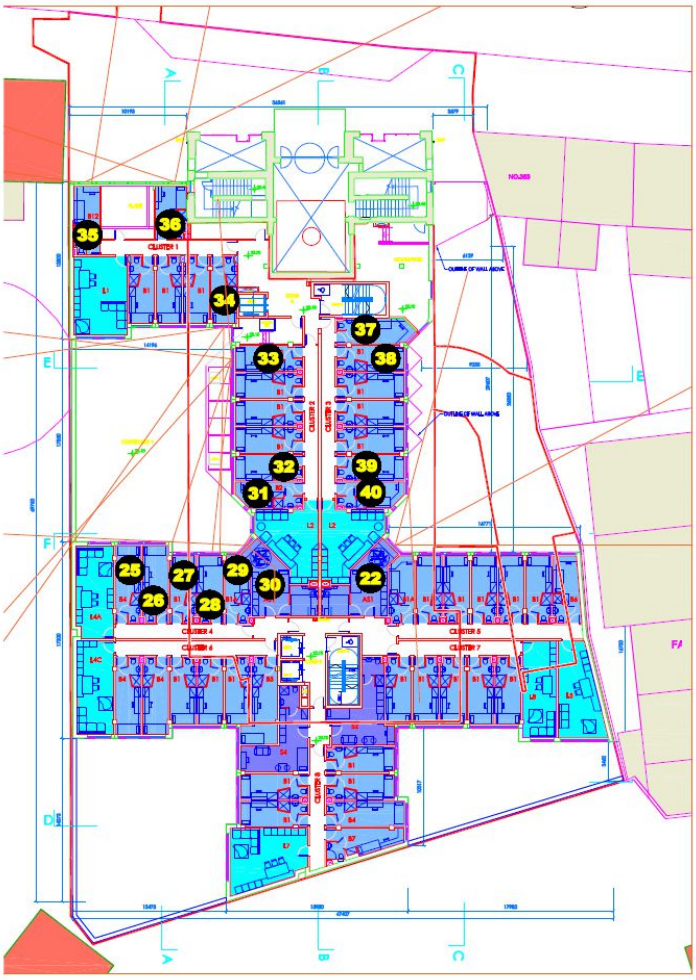
In general the daylight reception assessment initially targets habitable rooms at the lowest levels who are perceived to receive less day light due to the any near day light (large) obstacles.
In the Rialto project all ground floor student rooms have been assessed.
If rooms at the lowest level achieve the target rate then similar rooms at higher levels will also pass the target rate providing they have the same glazed area and other calculation parameters due to the fact that the vertical sky angle will have improved.

4.7 Selected rooms / dwellings location map.

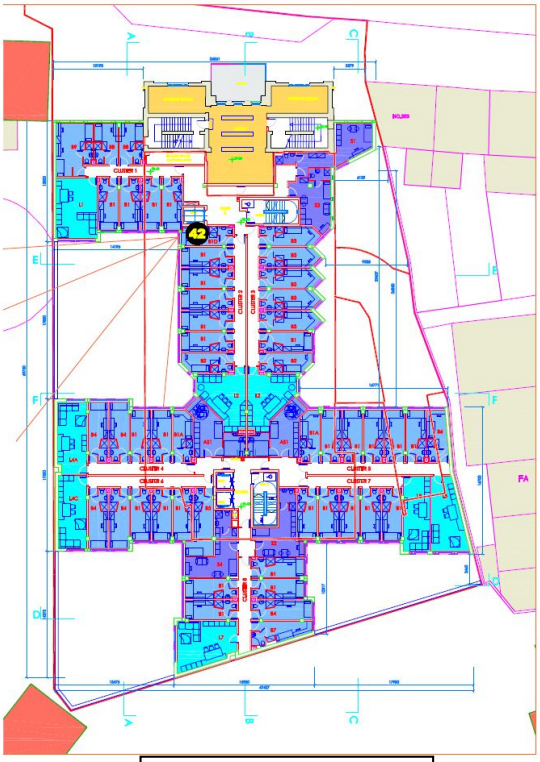
A total of 41 room locations have been selected on the basis that these locations are more daylight challenging and applying the methodology set out in point 4.7.



