



**DKPartnership**

post@dkpartnership.com : E

00 353 (0) 1-813-1930 : T

00 353 (0) 64-664-1686 : T

## **PROPOSED MIXED USE DEVELOPMENT AT CLONGRIFFIN**

### **DAYLIGHT RECEPTION**

#### **PROPOSED RESIDENTIAL NEW UNITS**

**CLONGRIFFIN  
DUBLIN 13**

GERARD GANNON PROPERTIES

**DKP-K00-6061-2P**  
2019-08-09

## Document control

Document ID : **DKP-K00-6061**

Part 1 of 1

| Circular                  | Issue >                           | 1P | 2P |
|---------------------------|-----------------------------------|----|----|
| Clients                   | Gerard Gannon Properties          | x  | x  |
| Architects                | CCK, Wilsons, Downey Architecture | x  | x  |
| Planning consultants      | Downey Planning                   | x  | x  |
| Structural/civil engineer | Waterman-Moylan                   | x  |    |
| Quantity surveyor         | MMP                               | x  |    |

### Issue

|    |            |   |
|----|------------|---|
| 1P | 2018-11-30 | Issue for pre planning  |
| 2P | 2019-08-09 | Added more receptors (dwellings)<br>Increased glazed area in rooms which where previously shown as below the BRE recommendations.<br>Changed room parameters where previously shown to be below BRE recommendations.<br>Change overall site commercial area data. |

### 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   |

---

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

| section                                    | Page |
|--|------|
| 1 Introduction .....                       | 4    |
| 2 Executive summary .....                  | 5    |
| 3 Geographical project overview .....      | 6    |
| 4 Approach and methodology .....           | 7    |
| 5 Calculation results and conclusion ..... | 11   |

### Appendix

|  |        |
|--|--------|
| 1 Example of horizontal plane and vertical plane ADF angles..... | 16, 17 |
|--|--------|



# 1 Introduction

## 1.1 Report purpose.

This report gives information on the effects of the proposed development on daylight reception in the habitable rooms of proposed residential units within the development.

## 1.2 Introduction.

DKPartnership (DKP) have been commissioned by Gerard Gannon Properties to carry out the analysis and report for the proposed development at Clongriffin, Dublin 13.

## 1.3 Development details.

This report covers multiple mixed use apartment blocks located in Clongriffin, Dublin 13 and represents most of the remaining sites to be “filled-in” within the Clongriffin development.

This phase consists of 15 blocks with a total of 1950 residential units and +/- 22,727m<sup>2</sup> of commercial space.

The 15 blocks are applied for in 3 no. separate planning packages, this report covers all of the blocks.

The report therefore is applied in all of the 3 applications.

Table 1.1 below shows the details of the 3 no. planning applications.

| Planning reference | Qty blocks | Block ID                         | No dwellings | Commercial space m2 | Comments |
|--------------------|------------|----------------------------------|--------------|---------------------|----------|
| SHD I              | 9          | 6, 8, 11, 17, 25, 26, 27, 28, 29 | 1030         | 2285                |          |
| SHD II             | 3          | 4, 5, 14                         | 500          | 3125                |          |
| DCC I              | 3          | 3, 13, 15                        | 420          | 17317               |          |

Table 1.1

## 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 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 analysed “Development at Clongriffin, Dublin 13” consists of a total of 15 no. proposed mixed use apartment blocks mainly located in the remaining sites to be filled-in within the overall Clongriffin development.

These blocks had been granted permission previously albeit the new proposed version in most cases proposes a different mix of residential units and quantum of commercial areas.

### 2.2 Analysis conducted.

In this report the amount of daylight received in the habitable rooms in new proposed units within the new proposed development was analysed.

### 2.3 Day light reception and building orientation.

Day light reception is effected by 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. orientation is not relevant to day light reception or daylight reception BRE calculations.

Day light factor analysis is equal to all orientations.

Day light is often confused with sunlight or sunlight energy which is effected by orientation.

### 2.4 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.

### 2.5 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%.

### 2.6 Conclusion.

Based on the calculation results we conclude that the habitable rooms in the proposed development all have average day light factors over and above the BRE guidelines and therefore receive sufficient day light.

We note that the calculations applied for daylight reception are based on conservative parameters i.e. darker room colours and lower glazed area light emittance which, if improved upon an increase the ADF with up to 1.5%.

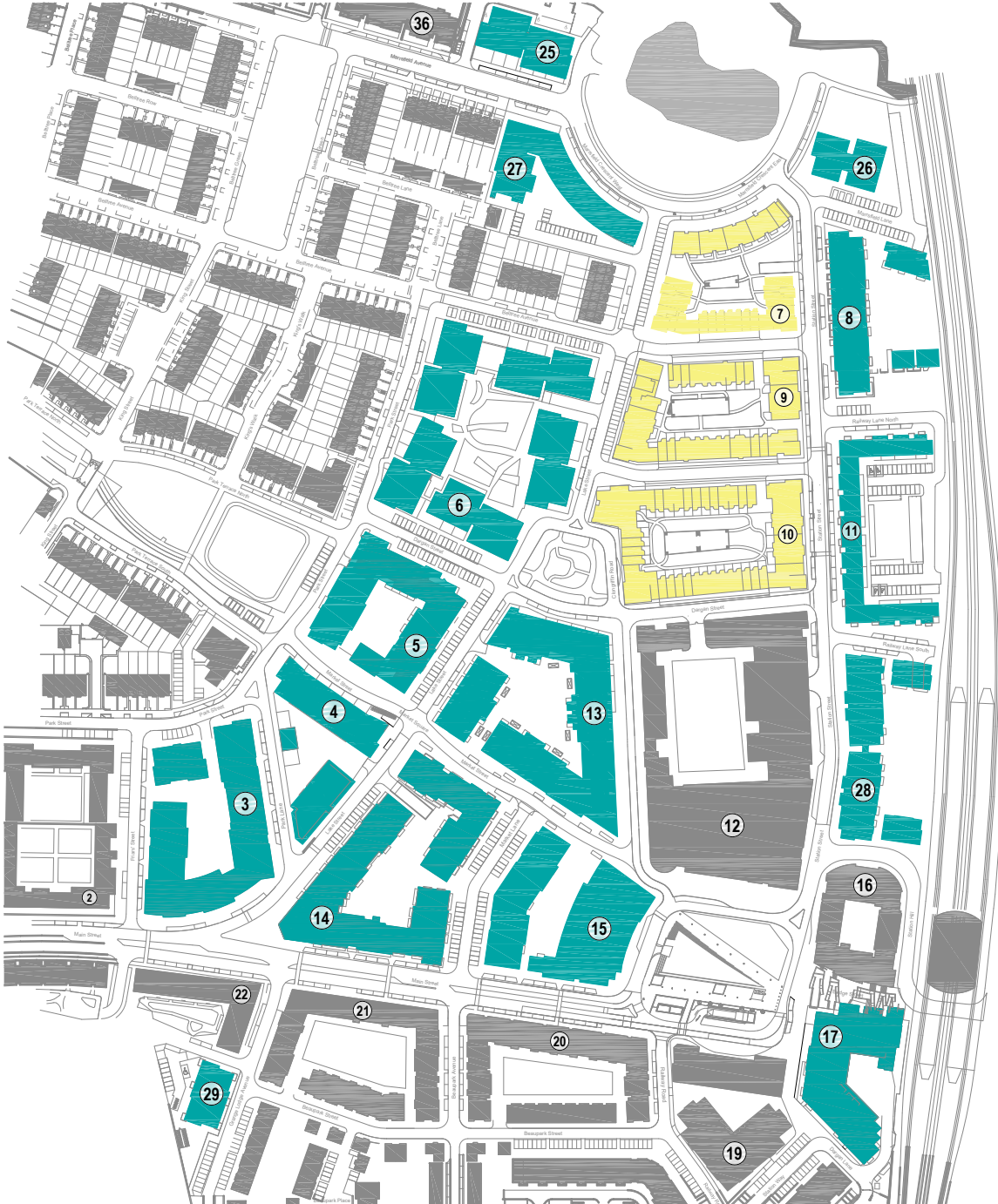
### 2.7 Mitigation measures / actions.

