

OCSC

O'CONNOR · SUTTON · CRONIN

MULTIDISCIPLINARY CONSULTING ENGINEERS

K455-3: BLACKGLEN ROAD RESIDENTIAL DEVELOPMENT

DAYLIGHT, SUNLIGHT & OVERSHADOWING ASSESSMENT

For

Zolbury Ltd.,

12 November 2024

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DOCUMENT CONTROL & HISTORY

OCSC Job No: K455-3	Project Code	Originator	Zone Volume	Level	File Type	Role Type	Number	Status / Suitability Code	Revision
	K455-3	OCSC	XX	XX	RP	YS	0002	S4	P03

Rev.	Status	Authors	Checked	Authorised	Issue Date
P03	For Planning	AN	MT	MT	12/11/2024
P02	For Planning	AN	MT	MT	5/06/2024
P01	For Comment	AN	MT	MT	10/05/2024

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1 EXECUTIVE SUMMARY

OCSC (M&E) have been appointed to carry out a Daylight, Sunlight & Overshadowing Assessment for the Blackglen Road residential development.

The aim of the study is to record and analyse the results for the following:

- The internal daylight levels within the living and bedroom on selected lower floor units;
- The quality of amenity space being provided as part of the development, in relation to sunlight;
- A secondary assessment has also been carried out assessing all apartments against the newly issued BRE Guide Third Edition (2022);
- The impact of the proposed scheme on adjacent properties.

The analysis has been performed on ground floor for all blocks and on the first floor for most of the blocks. The analysis confirms that overall, excellent levels of internal daylight achieved using the old method for daylight (Second Edition). The results show a 93% compliance rate has been achieved across the assessed development when compared against the older daylight standard. Also, 95% for criterion 1 and 94% for criterion 2 of the proposed development comply with internal daylight levels when each space was assessed under the newer Third Edition standard.

It is important to note that the performance targets which are included should be used with a degree of flexibility as per the extract below from the BRE Guide:

"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numeral guidelines these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design."

The calculation methodology for daylight and sunlight is based on the Building Research Establishments "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2022 Third Edition, as well as the older 2011 Second Edition.

Sunlight to proposed development amenity spaces

In relation to amenity space sunlight, excellent levels of sunlight are experienced across the proposed amenity space. The communal amenity space provided exceed the BRE guidelines for sunlight on the test day of 21st of March.

Overshadowing

The overshadowing images have shown that there is a negligible impact to the surrounding developments when the proposed schemes is assessed.

Impact to neighbouring properties

With the proposed development modelled, the VSC at all the windows assessed within the surrounding properties have been assessed. The analysis confirms that proposed development, on the adjacent buildings will not perceive any major impacts.

Note: *We have revised the VSC results for X-2 based on the latest available site survey drawings. The updated analysis confirms that X-2 meets the VSC requirements.*

2 INTRODUCTION

OCSC (M&E) have been appointed to carry out a Daylight, Sunlight & Overshadowing Assessment for the Blackglen Road residential development.

The aim of the study is to record and analyse the results for the following:

- The internal daylight levels within the living and bedroom on selected lower floor units;
- The quality of amenity space being provided as part of the development, in relation to sunlight;
- A secondary assessment has also been carried out assessing selected lower floor units against the BRE Guide Third Edition (2022);
- The impact of the proposed scheme on adjacent properties.

Daylight and sunlight in the proposed development were assessed under two methodologies:

1) The Building Research Establishments "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2011 Second Edition;
2) The Building Research Establishment's "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2022 Third Edition.

3 PROPOSED DEVELOPMENT

Zolbury Ltd., intend to apply to Dun Laoghaire Rathdown County Council for permission for development for a Large-Scale Residential Development (LRD) on a site of approx. 3.83ha on lands at Blackglen Road, Sandyford, Dublin 18.