Ground floor



First floor



Second floor

5 Calculation results

AVERAGE DAY LIGHT RECEPTION ANALYSIS

1

Compliance hierarchy

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

Reflectance R (λ) cover(A)

Ceiling	0.9	95%	Very light
Walls	0.8	85%	Light
Floor	0.2	75%	Very dark

Average day light factor requirements(%)

Bedroom	1.0%	50%
Bedroom-Living	1.5%	75%
Bed-Sit	2.0%	70%
Kitchen	2.0%	75%
Living	1.5%	70%

Rf	Average reflectance	0.71	Glazing ligh emission factor	**0.72**
Em	Overall light emittance	0.66	Em diffusion/dirt/maintenance	**8%**

Room ADF formula = $Em * \sum Aw * \sum V\angle / A * (1 - Rf*Rf)$

Em = Glass light emittance, Aw=Total combined glass area, A=Total of all room surfaces,

V∠ =Total combined vertical light angles at each horizontal angle, Rf=Combined total room surfaces reflectance

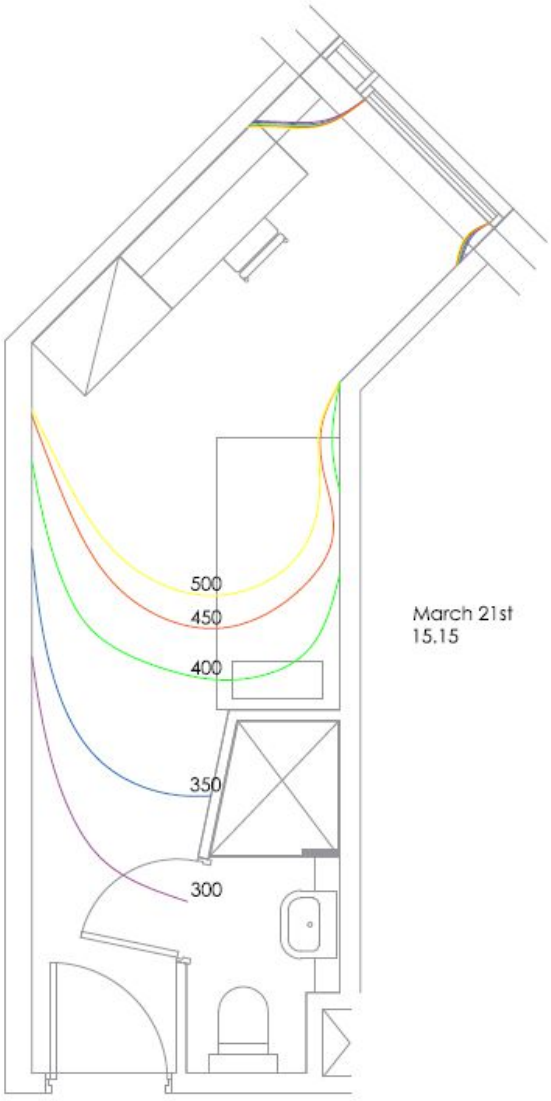
Room depth / with fraction formula (D*W) + (D/H) <= 2 / (1-Rf) Depth/With ratio >= 1 Minium 2.01 Maximum 3.69