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 overview.

The site map below is a basic over view of the project and location of the apartment blocks. As indicated in section 1.3 the planning application will be applied for in 3 different packages.



#### 3.2 Buildings 7, 9 and 10.

Buildings 7, 9 and 10 are not part of the current application but they have been taken into consideration in the daylight reception calculations based on their original planning permission configuration.

## 4 Approach and methodology

### 4.1 General approach.

This report covers the day light reception in new proposed dwellings within the new proposed development.

The day light reception is applied as the average day light factor in the following rooms ;

1 – Bed rooms within dwellings

2 – Living rooms / dining rooms / kitchens or any combination of these within dwellings.

### 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 shines 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 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 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.

#### 4.4 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.

The table below summarises the criteria used to assess the daylight reception in properties.

Table 4.1 details the BRE assessment criteria for daylight reception.

| 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 8205 gives guidance on the minimum glazed area with different virtual sky component angles to maintain sufficient daylight reception.

Table 4.2 show minimum glazed areas fractions relative to the available sky view angle. (BS 8206)

| Room depth | VSC $\leq 25^\circ$ | VSC $\geq 25^\circ \leq 45^\circ$ | VSC $\geq 45^\circ \leq 65^\circ$ | VSC $\geq 65^\circ$ | 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 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 4.3 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%                      |



#### 4.6 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;

$$df = TAw q / [A ( 1-R_2)] \%$$

where T is the diffuse visible transmittance of the glazing, including corrections for dirt on glass.

$A_w$  is the net glazed area of the window (m<sup>2</sup>). A is the total area of the room surfaces: ceiling, floor, walls and windows (m<sup>2</sup>). 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 a conservative 0.64.

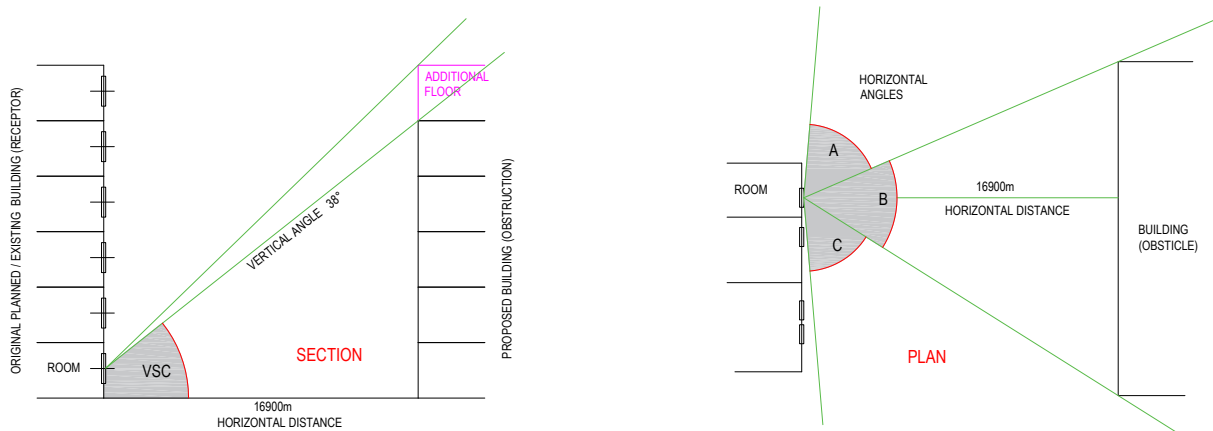
Current triple glazed elements can now be supplied with light emittance in excess of 0.70 effecting / improving the ADF by 0.3% to 0.5%.

For R, the average reflectance of the walls, ceiling and floor we have used an overall average figure 0.64 representing a dark floor, medium dark/light walls and a light ceiling.

R can 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%.

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.



#### 4.7 Basis of room or dwelling selection.

The daylight reception assessment has been targeted to rooms and dwellings who are perceived to receive less day light i.e. basement rooms, ground floor rooms and dwellings/rooms facing close by large obstacles 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 but subject to maintaining the same glazed areas and other parameters.

Also previous rooms/dwellings analysed in report issue 1P showing to be below the recommendation although having been addressed by means of increased glazed area or by distancing the nearest largest object and have also been re-selected.

#### 4.8 Selected rooms / dwellings location map.

A total of 101 room locations have been selected on the basis that these locations are more daylight challenging.



## 5 Calculation results

5.1 The following 4 no. pages are the calculation results of the ADF analysis.

5.2 Sheet no. 1 Blocks 3, 4, 5, 6, 8

| Compliance hierarchy |                         | Reflectance R (λ) cover(A) |      |     | Average day light factor requirements(%) |                |          |
|----------------------|-------------------------|----------------------------|------|-----|--|----------------|----------|
| ☑                    | 0% Over /equal to       | Ceiling                    | 0.80 | 95% | Light                                    | Bed room       | 1% 50%   |
| ☑                    | 5% Within               | Walls                      | 0.70 | 65% | Medium light                             | Kitchen        | 2% 75%   |
| !!                   | 10% Within              | Floor                      | 0.20 | 55% | Very dark                                | Living         | 1.5% 70% |
| x                    | 10% In excess of        |                            |      |     |  | Living-bedroom | 1.5% 65% |
|                      |                         |                            |      |     |  | Living-kitchen | 2% 73%   |
| Rf                   | Average reflectance     | 0.63                       |      |     | Glazing ligh emission factor             | 0.66           |          |
| Em                   | Overall light emittance | 0.64                       |      |     | Em diffusion/dirt/maintenance            | 10%            |          |

Room ADF formula

$$Em * \sum Aw * \sum VL / A * (1 - R * Rf)$$

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

VL =Total combined vertical light angles at each horizontal angle, Rf=Ccombined total room surfaces reflectance

GF=Ground floor

POD=Podium (lowest level)