The development will consist of 192 no. residential units ranging from 2-5 storeys in height, associated resident amenity facilities, a childcare facility, all boundary treatment and landscaping works, site services connections and all site development works to include:

a) Construction of 192 no. residential units, in the form of 6 no. new apartment buildings (A1 – B4), 40 duplexes (C1, C2, C2A) and 14 houses (D1 & D2), to include 33 no. 1-beds, 84 no. 2 -beds, 61 no. 3-beds and 14 no. 4-beds as follows:
    - Block A1 (4 storeys) comprising 15 no. apartments (3 no. 1 bed units, 6 no. 2 bed units & 6 no. 3 bed); a crèche facility of approx. 378 sq. m with associated outdoor play space of approx. 170 sq. m; and resident amenity facilities of approx. 33.3 sq. m.
    - Block A2 (3-4 storeys) comprising 26 no. apartments (2 no. 1 bed units, 20 no. 2 bed units and 4 no. no. 3 bed units) and resident amenity facilities of approx. 353.6 sq.m.
    - Blocks B1 and B2 (2-5 storeys) comprising 51 no. apartments (15 no. 1 bed units, 29 no. 2 bed units, 7 no. 3 bed units).
    - Blocks B3 and B4 (2-5 storeys) comprising 46 no. apartments (13 no. 1 bed units, 23 no. 2 bed units and 10 no. 3 bed units).
    - Duplex Units C1 (4 storeys), C2 and C2A (3 storeys) comprising 40 duplexes (6 no. 2 bed units, 20 no. 3 bed units and 14 no. 4 bed units).
    - House Units D1 and D2 (2 storeys) comprising 14 houses (14 no. 3 bed units).

b) Total Open space (approx. 10,854 sqm) is proposed in the form of public open space (approx. 8, 686 sqm), and residential communal open space (approx. 2,168 sqm). Each residential unit is afforded with associated private open space in the form of a garden/terrace / balcony.

c) The development will be served via a new vehicular access via Blackglen Road. This will be designed as a priority junction with pedestrian and cycle crossings where required to tie in with the Blackglen Road Improvement Scheme.

d) A new toucan crossing is proposed across Blackglen Road just to the east of the new vehicular access. This toucan crossing has been designed as per TL607 of the Cycle Design Manual to allow crossing of pedestrians and cyclists to the northern side of Blackglen Road for improved public transport access.

e) Emergency access only is proposed via Woodside Road.

f) A dedicated wildlife corridor is proposed to the east/south-east side of the site and a public open space (approx. 307 m in length) tree trail to the west/north-west side of the site.

g) Basement/Podium car park areas are proposed below Blocks B1, B2, B3 and B4. A total of 234 no. car parking spaces are proposed, which includes 2 no. car club spaces, 12 no. accessible

spaces and 47 no. EV charging spaces (206 no. long-stay spaces, 18 no. visitor space & 10 no. car parking spaces for creche use), in addition to 9 no. motorcycle spaces.

h) A total of 484 no. bicycle spaces are proposed in the form of 442 no. long stay bicycle spaces 42 short-term stay visitor parking.

i) 2 no. ESB substation at surface level.

j) Bin Storage areas for the Duplex blocks are proposed at ground level adjacent to the Duplex blocks.

k) All associated site and infrastructural works to include provision for water services; foul and surface water drainage and connections; internal roads, attenuation proposal; permeable paving; all landscaping works including green infrastructure zones; green roofs; and general plant areas; photovoltaic panels; landscaped boundary treatment; footpaths; public lighting; and electrical services.



Figure 1: Proposed Development Site Plan

4 PROPOSED BUILDING DESIGN

To ensure that daylight levels were maximised for the development, several key design strategies were incorporated during concept design.

BUILDING MATERIAL SELECTION

The selection of materials play an important role in ambient daylight levels. The façade of the proposed development has been carefully selected to promote a sense of brightness. This will ensure light is reflected throughout the development. The inclusion of greenery to the amenity spaces will help to improve the sense of light and brightness within the dwellings.



Figure 2: Façade Views of Proposed Development

GLAZING TO WALL RATIO

The primary function of the glazing to wall ratio is to maximise daylight within the space while reducing excessive solar gains within a given development. The other advantage, in conjunction with appropriate materials, is that the more light coloured, reflective materials used externally, the more ambient daylight will be reflected to the surrounding areas. Extensive analysis was undertaken on all building façades to ensure glazing widths were maximised to promote access to daylight. The image below illustrates the glazing to wall ratio of the proposed development.