Receptor	Location	Unit ID	Level	Room / type	Rf	Hor Sec a Hor ∠°	Vert ∠°	fraction	Hor Sec b Hor ∠°	Vert ∠°	fraction	Hor Sec c Hor ∠°	Vert ∠°	fraction	Hor Sec d Hor ∠°	Vert ∠°	fraction	Σ Hor ∠	Σ VSC	Glass area m2	Habitable Section width m	depth m	height m	Dept/Width	Room ADF %	BRE ADF %
1	Clu5	B12	GF	Bedroom-Living	0.72	45	14	25%	28	13	16%							73	32%	2.93	1.85	5.50	2.5	1.33	2.20	1.50
2	Clu5	B1A	GF	Bedroom-Living	0.72	25	76	14%	51	14	28%	26	13	14%				102	26%	2.25	2.25	4.20	2.5	1.91	2.10	1.50
3	Clu5	B1	GF	Bedroom-Living	0.71	45	69	25%	53	14	29%	32	15	18%				130	24%	2.93	2.25	4.20	2.5	1.91	3.22	1.50
4	Clu5	B1	GF	Bedroom-Living	0.71	45	58	25%	52	14	29%	32	20	18%				129	25%	2.93	2.25	4.20	2.5	1.91	3.33	1.50
5	Clu5	B1	GF	Bedroom-Living	0.71	47	55	26%	48	14	27%	38	25	21%				133	25%	2.93	2.25	4.20	2.5	1.91	3.39	1.50
6	Clu5	B1	GF	Bedroom-Living	0.71	49	50	27%	44	14	24%	40	30	22%				133	25%	2.93	2.25	4.20	2.5	1.91	3.36	1.50
7	Clu7	B1B	GF	Bedroom-Living	0.70	28	32	16%	107	20	59%	30	54	17%				165	26%	2.93	3.00	5.40	2.5	1.62	2.95	1.50
8	Clu7	B1	GF	Bedroom-Living	0.71	96	20	53%	41	58	23%							137	25%	2.93	2.25	4.20	2.5	1.91	3.50	1.50
9	Clu7	B1	GF	Bedroom-Living	0.71	9	22	5%	90	20	50%	49	65	27%				148	23%	2.93	2.25	4.20	2.5	1.91	3.55	1.50
10	Clu7	B1	GF	Bedroom-Living	0.71	17	19	9%	81	19	45%	60	68	33%				158	22%	2.93	2.25	4.20	2.5	1.91	3.61	1.50
11	Clu7	B1	GF	Bedroom-Living	0.71	13	16	7%	78	18	43%	70	74	39%				161	20%	2.93	2.25	4.20	2.5	1.91	3.36	1.50
12	Clu7	B1	GF	Bedroom-Living	0.71	12	12	7%	67	18	37%	12	78	7%				92	27%	2.48	2.25	4.20	2.5	1.91	2.21	1.50
13	Clu8	B1	GF	Bedroom-Living	0.71	63	67	35%	17	14	9%	61	20	34%				141	21%	2.93	2.25	4.20	2.5	1.91	3.06	1.50
14	Clu8	B1	GF	Bedroom-Living	0.71	65	62	36%	24	14	13%	42	20	23%				131	21%	2.93	2.25	4.20	2.5	1.91	2.87	1.50
15	Clu8	B4	GF	Bedroom-Living	0.71	57	58	32%	21	14	12%	67	21	37%				145	23%	2.93	2.25	4.20	2.5	1.91	3.51	1.50
16	Clu8	B7	GF	Bedroom-Living	0.72	60	54	33%	20	14	11%	72	22	40%				152	24%	1.80	2.25	4.20	2.5	1.92	2.32	1.50
17	Clu8	B1	GF	Bedroom-Living	0.71	90	14	50%	50	74	28%							140	23%	2.93	2.25	4.20	2.5	1.91	3.33	1.50
18	Clu8	B1	GF	Bedroom-Living	0.71	78	14	43%	57	78	32%							135	21%	2.48	2.25	4.20	2.5	1.91	2.44	1.50
19	Clu9	B5	GF	Bedroom-Living	0.71	81	11	45%										81	33%	2.93	2.25	5.50	2.5	1.44	2.22	1.50
20	Clu9	B1	GF	Bedroom-Living	0.72	78	11	43%										78	33%	2.25	2.25	4.20	2.5	1.91	2.08	1.50
21	Clu9	B1	GF	Bedroom-Living	0.71	74	11	41%										74	33%	2.93	2.25	4.20	2.5	1.91	2.55	1.50
22	Clu9	B1	GF	Bedroom-Living	0.71	65	11	36%										65	33%	2.93	2.25	4.20	2.5	1.91	2.24	1.50
23	Clu9	B4	GF	Bedroom-Living	0.71	102	11	57%										102	33%	2.93	2.25	4.20	2.5	1.91	3.52	1.50
24	Clu9	B4	GF	Bedroom-Living	0.71	107	11	59%										107	33%	2.93	2.25	4.20	2.5	1.91	3.69	1.50