FF=First floor

SF=Second floor

| Receptor Location | Receptor |       | Rf  | Hor Sec A      |        |         | Hor Sec B |        |         | Hor Sec C |        |         | Hor Sec D |        |         | Σ Hor L | Σ VSC | Glass Room |         |         |         | Room BRE |       |       |      |
|-------------------|----------|-------|-----|----------------|--------|---------|-----------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|-------|------------|---------|---------|---------|----------|-------|-------|------|
|                   | Unit ID  | Level |     | Room / type    | Hor L° | Vert L° | fraction  | Hor L° | Vert L° | fraction  | Hor L° | Vert L° | fraction  | Hor L° | Vert L° |         |       | fraction   | area m2 | width m | depth m | height m | ADF % | BRE % |      |
| 1                 | B3       | 001   | GF  | Living         | 0.63   | 22      | 19        | 12%    | 122     | 25        | 68%    | 36      | 23        | 20%    |         | 0%      | 180   | 28%        | 5.04    | 4.90    | 4.70    | 2.5      | 3.81  | 1.50  |      |
| 2                 | B3       | 104   | FF  | Bed room       | 0.64   | 41      | 47        | 23%    | 85      | 52        | 47%    | 54      | 37        | 30%    |         | 0%      | 180   | 19%        | 2.40    | 3.70    | 3.90    | 2.5      | 1.72  | 1.00  |      |
| 3                 | B3       | 113   | FF  | Living         | 0.63   | 34      | 33        | 19%    | 108     | 42        | 60%    | 38      | 5         | 21%    |         | 0%      | 180   | 24%        | 6.00    | 5.10    | 5.90    | 2.5      | 3.20  | 1.50  |      |
| 4                 | B4       | 001   | GF  | Bed room       | 0.65   | 60      | 31        | 33%    | 57      | 51        | 32%    | 63      | 27        | 35%    |         | 0%      | 180   | 23%        | 1.20    | 2.00    | 3.40    | 2.5      | 1.81  | 1.00  |      |
| 5                 | B4       | 109   | FF  | Bed room       | 0.64   | 50      | 26        | 28%    | 62      | 51        | 34%    | 68      | 22        | 38%    |         | 0%      | 180   | 24%        | 1.90    | 3.20    | 3.50    | 2.5      | 2.15  | 1.00  |      |
| 6                 | B4       | 104   | FF  | Bed room       | 0.64   | 24      | 22        | 13%    | 140     | 45        | 78%    | 16      | 12        | 9%     |         | 0%      | 180   | 22%        | 1.90    | 3.20    | 4.00    | 2.5      | 1.74  | 1.00  |      |
| 7                 | B5       | 007   | GF  | Bed room       | 0.64   | 59      | 35        | 33%    | 82      | 41        | 46%    | 39      | 19        | 22%    |         | 0%      | 180   | 24%        | 1.90    | 3.10    | 4.00    | 2.5      | 1.94  | 1.00  |      |
| 8                 | B5       | 112   | POD | Bed room       | 0.64   | 96      | 70        | 53%    | 73      | 19        | 41%    | 11      | 70        | 6%     |         | 0%      | 180   | 17%        | 1.90    | 3.40    | 4.20    | 2.5      | 1.28  | 1.00  |      |
| 9                 | B5       | 102   | POD | Bed room       | 0.64   | 69      | 71        | 38%    | 105     | 23        | 58%    | 6       | 68        | 3%     |         | 0%      | 180   | 20%        | 1.90    | 3.40    | 4.30    | 2.5      | 1.45  | 1.00  |      |
| 10                | B6       | 007   | GF  | Bed room       | 0.64   | 78      | 75        | 43%    | 32      | 62        | 18%    | 70      | 22        | 39%    |         | 0%      | 180   | 16%        | 2.28    | 2.80    | 4.30    | 2.5      | 1.61  | 1.00  |      |
| 11                | B6       | 007   | GF  | Bed room       | 0.64   | 57      | 75        | 32%    | 28      | 62        | 16%    | 95      | 21        | 53%    |         | 0%      | 180   | 19%        | 2.58    | 2.80    | 4.20    | 2.5      | 2.22  | 1.00  |      |
| 12                | B6       | 007   | GF  | Living         | 0.63   | 135     | 28        | 75%    | 45      | 60        | 25%    |         |           | 0%     |         | 0%      | 180   | 23%        | 7.68    | 3.90    | 7.30    | 2.5      | 3.93  | 1.50  |      |
| 13                | B6       | 115   | POD | Bed room       | 0.64   | 49      | 29        | 27%    | 74      | 65        | 41%    | 42      | 42        | 23%    | 15      | 44      | 8%    | 180        | 18%     | 1.68    | 2.80    | 4.30     | 2.5   | 1.31  | 1.00 |
| 14                | B6       | 115   | POD | Bed room       | 0.64   | 16      | 53        | 9%     | 31      | 17        | 17%    | 94      | 62        | 52%    | 39      | 26      | 22%   | 180        | 19%     | 1.68    | 2.80    | 4.20     | 2.5   | 1.41  | 1.00 |
| 15                | B6       | 115   | POD | Living-kitchen | 0.63   | 68      | 74        | 38%    | 29      | 17        | 16%    | 40      | 16        | 22%    | 43      | 49      | 24%   | 180        | 19%     | 4.80    | 3.70    | 7.10     | 2.5   | 2.14  | 2.00 |
| 16                | B6       | 225   | POD | Living-kitchen | 0.63   | 68      | 68        | 38%    | 29      | 13        | 16%    | 40      | 34        | 22%    | 43      | 40      | 24%   | 180        | 19%     | 4.80    | 3.70    | 7.10     | 2.5   | 2.19  | 2.00 |
| 17                | B6       | 111   | POD | Living-kitchen | 0.63   | 50      | 74        | 28%    | 28      | 27        | 16%    | 66      | 46        | 37%    | 36      | 26      | 20%   | 180        | 18%     | 4.48    | 3.30    | 7.10     | 2.5   | 2.12  | 2.00 |
| 18                | B6       | 111   | POD | Bed room       | 0.64   | 42      | 17        | 23%    | 30      | 46        | 17%    | 62      | 22        | 34%    | 46      | 62      | 26%   | 180        | 23%     | 1.68    | 3.10    | 5.10     | 2.5   | 1.40  | 1.00 |
| 19                | B6       | 112   | POD | Bed room       | 0.64   | 54      | 26        | 30%    | 73      | 53        | 41%    | 53      | 26        | 29%    |         | 0%      | 180   | 23%        | 1.68    | 2.80    | 4.20    | 2.5      | 1.69  | 1.00  |      |
| 20                | B6       | 112   | POD | Bed room       | 0.64   | 47      | 26        | 26%    | 77      | 53        | 43%    | 56      | 26        | 31%    |         | 0%      | 180   | 22%        | 1.68    | 2.82    | 4.30    | 2.5      | 1.63  | 1.00  |      |
| 21                | B6       | 112   | POD | Living-kitchen | 0.63   | 46      | 83        | 26%    | 60      | 40        | 33%    | 74      | 28        | 41%    |         | 0%      | 180   | 19%        | 6.48    | 3.80    | 7.30    | 2.5      | 2.76  | 2.00  |      |
| 22                | B6       | 109   | POD | Bed room       | 0.64   | 68      | 45        | 38%    | 78      | 29        | 43%    | 33      | 35        | 18%    |         | 0%      | 179   | 23%        | 1.90    | 3.20    | 4.20    | 2.5      | 1.76  | 1.00  |      |
| 23                | B8       | 002   | GF  | Bed room       | 0.64   | 40      | 21        | 22%    | 51      | 11        | 28%    | 34      | 75        | 19%    |         | 0%      | 125   | 25%        | 1.90    | 2.80    | 4.80    | 2.5      | 1.31  | 1.00  |      |
| 24                | B8       | 101   | FF  | Kitchen        | 0.63   | 69      | 38        | 38%    | 41      | 49        | 23%    | 70      | 47        | 39%    |         | 0%      | 180   | 20%        | 6.00    | 3.70    | 8.70    | 2.5      | 2.34  | 2.00  |      |
| 25                | B8       | 116   | FF  | Bed room       | 0.64   | 46      | 43        | 26%    | 54      | 52        | 30%    | 80      | 36        | 44%    |         | 0%      | 180   | 20%        | 1.90    | 3.00    | 3.70    | 2.5      | 1.80  | 1.00  |      |