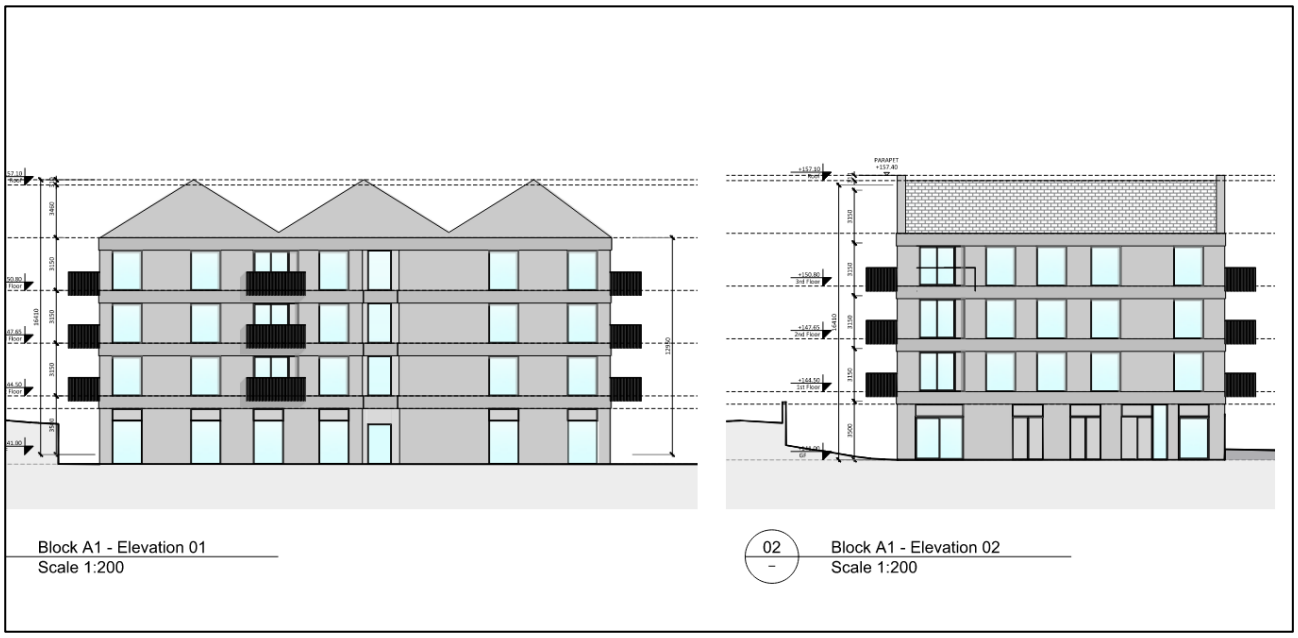


Figure 3: Block A1 - Front Elevation Glazing to Wall Ratio

5 GUIDELINES FOR DAYLIGHTING AND SUNLIGHT

The analysis of the development's daylight potential and the quality of amenity spaces have been based on the Building Research Establishment (BRE) guidelines on "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice (Building Research Establishment Report, 2011)" and BRE "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2022. Whilst it is acknowledged that the 2011 BRE Guidelines have been superseded by the 2022 edition, the 2011 edition has still been considered and summarised as it is still referenced in many planning documents.

These guidelines provide the criteria and methodology for calculations pertaining to daylight and sunlight and is the primary reference for this matter. The guide gives simple rules for analysing sites where the geometry of the surroundings is straightforward, supplementing them with graphical methods for complex sites.

However, it is important to note that the performance targets which are included should be used with a degree of flexibility as per the extract below from the BRE guidance:

"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numeral guidelines these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design."

6 DAYLIGHT LEVELS WITHIN THE PROPOSED DEVELOPMENT

ASSESSMENT CRITERIA – INTERNAL DAYLIGHT (2011 METHODOLOGY)

One of the methods of calculation selected for the internal daylight analysis for the proposed scheme is the Average Daylight Factor (ADF). This method considers not only the amount of sky visible from the vertical face of the window, but also the window size, room size and room use.

Architectural plans and elevations provided by OMP architects formed the basis for the internal daylight assessment.

To quantify the quality of daylight within a space as per BRE Guidelines, the British standards BS 8206 sets out minimum daylight factors to be achieved in new build residential units.

Table 2 **Minimum average daylight factor**

Room type	Minimum average daylight factor %
Bedrooms	1
Living rooms	1.5
Kitchens	2

Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%.

Figure 4: BS 8206 – Table 2

BS 8206 outlines that for a room that serves more than one purpose, the minimum ADF should be that for the room type with the highest value. For example, in a combined living/kitchen space, the minimum recommended ADF value should be 2%.