25	Clu4	B4	FF	Bedroom-Living	0.71	64	9	36%	41	41	23%	55	52	31%				160	25%	2.93	2.25	5.50	2.5	1.44	3.22	1.50
26	Clu4	B4	FF	Bedroom-Living	0.71	58	9	32%	42	41	23%	61	54	34%				161	24%	2.93	2.25	5.50	2.5	1.44	3.11	1.50
27	Clu4	B1	FF	Bedroom-Living	0.71	36	9	20%	35	40	19%	70	62	39%				141	20%	2.93	2.25	4.20	2.5	1.91	2.89	1.50
28	Clu4	B1	FF	Bedroom-Living	0.71	42	8	23%	38	40	21%	53	68	29%				133	21%	2.93	2.25	4.20	2.5	1.91	2.84	1.50
29	Clu4	B1A	FF	Bedroom-Living	0.72	43	8	24%	37	39	21%	50	76	28%				130	20%	2.25	2.25	4.20	2.5	1.91	2.06	1.50
30	Clu4	AS1	FF	Bedroom-Living	0.71	49	8	27%	32	38	18%	48	78	27%				129	21%	3.04	2.25	6.30	2.5	1.25	2.01	1.50
31	Clu2	B2	FF	Bedroom-Living	0.71	52	62	29%	61	8	34%	42	46	23%				155	23%	2.25	2.25	5.50	2.5	1.44	2.23	1.50
32	Clu2	B1	FF	Bedroom-Living	0.71	50	59	28%	63	8	35%	46	52	26%				159	23%	2.93	2.25	4.20	2.5	1.91	3.69	1.50
33	Clu2	B1	FF	Bedroom-Living	0.71	36	43	20%	54	8	30%	39	71	22%				129	23%	2.93	2.25	4.20	2.5	1.91	2.99	1.50
34	Clu1	B1	FF	Bedroom-Living	0.71	34	21	19%	47	8	26%							81	32%	2.93	2.25	5.50	2.5	1.44	2.16	1.50
35	Clu1	B12	FF	Bedroom-Living	0.71	30	53	17%	115	8	64%							145	31%	2.70	2.25	4.20	2.5	1.91	4.24	1.50
36	Clu1	B8	FF	Bedroom-Living	0.71	10	48	6%	83	8	46%							93	33%	4.05	2.75	4.20	2.5	2.04	3.77	1.50
37	Clu3	B3	FF	Bedroom-Living	0.71	18	26	10%	20	5	11%	40	7	22%	35	36	19%	113	30%	2.70	2.25	5.50	2.5	1.44	2.59	1.50
38	Clu3	B1	FF	Bedroom-Living	0.71	48	24	27%	17	5	9%	43	7	24%	35	40	19%	143	29%	2.93	2.25	5.50	2.5	1.44	3.45	1.50
39	Clu3	B1	FF	Bedroom-Living	0.71	70	10	39%	33	7	18%	60	62	33%				163	26%	2.93	2.25	4.20	2.5	1.91	4.37	1.50
40	Clu3	B2	FF	Bedroom-Living	0.72	64	10	36%	34	7	19%	66	75	37%				164	23%	2.25	2.25	4.20	2.5	1.91	3.01	1.50
41	Clu5	AS1	FF	Bedroom-Living	0.71	48	9	27%	28	6	16%							77	34%	3.04	2.25	6.30	2.5	1.25	2.02	1.50
42	Clu2	B1D	SF	Bedroom-Living	0.72	35	36	19%	48	3	27%							83	31%	2.25	2.25	4.20	2.5	1.91	2.05	1.50

5.1 Day light illuminance verification.

To verify the day light reception in the angled rooms a separate 3D illuminance analysis was carried out at 15.15 on March 21st . The room receives an average illuminance in excess of 350lx and more then adequate for the room functions to be performed without the assistance of artificial lighting.



5.2 Conclusion.

From the calculation results we note that all analysed rooms are all above the minimum recommended BRE target of 1.5% with the lowest ADF result being 2.01% and at least 25% above the target range.
We therefore conclude that the day light reception in the student rooms is comfortable in excess of the BRE Site report “Layout and Planning for Daylight and Sunlight” recommendations on day light reception.