5.3 Blocks 11, 13, 14

| Compliance hierarchy                |                         | Reflectance R (λ) cover(A) |      |     | Average day light factor requirements(%) |                |          |
|-------------------------------------|-------------------------|----------------------------|------|-----|--|----------------|----------|
| <input checked="" type="checkbox"/> | 0% Over /equal to       | Ceiling                    | 0.80 | 95% | Light                                    | Bed room       | 1% 50%   |
| <input checked="" type="checkbox"/> | 5% Within               | Walls                      | 0.70 | 65% | Medium light                             | Kitchen        | 2% 75%   |
| !!                                  | 10% Within              | Floor                      | 0.20 | 55% | Very dark                                | Living         | 1.5% 70% |
| x                                   | 10% In excess of        |                            |      |     |  | Living-bedroom | 1.5% 65% |
|                                     |                         |                            |      |     |  | Living-kitchen | 2% 73%   |
| Rf                                  | Average reflectance     | 0.63                       |      |     | Glazing ligh emission factor             | 0.66           |          |
| Em                                  | Overall light emittance | 0.64                       |      |     | Em diffusion/dirt/maintenance            | 10%            |          |

Room ADF formula

$$Em * \sum Aw * \sum VL / A * (1 - Rf * Rf)$$

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

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

GF=Ground floor

POD=Podium (lowest level)

FF=First floor

SF=Second floor

| Receptor Location | Receptor |       | Rf | Hor Sec A      |        |         | Hor Sec B |        |         | Hor Sec C |        |         | Hor Sec D |        |         | Σ Hor L | Σ VSC | Glass area m2 | Room     |         |         |          | Room BRE |       |      |
|-------------------|----------|-------|----|----------------|--------|---------|-----------|--------|---------|-----------|--------|---------|-----------|--------|---------|---------|-------|---------------|----------|---------|---------|----------|----------|-------|------|
|                   | Unit ID  | Level |    | Room / type    | Hor L° | Vert L° | fraction  | Hor L° | Vert L° | fraction  | Hor L° | Vert L° | fraction  | Hor L° | Vert L° |         |       |               | fraction | width m | depth m | height m | ADF %    | ADF % |      |
| 26                | B11      | 012   | GF | Bed room       | 0.64   | 73      | 83        | 41%    | 49      | 26        | 27%    | 58      | 43        | 32%    | 0%      | 180     | 15%   | 1.90          | 3.90     | 3.50    | 2.5     | 1.16     | 1.00     |       |      |
| 27                | B11      | 015   | GF | Living         | 0.63   | 45      | 25        | 25%    | 94      | 43        | 52%    | 39      | 38        | 22%    | 0%      | 178     | 22%   | 6.00          | 8.00     | 3.60    | 2.5     | 2.91     | 1.50     |       |      |
| 28                | B11      | 008   | GF | Living         | 0.62   | 47      | 37        | 26%    | 80      | 44        | 44%    | 53      | 26        | 29%    | 0%      | 180     | 23%   | 4.56          | 7.40     | 5.40    | 2.5     | 1.79     | 1.50     |       |      |
| 29                | B13      | 001   | GF | Bed room       | 0.64   | 101     | 38        | 56%    | 44      | 60        | 24%    | 35      | 44        | 19%    | 0%      | 180     | 19%   | 1.90          | 3.20     | 3.60    | 2.5     | 1.68     | 1.00     |       |      |
| 30                | B13      | 0101  | FF | Bed room       | 0.64   | 40      | 53        | 22%    | 86      | 54        | 48%    | 55      | 45        | 31%    | 0%      | 181     | 17%   | 1.90          | 2.70     | 4.20    | 2.5     | 1.45     | 1.00     |       |      |
| 31                | B13      | 0121  | FF | Bed room       | 0.64   | 10      | 44        | 6%     | 91      | 20        | 51%    | 79      | 62        | 44%    | 0%      | 180     | 21%   | 1.90          | 3.00     | 4.30    | 2.5     | 1.69     | 1.00     |       |      |
| 32                | B14      | 016   | GF | Bed room       | 0.64   | 21      | 57        | 12%    | 105     | 66        | 58%    | 53      | 45        | 29%    | 0%      | 179     | 14%   | 3.00          | 4.90     | 2.80    | 2.5     | 1.56     | 1.00     |       |      |
| 33                | B14      | 003   | GF | Living         | 0.63   | 64      | 36        | 36%    | 59      | 43        | 33%    | 57      | 40        | 32%    | 0%      | 180     | 21%   | 6.00          | 3.90     | 6.10    | 2.5     | 3.34     | 1.50     |       |      |
| 34                | B14      | 0127  | FF | Bed room       | 0.64   | 83      | 79        | 46%    | 26      | 18        | 14%    | 71      | 38        | 39%    | 0%      | 180     | 16%   | 1.90          | 2.80     | 4.00    | 2.5     | 1.35     | 1.00     |       |      |
| 35                | B14      | 0120  | FF | Living-bedroom | 0.63   | 70      | 64        | 39%    | 43      | 16        | 24%    | 67      | 60        | 37%    | 0%      | 180     | 17%   | 3.70          | 4.20     | 5.70    | 2.5     | 1.61     | 1.50     |       |      |
| 36                | B14      | 0139  | FF | Living-bedroom | 0.62   | 70      | 60        | 39%    | 104     | 22        | 58%    | 6       | 14        | 3%     | 0%      | 180     | 23%   | 4.00          | 5.10     | 7.10    | 2.5     | 1.71     | 1.50     |       |      |
| 37                | B14      | 012   | GF | Bed room       | 0.64   | 37      | 67        | 21%    | 28      | 19        | 16%    | 67      | 29        | 37%    | 0%      | 132     | 22%   | 1.80          | 4.50     | 2.80    | 2.5     | 1.24     | 1.00     |       |      |
| 38                | B14      | 128   | FF | Bed room       | 0.64   | 75      | 69        | 42%    | 24      | 13        | 13%    | 81      | 60        | 45%    | 0%      | 180     | 14%   | 1.90          | 3.60     | 3.60    | 2.5     | 1.10     | 1.00     |       |      |
| 39                | B14      | 002A  | GF | Bed room       | 0.64   | 67      | 31        | 37%    | 57      | 46        | 32%    | 56      | 27        | 31%    | 0%      | 180     | 24%   | 2.04          | 3.50     | 3.50    | 2.5     | 2.10     | 1.00     |       |      |
| 40                | B14      | 003A  | GF | Living-kitchen | 0.63   | 56      | 22        | 31%    | 77      | 58        | 43%    | 47      | 22        | 26%    | 0%      | 180     | 22%   | 5.40          | 3.90     | 6.10    | 2.5     | 3.14     | 2.00     |       |      |
| 41                | B14      | 003A  | GF | Bed room       | 0.64   | 82      | 22        | 46%    | 58      | 58        | 32%    | 40      | 22        | 22%    | 0%      | 180     | 24%   | 2.04          | 3.60     | 3.20    | 2.5     | 2.23     | 1.00     |       |      |
| 42                | B14      | 005A  | GF | Living-kitchen | 0.63   | 36      | 61        | 20%    | 38      | 41        | 21%    | 49      | 29        | 27%    | 47      | 21      | 26%   | 170           | 23%      | 5.40    | 5.10    | 5.90     | 2.5      | 2.55  | 2.00 |
| 43                | B14      | 006A  | GF | Living-kitchen | 0.62   | 68      | 77        | 38%    | 69      | 20        | 38%    | 37      | 22        | 21%    | 6       | 66      | 3%    | 180           | 20%      | 5.40    | 5.70    | 5.90     | 2.5      | 2.14  | 2.00 |
| 44                | B14      | 012A  | GF | Bed room       | 0.64   | 37      | 84        | 21%    | 31      | 22        | 17%    | 67      | 20        | 37%    | 45      | 58      | 25%   | 180           | 20%      | 1.92    | 2.80    | 5.10     | 2.5      | 1.46  | 1.00 |
| 45                | B14      | 012A  | GF | Bed room       | 0.64   | 59      | 31        | 33%    | 47      | 23        | 26%    | 74      | 59        | 41%    | 0%      | 180     | 21%   | 2.04          | 2.80     | 5.10    | 2.5     | 1.64     | 1.00     |       |      |
| 46                | B14      | 012A  | GF | Living-kitchen | 0.63   | 63      | 50        | 35%    | 46      | 21        | 26%    | 71      | 27        | 39%    | 0%      | 180     | 24%   | 5.40          | 4.20     | 7.80    | 2.5     | 2.60     | 2.00     |       |      |
| 47                | B14      | 017A  | GF | Bed room       | 0.64   | 124     | 37        | 69%    | 20      | 27        | 11%    | 36      | 27        | 20%    | 0%      | 180     | 24%   | 2.04          | 2.80     | 4.70    | 2.5     | 1.98     | 1.00     |       |      |
| 48                | B14      | 017A  | GF | Bed room       | 0.64   | 28      | 27        | 16%    | 97      | 37        | 54%    | 55      | 27        | 31%    | 0%      | 180     | 24%   | 2.04          | 2.80     | 4.70    | 2.5     | 2.03     | 1.00     |       |      |
| 49                | B14      | 017A  | GF | Living-kitchen | 0.63   | 63      | 27        | 35%    | 91      | 37        | 51%    | 26      | 27        | 14%    | 0%      | 180     | 25%   | 5.40          | 4.60     | 6.90    | 2.5     | 2.76     | 2.00     |       |      |
| 50                | B14      | 139B  | FF | Living-bedroom | 0.62   | 65      | 58        | 36%    | 29      | 40        | 16%    | 86      | 25        | 48%    | 0%      | 180     | 22%   | 4.60          | 5.12     | 7.10    | 2.5     | 1.86     | 1.50     |       |      |