To analyse the daylight requirements for the proposed scheme, a detailed 3D model was constructed of the entire development, in the Integrated Environmental Solutions Virtual Environment (IES VE) software package. A number of computer simulations were then undertaken in IES VE to ascertain the ADFs achieved within the proposed scheme.

ASSESSMENT CRITERIA – INTERNAL DAYLIGHT (2022 METHODOLOGY)

In addition to the Second Edition (2011) standard, the proposed scheme's daylight levels have also been tested to the more recently published Third Edition (2022). The 2022 Methodology standard goes beyond the average daylight levels within a space, and accounts for the distribution of light within a space.

Level of recommendation for vertical and inclined daylight opening	Target illuminance E_T lx	Fraction of space for target level $F_{plane,\%}$	Minimum target illuminance E_{TM} lx	Fraction of space for minimum target level $F_{plane,\%}$	Fraction of daylight hours $F_{time,\%}$
Minimum	300	50 %	100	95 %	50 %
Medium	500	50 %	300	95 %	50 %
High	750	50 %	500	95 %	50 %
NOTE Table A.3 gives target daylight factor (D_T) and minimum target daylight factor (D_{TM}) corresponding to target illuminance level and minimum target illuminance, respectively, for the CEN capital cities.					

Figure 5: 2022 Methodology – Table A.1

2022 Methodology features two daylight criteria for compliance.

- Criterion one recommends that in the analysed space an illuminance of ≥ 100 lux must be achieved for half of the daylight time in a year (2,190 hours), across ≥ 95% of the floor area of the given space;
- Criterion two recommends that in the analysed space an illuminance of ≥ 300 lux must be achieved for half of the daylight time in a year (2,190 hours), across ≥ 50% of the floor area of the given space.

In order to analyse the daylight performance for the proposed scheme in this regard, a further detailed 3D model was generated of the entire development,. A number of computer simulations were then undertaken in IES VE to ascertain the lux levels achieved within all amended units of the proposed development.

DAYLIGHT PARAMETERS

The surface reflectance values outlined in Table 1 have been used in the analysis, as per BR206 document (second edition).

Surface Type	Reflectance (%)
External Wall	40
Internal Partitions	70
Ceiling	70
Floor	40
Adjacent Buildings	40
Glazing Transmittance	70

Table 1: Surface Reflectance Values

The ADF and lux calculations are carried out in a working plane that lies 850mm above the floor and it is offset 500mm from the perimeter of the room. A grid of 250mm is used to calculate all different points within the room and the average of these points determines both the ADF and Lux levels achieved.

Unit assessed are based on the following drawings provided by OMP architects:

Job No.	Drawing No.	Drawing
20006A	20006A-OMP-A1+A2-00-DR-A-1000	Floor Plans
20006A	20006A-OMP-B1+B2-ZZ-M2-A-1200-20006A-OMP-B1+B2-ZZ-DR-A-1000	Floor Plans
20006A	20006A-OMP-C1-DR-A-1000-20006A-OMP-C1-ZZ-DR-A-1000	Floor Plans
20006A	20006A-OMP-D-ZZ-DR-A-1000	Floor Plans
20006A	20006A-OMP-A1-ZZ-DR-A-2100	Elevation
20006A	20006A-OMP-B1+B2-ZZ-M2-A-2200-20006A-OMP-B1-ZZ-DR-A-2200	Elevation
20006A	20006A-OMP-A2-ZZ-DR-A-2102	Elevation
20006A	20006A-OMP-C1-DR-A-2000-20006A-OMP-C1-DR-A-2000	Elevation
20006A	20003-OMP-BB-ZZ-DR-A-3000	Elevation

Table 2: List of drawings

TREES

BRE Guideline outlines the following in relation to the inclusion of trees within daylight and sunlight calculations.

"The question of whether trees or fences should be included in the calculation depends upon the type of shade they produce. Normally trees and shrubs need not to be included, partly because their shapes are almost impossible to predict, and partly because the dappled shade of a tree is more pleasant than the deep shadow of a building (this applies specially to deciduous trees)."