5.4 Blocks 14, 15, 17,

| Compliance hierarchy |                         | Reflectance R (λ) cover(A) |      |     | Average day light factor requirements(%) |                |          |
|----------------------|-------------------------|----------------------------|------|-----|--|----------------|----------|
| ☑                    | 0% Over /equal to       | Ceiling                    | 0.80 | 95% | Light                                    | Bed room       | 1% 50%   |
| ☑                    | 5% Within               | Walls                      | 0.70 | 65% | Medium light                             | Kitchen        | 2% 75%   |
| !!                   | 10% Within              | Floor                      | 0.20 | 55% | Very dark                                | Living         | 1.5% 70% |
| x                    | 10% In excess of        |                            |      |     |  | Living-bedroom | 1.5% 65% |
|                      |                         |                            |      |     |  | Living-kitchen | 2% 73%   |
| Rf                   | Average reflectance     | 0.63                       |      |     | Glazing ligh emission factor             | 0.66           |          |
| Em                   | Overall light emittance | 0.64                       |      |     | Em diffusion/dirt/maintenance            | 10%            |          |

Room ADF formula

$$Em * \sum Aw * \sum VL / A * (1 - RfRf)$$

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

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

GF=Ground floor

POD=Podium (lowest level)

FF=First floor

SF=Second floor

| Receptor Location | Unit ID | Level | Receptor Room / type | Rf             | Hor Sec A |         |          | Hor Sec B |         |          | Hor Sec C |         |          | Hor Sec D |         |          | Σ Hor L | Σ VSC | Glass area m2 | Room width m | Room depth m | Room height m | Room ADF % | BRE ADF % |      |
|-------------------|---------|-------|----------------------|----------------|-----------|---------|----------|-----------|---------|----------|-----------|---------|----------|-----------|---------|----------|---------|-------|---------------|--------------|--------------|---------------|------------|-----------|------|
|                   |         |       |                      |                | Hor L°    | Vert L° | fraction | Hor L°    | Vert L° | fraction | Hor L°    | Vert L° | fraction | Hor L°    | Vert L° | fraction |         |       |               |              |              |               |            |           |      |
| 51                | B14     | 118B  | GF                   | Living-bedroom | 0.64      | 64      | 49       | 36%       | 41      | 22       | 23%       | 30      | 19       | 17%       | 45      | 78       | 25%     | 180   | 19%           | 3.40         | 2.60         | 5.90          | 2.5        | 2.29      | 1.50 |
| 52                | B14     | 119B  | GF                   | Living-bedroom | 0.63      | 74      | 55       | 41%       | 35      | 19       | 19%       | 15      | 17       | 8%        | 56      | 40       | 31%     | 180   | 21%           | 3.40         | 4.10         | 5.40          | 2.5        | 2.00      | 1.50 |
| 53                | B14     | 120B  | GF                   | Living-bedroom | 0.63      | 80      | 61       | 44%       | 33      | 17       | 18%       | 16      | 12       | 9%        | 51      | 46       | 28%     | 180   | 19%           | 3.40         | 4.30         | 5.70          | 2.5        | 1.70      | 1.50 |
| 54                | B14     | 127B  | GF                   | Bed room       | 0.64      | 67      | 78       | 37%       | 28      | 14       | 16%       | 64      | 49       | 36%       | 21      | 78       | 12%     | 180   | 14%           | 2.04         | 2.80         | 4.90          | 2.5        | 1.10      | 1.00 |
| 55                | B14     | 127B  | FF                   | Bed room       | 0.64      | 53      | 74       | 29%       | 19      | 14       | 11%       | 26      | 22       | 14%       | 82      | 48       | 46%     | 180   | 18%           | 3.00         | 2.80         | 4.10          | 2.5        | 2.41      | 1.00 |
| 56                | B14     | 101B  | FF                   | Bed room       | 0.64      | 53      | 69       | 29%       | 19      | 10       | 11%       | 26      | 17       | 14%       | 82      | 40       | 46%     | 180   | 20%           | 3.00         | 2.80         | 4.10          | 2.5        | 2.77      | 1.00 |
| 57                | B14     | 136B  | GF                   | Bed room       | 0.64      | 53      | 59       | 29%       | 19      | 7        | 11%       | 26      | 11       | 14%       | 82      | 29       | 46%     | 180   | 24%           | 3.00         | 2.80         | 4.10          | 2.5        | 3.30      | 1.00 |
| 58                | B14     | 171B  | GF                   | Bed room       | 0.64      | 53      | 39       | 29%       | 19      | 3        | 11%       | 26      | 6        | 14%       | 82      | 15       | 46%     | 180   | 30%           | 0.75         | 2.80         | 4.10          | 2.5        | 1.03      | 1.00 |
| 59                | B15     | 003   | GF                   | Living         | 0.63      | 46      | 28       | 26%       | 118     | 35       | 66%       | 16      | 21       | 9%        |         | 0%       | 180     | 25%   | 4.00          | 8.00         | 3.60         | 2.5           | 2.18       | 1.50      |      |
| 60                | B15     | 111   | POD                  | Bed room       | 0.64      | 41      | 26       | 23%       | 81      | 74       | 45%       | 58      | 28       | 32%       |         | 0%       | 180     | 18%   | 1.90          | 3.70         | 3.10         | 2.5           | 1.54       | 1.00      |      |
| 61                | B15     | 102   | POD                  | Bed room       | 0.64      | 92      | 21       | 51%       | 19      | 18       | 11%       | 69      | 27       | 38%       |         | 0%       | 180     | 28%   | 1.90          | 3.10         | 4.70         | 2.5           | 2.06       | 1.00      |      |
| 62                | B17     | 002   | GF                   | Bed room       | 0.64      | 42      | 52       | 23%       | 88      | 40       | 49%       | 49      | 32       | 27%       |         | 0%       | 179     | 21%   | 1.90          | 3.20         | 3.60         | 2.5           | 1.81       | 1.00      |      |
| 63                | B17     | 009   | GF                   | Bed room       | 0.64      | 56      | 29       | 31%       | 61      | 60       | 34%       | 63      | 25       | 35%       |         | 0%       | 180     | 22%   | 1.90          | 5.20         | 2.80         | 2.5           | 1.57       | 1.00      |      |
| 64                | B17     | 003   | GF                   | Bed room       | 0.64      | 95      | 61       | 53%       | 81      | 54       | 45%       |         |          | 0%        |         | 0%       | 176     | 14%   | 1.90          | 3.70         | 3.40         | 2.5           | 1.09       | 1.00      |      |
| 65                | B17     | 001   | GF                   | Bed room       | 0.64      | 74      | 71       | 41%       | 62      | 18       | 34%       | 43      | 64       | 24%       |         | 0%       | 179     | 17%   | 1.90          | 3.20         | 3.80         | 2.5           | 1.38       | 1.00      |      |
| 66                | B17     | 001   | GF                   | Living-kitchen | 0.63      | 35      | 28       | 19%       | 64      | 52       | 36%       | 81      | 37       | 45%       |         | 0%       | 180     | 21%   | 7.13          | 3.90         | 10.0         | 2.5           | 2.55       | 2.00      |      |
| 67                | B17     | 001B  | GF                   | Bed room       | 0.64      | 66      | 31       | 37%       | 38      | 53       | 21%       | 76      | 32       | 42%       |         | 0%       | 180     | 23%   | 4.00          | 2.80         | 5.00         | 2.5           | 3.54       | 1.00      |      |
| 68                | B17     | 002   | GF                   | Living-kitchen | 0.63      | 37      | 27       | 21%       | 73      | 53       | 41%       | 62      | 46       | 34%       | 8       | 37       | 4%      | 180   | 19%           | 7.13         | 5.50         | 4.80          | 2.5        | 3.33      | 2.00 |
| 69                | B17     | 002B  | GF                   | Bed room       | 0.64      | 45      | 28       | 25%       | 79      | 48       | 44%       | 52      | 41       | 29%       | 4       | 27       | 2%      | 180   | 21%           | 4.00         | 2.90         | 4.00          | 2.5        | 3.78      | 1.00 |
| 70                | B17     | 002B  | GF                   | Bed room       | 0.64      | 53      | 26       | 29%       | 82      | 78       | 46%       | 45      | 25       | 25%       |         | 0%       | 180     | 17%   | 3.60          | 3.30         | 3.60         | 2.5           | 2.76       | 1.00      |      |
| 71                | B17     | 214   | FF                   | Living-kitchen | 0.63      | 35      | 23       | 19%       | 64      | 46       | 36%       | 81      | 31       | 45%       |         | 0%       | 180     | 23%   | 6.60          | 3.80         | 9.30         | 2.5           | 2.87       | 2.00      |      |
| 72                | B17     | 228   | SF                   | Living-kitchen | 0.63      | 27      | 46       | 15%       | 82      | 21       | 46%       | 71      | 67       | 39%       |         | 0%       | 180     | 20%   | 5.80          | 3.70         | 7.50         | 2.5           | 2.64       | 2.00      |      |
| 73                | B17     | 232   | SF                   | Living-kitchen | 0.63      | 61      | 41       | 34%       | 41      | 21       | 23%       | 78      | 70       | 43%       |         | 0%       | 180     | 18%   | 5.80          | 3.40         | 7.50         | 2.5           | 2.43       | 2.00      |      |
| 74                | B17     | 232   | SF                   | Bed room       | 0.64      | 19      | 77       | 11%       | 56      | 13       | 31%       | 105     | 37       | 58%       |         | 0%       | 180     | 24%   | 2.64          | 3.80         | 3.40         | 2.5           | 2.65       | 1.00      |      |
| 75                | B17     | 233   | SF                   | Bed room       | 0.64      | 96      | 75       | 53%       | 17      | 50       | 9%        | 7       | 9        | 4%        | 60      | 87       | 33%     | 180   | 7%            | 3.63         | 4.20         | 3.20          | 2.5        | 1.00      | 1.00 |



5.5 Blocks 17, 25, 26, 27, 28, 29, 16, 36

| Compliance hierarchy |                         | Reflectance R (λ) cover(A) |      |     | Average day light factor requirements(%) |                |             |
|----------------------|-------------------------|----------------------------|------|-----|--|----------------|-------------|
| ☑                    | 0% Over /equal to       | Ceiling                    | 0.80 | 95% | Light                                    | Bed room       | 1% 50%      |
| ☑                    | 5% Within               | Walls                      | 0.70 | 65% | Medium light                             | Kitchen        | 2% 75%      |
| !!                   | 10% Within              | Floor                      | 0.20 | 55% | Very dark                                | Living         | 1.5% 70%    |
| ✘                    | 10% In excess of        |                            |      |     |  | Living-bedroom | 1.5% 65%    |
|                      |                         |                            |      |     |  | Living-kitchen | 2% 73%      |
| Rf                   | Average reflectance     |                            | 0.63 |     | Glazing ligh emission factor             |                | <b>0.66</b> |
| Em                   | Overall light emittance |                            | 0.64 |     | Em diffusion/dirt/maintenance            |                | <b>10%</b>  |