Within Appendix H of the BRE Guidelines the following statements are outlined:

"It is generally more difficult to calculate the effects of trees on daylight because of their irregular shapes and because some light will generally penetrate through the tree crown. Where the effect of a new building on existing buildings nearby is being analysed, it is usual to ignore the effect of existing trees. This is because daylight is at its scarcest and most valuable in winter when most trees will not be in leaf. "

<u>When assessing the skylight in new dwellings:</u>

"Sometimes, however, trees should be taken into account, e.g where a new dwelling is proposed near to large existing trees."

<u>When assessing the sunlight in gardens:</u>

"In assessing the impact of buildings on sunlight in gardens, trees and shrubs are not normally included in the calculation unless a dense belt or group of evergreens is specifically planned as a windbreak or for privacy purposes."

DAYLIGHT RESULTS – INTERNAL DAYLIGHT IN DWELLINGS

This section outlines the assessment of internal daylight levels in the Blackglen Road residential development.

The analysis has been performed on ground floor for all blocks and first floor of few blocks. In summary, 93% of units compliance rate has been achieved across the development when compared against the older daylight standard (Second Edition/2011 Methodology). Also, 95% for criterion 1 and 94% for criterion 2 of proposed development achieve the recommended Lux levels outlined under the newer Third Edition standard. Units which fail marginally in relation to the third edition requirements (mainly due to internal layouts, position in the building or floor level) are compensated with access and views to green areas and high-quality amenity spaces (see Compensatory Measures below).

In all cases, generous floor to ceiling heights have been designed into the project with glazing areas being increased to amplify the quality of daylight received. Careful consideration has been given to room layout design, generally aiming to allocate storage and circulation areas to the back of rooms, and living spaces to the front - where the highest level of daylight is expected. The results of the analysis are outlined in the accompanying tables.