Room ADF formula

$$Em * \sum Aw * \sum VL / A * (1 - Rf * Rf)$$

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

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

GF=Ground floor

POD=Podium (lowest level)

FF=First floor

SF=Second floor

| Receptor Location | Receptor |       | Rf  | Hor Sec A      |       |        | Hor Sec B |       |        | Hor Sec C |       |        | Hor Sec D |       |        | Σ Hor ∟ | Σ V∟C | Glass Room |         |         |         | Room BRE |       |       |      |
|-------------------|----------|-------|-----|----------------|-------|--------|-----------|-------|--------|-----------|-------|--------|-----------|-------|--------|---------|-------|------------|---------|---------|---------|----------|-------|-------|------|
|                   | Unit ID  | Level |     | Room / type    | Hor ∟ | Vert ∟ | fraction  | Hor ∟ | Vert ∟ | fraction  | Hor ∟ | Vert ∟ | fraction  | Hor ∟ | Vert ∟ |         |       | fraction   | area m2 | width m | depth m | height m | ADF % | ADF % |      |
| 76                | B17      | 233   | SF  | Bed room       | 0.64  | 94     | 80        | 52%   | 18     | 47        | 10%   | 27     | 11        | 15%   | 49     | 85      | 27%   | 188        | 10%     | 2.64    | 4.20    | 3.20     | 2.5   | 1.04  | 1.00 |
| 77                | B17      | 233   | TF  | Bed room       | 0.64  | 59     | 87        | 33%   | 57     | 12        | 32%   | 64     | 59        | 36%   |        | 0%      | 180   | 16%        | 2.64    | 3.50    | 3.30    | 2.5      | 1.88  | 1.00  |      |
| 78                | B17      | 357   | TF  | Bed room       | 0.64  | 96     | 74        | 53%   | 17     | 41        | 9%    | 7      | 8         | 4%    | 60     | 87      | 33%   | 180        | 8%      | 3.52    | 3.50    | 3.30     | 2.5   | 1.18  | 1.00 |
| 79                | B17      | 382   | GF  | Bed room       | 0.64  | 96     | 73        | 53%   | 17     | 36        | 9%    | 7      | 7         | 4%    | 60     | 86      | 33%   | 180        | 8%      | 3.52    | 3.50    | 3.30     | 2.5   | 1.28  | 1.00 |
| 80                | B25      | 001   | GF  | Kitchen        | 0.64  | 42     | 12        | 23%   | 62     | 35        | 34%   | 76     | 20        | 42%   |        | 0%      | 180   | 28%        | 2.00    | 3.60    | 3.40    | 2.5      | 2.48  | 2.00  |      |
| 81                | B25      | 001   | GF  | Bed room       | 0.64  | 64     | 19        | 36%   | 65     | 18        | 36%   | 50     | 12        | 28%   |        | 0%      | 179   | 31%        | 1.50    | 3.00    | 3.90    | 2.5      | 2.10  | 1.00  |      |
| 82                | B26      | 101   | FF  | Kitchen        | 0.63  | 59     | 35        | 33%   | 39     | 18        | 22%   | 82     | 17        | 46%   |        | 0%      | 180   | 28%        | 4.00    | 6.00    | 4.50    | 2.5      | 2.70  | 2.00  |      |
| 83                | B26      | 207   | SF  | Bed room       | 0.64  | 59     | 31        | 33%   | 39     | 15        | 22%   | 82     | 14        | 46%   |        | 0%      | 180   | 30%        | 1.90    | 2.70    | 4.00    | 2.5      | 2.69  | 1.00  |      |
| 84                | B27      | 004   | GF  | Bed room       | 0.64  | 62     | 25        | 34%   | 43     | 22        | 24%   | 73     | 11        | 41%   |        | 0%      | 178   | 30%        | 1.90    | 3.00    | 4.20    | 2.5      | 2.42  | 1.00  |      |
| 85                | B27      | 004   | GF  | Living         | 0.64  | 40     | 38        | 22%   | 85     | 28        | 47%   | 38     | 7         | 21%   |        | 0%      | 163   | 27%        | 1.90    | 3.60    | 3.80    | 2.5      | 1.90  | 1.50  |      |
| 86                | B28      | 104   | POD | Living-kitchen | 0.63  | 48     | 10        | 27%   | 73     | 57        | 41%   | 22     | 10        | 12%   | 15     | 34      | 8%    | 158        | 24%     | 7.32    | 3.72    | 7.17     | 2.6   | 3.53  | 2.00 |
| 87                | B28      | 104   | POD | Bed room       | 0.64  | 53     | 10        | 29%   | 68     | 57        | 38%   | 15     | 10        | 8%    | 21     | 34      | 12%   | 157        | 24%     | 3.60    | 2.98    | 3.88     | 2.6   | 3.34  | 1.00 |
| 88                | B28      | 115   | POD | Living-kitchen | 0.63  | 7      | 26        | 4%    | 67     | 53        | 37%   | 54     | 12        | 30%   |        | 0%      | 128   | 24%        | 7.32    | 3.72    | 7.17    | 2.6      | 2.85  | 2.00  |      |
| 89                | B28      | 115   | POD | Bed room       | 0.64  | 23     | 26        | 13%   | 60     | 53        | 33%   | 60     | 12        | 33%   |        | 0%      | 143   | 25%        | 3.60    | 2.98    | 3.87    | 2.6      | 3.16  | 1.00  |      |
| 90                | B28      | 215   | FF  | Bed room       | 0.64  | 27     | 21        | 15%   | 65     | 46        | 36%   | 54     | 10        | 30%   |        | 0%      | 146   | 26%        | 3.60    | 2.85    | 4.86    | 2.6      | 2.94  | 1.00  |      |
| 91                | B28      | 215   | FF  | Bed room       | 0.65  | 27     | 21        | 15%   | 60     | 46        | 33%   | 66     | 10        | 37%   |        | 0%      | 153   | 27%        | 3.60    | 3.52    | 2.31    | 2.6      | 4.70  | 1.00  |      |
| 92                | B28      | 215   | FF  | Kitchen        | 0.63  | 25     | 21        | 14%   | 45     | 46        | 25%   | 85     | 10        | 47%   | 13     | 46      | 7%    | 168        | 28%     | 7.32    | 3.70    | 8.79     | 2.6   | 3.73  | 2.00 |
| 93                | B28      | 205   | FF  | Bed room       | 0.64  | 50     | 7         | 28%   | 70     | 50        | 39%   | 16     | 7         | 9%    | 21     | 29      | 12%   | 157        | 26%     | 3.60    | 3.77    | 2.91     | 2.6   | 3.74  | 1.00 |
| 94                | B28      | 205   | FF  | Bed room       | 0.64  | 46     | 7         | 26%   | 74     | 50        | 41%   | 22     | 7         | 12%   | 23     | 29      | 13%   | 165        | 26%     | 3.60    | 2.64    | 4.86     | 2.6   | 3.43  | 1.00 |
| 95                | B28      | 205   | FF  | Kitchen        | 0.63  | 90     | 7         | 50%   | 56     | 50        | 31%   | 7      | 7         | 4%    | 21     | 29      | 12%   | 174        | 28%     | 7.32    | 3.88    | 8.79     | 2.6   | 3.76  | 2.00 |
| 96                | B28      | 114   | POD | Bed room       | 0.64  | 34     | 57        | 19%   | 110    | 60        | 61%   | 36     | 31        | 20%   |        | 0%      | 180   | 16%        | 1.90    | 3.10    | 4.10    | 2.5      | 1.24  | 1.00  |      |
| 97                | B29      | 004   |     | Bed room       | 0.64  | 52     | 44        | 29%   | 40     | 48        | 22%   | 88     | 51        | 49%   |        | 0%      | 180   | 18%        | 1.90    | 2.80    | 4.60    | 2.5      | 1.40  | 1.00  |      |
| 98                | B29      | 004   |     | Kitchen        | 0.62  | 63     | 49        | 35%   | 58     | 57        | 32%   | 59     | 24        | 33%   |        | 0%      | 180   | 20%        | 6.00    | 8.40    | 4.50    | 2.5      | 2.13  | 2.00  |      |
| 99                | B29      | 002   |     | Bed room       | 0.64  | 48     | 37        | 27%   | 104    | 42        | 58%   | 28     | 24        | 16%   |        | 0%      | 180   | 22%        | 1.90    | 2.80    | 4.50    | 2.5      | 1.78  | 1.00  |      |
| ##                | B16      | 017   | GF  | Living         | 0.63  | 53     | 2         | 29%   | 111    | 76        | 62%   | 16     | 2         | 9%    |        | 0%      | 180   | 18%        | 4.00    | 8.00    | 3.60    | 2.5      | 1.58  | 1.50  |      |
| ##                | B36      | 014   | GF  | Living         | 0.63  | 68     | 17        | 38%   | 72     | 40        | 40%   | 40     | 3         | 22%   |        | 0%      | 180   | 28%        | 4.00    | 8.00    | 3.60    | 2.5      | 2.50  | 1.50  |      |



## 5.6 Conclusion.

From the calculation results we note that all analysed room now are within the guidelines of the BRE design guide and therefore deem the day light reception to be satisfactory.

Adjustment to the glazed areas (increased) in a number of rooms/dwellings and removing of close facing large obstacles in some circumstances resolved issues illustrated in issue 1P of this report.

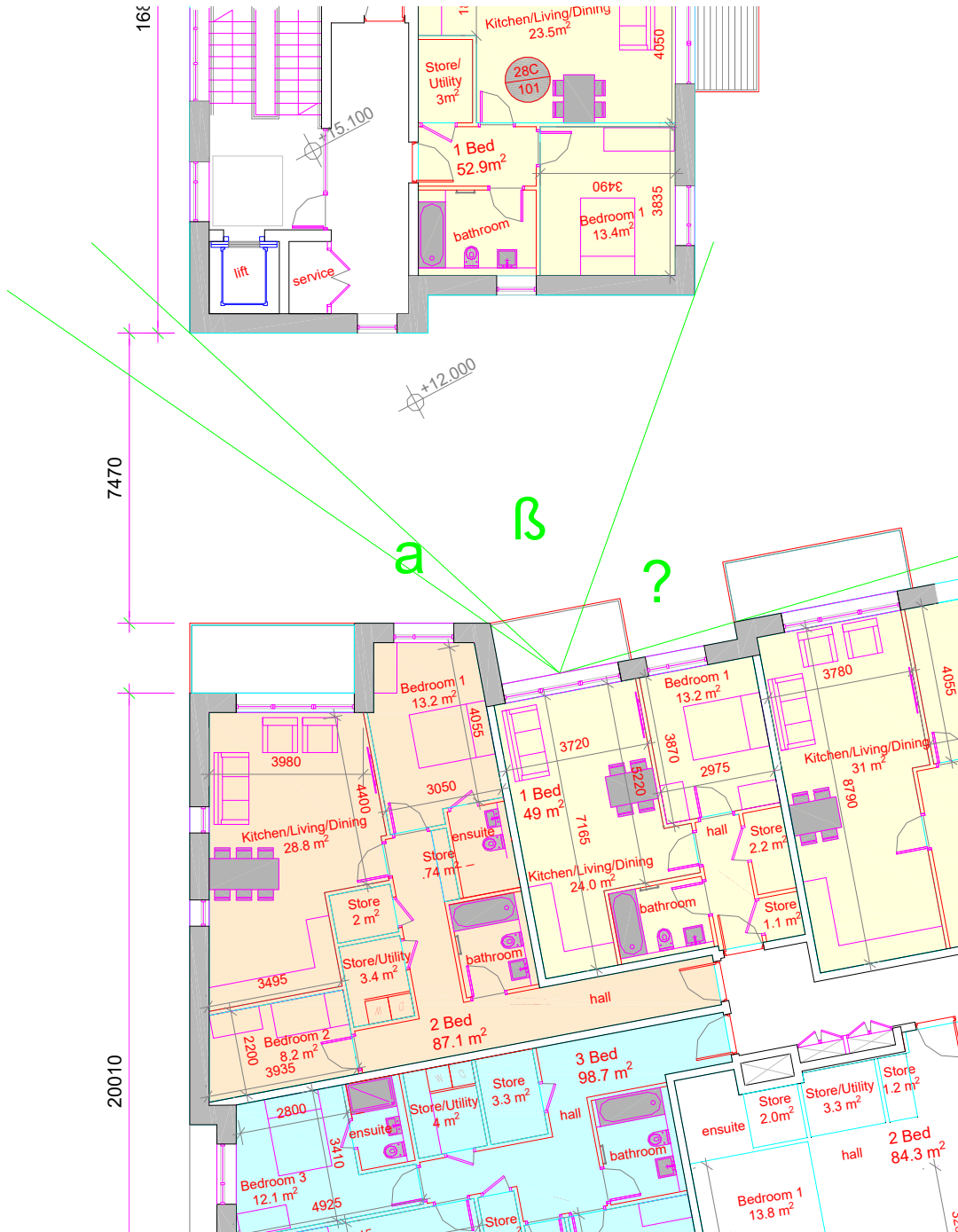
As stated previously improvements to daylight reception can always be made beyond the calculation parameters used in this report by applying lighter colours to the floor and wall covering or by applying a glass type with an increased light emittance factor.

# Appendix 1

## Example of plan (horizontal plane) and section (vertical plane) drawing block 28

Apartment 115 on plan showing horizontal plane angles.

Apartment 101 in facing block was moved backwards (away) to allow for sufficient daylight reception.





Apartment 115 and 215 vertical angles against facing block with apartment 101.  
This block was moved back wards, away from the receptors to allow for sufficient daylight reception.