Legends - Block A1 & A2

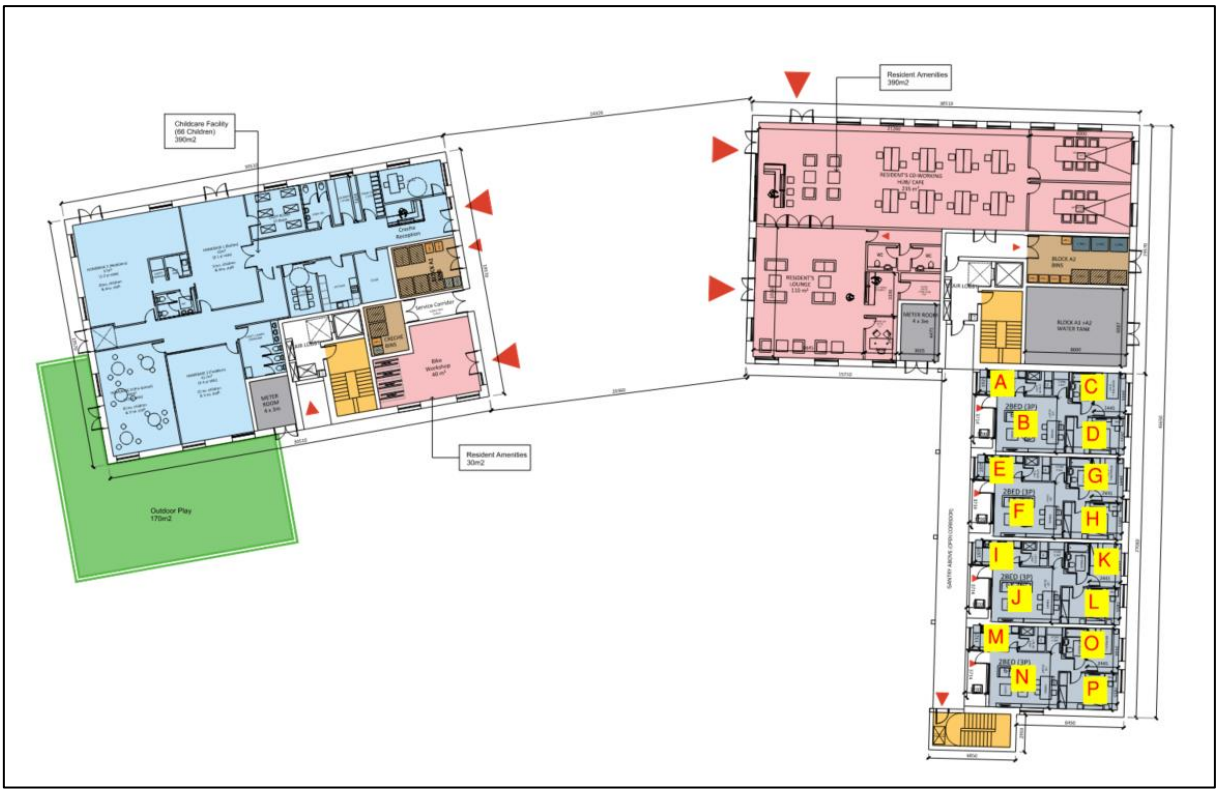


Figure 6: Block A 1 & A2 – Level 00



Figure 7: Block A 1 & A2 – Level 01

Block A1 & A2 – Old Standard

Proposed Units – BR206 (Old) Standard					
Unit Type	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
2BED	A	Kitchen	1%	2.92%	Y
	B	Living/Dining	2%	1.08%	N
	C	Bedroom 1	1%	8.31%	Y
	D	Bedroom 2	1%	4.64%	Y
2BED	E	Kitchen	1%	3.71%	Y
	F	Living/Dining	2%	1.24%	N
	G	Bedroom 1	1%	8.62%	Y
	H	Bedroom 2	1%	4.70%	Y
2BED	I	Kitchen	1%	3.90%	Y
	J	Living/Dining	2%	1.24%	N
	K	Bedroom 1	1%	8.81%	Y
	L	Bedroom 2	1%	4.38%	Y
2BED	M	Kitchen	1%	3.49%	Y
	N	Living/Dining	2%	3.21%	Y
	O	Bedroom 1	1%	8.24%	Y
	P	Bedroom 2	1%	4.54%	Y
1BED	Q	Bedroom	1%	5.89%	Y
	R	Living/Dining	2%	3.16%	Y
2BED	S	Living/Dining	2%	7.34%	Y
	T	Bedroom	1%	5.47%	Y
	U	Bedroom	1%	6.20%	Y
3BED	V	Living/Dining	2%	6.76%	Y
	W	Bedroom	1%	5.95%	Y
	X	Bedroom	1%	6.97%	Y
	Y	Bedroom	1%	6.83%	Y
3BED	Z	Bedroom	1%	6.90%	Y
	AA	Bedroom	1%	7.10%	Y
	AB	Bedroom	1%	5.93%	Y
	AC	Living/Dining	2%	7.18%	Y
2BED	AD	Bedroom	1%	6.08%	Y
	AE	Bedroom	1%	5.09%	Y
	AF	Living/Dining	2%	6.94%	Y

Proposed Units – BR206 (Old) Standard					
Unit Type	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
1BED	AG	Bedroom	1%	5.20%	Y
	AH	Living/Dining	2%	4.51%	Y
2BED	AI	Living/Dining	2%	8.07%	Y
	AJ	Bedroom	1%	5.10%	Y
	AK	Bedroom	1%	5.56%	Y
3BED	AL	Living/Dining	2%	7.76%	Y
	AM	Bedroom	1%	6.22%	Y
	AN	Bedroom	1%	7.12%	Y
	AO	Bedroom	1%	7.01%	Y
3BED	AP	Bedroom	1%	6.95%	Y
	AQ	Bedroom	1%	6.92%	Y
	AR	Bedroom	1%	6.06%	Y
	AS	Living/Dining	2%	8.47%	Y
2BED	AT	Bedroom	1%	6.33%	Y
	AU	Bedroom	1%	5.74%	Y
	AV	Living/Dining	2%	5.65%	Y
2BED	AW	Kitchen	1%	2.60%	Y
	AX	Living/Dining	2%	0.93%	N
	AY	Bedroom	1%	9.02%	Y
	AZ	Bedroom	1%	5.00%	Y
2BED	BA	Kitchen	1%	3.15%	Y
	BB	Living/Dining	2%	1.07%	N
	BC	Bedroom	1%	9.16%	Y
	BD	Bedroom	1%	5.03%	Y
2BED	BE	Kitchen	1%	3.24%	Y
	BF	Living/Dining	2%	1.08%	N
	BG	Bedroom	1%	9.34%	Y
	BH	Bedroom	1%	4.71%	Y
2BED	BI	Kitchen	1%	3.03%	Y
	BJ	Living/Dining	2%	3.39%	Y
	BK	Bedroom	1%	8.37%	Y
	BL	Bedroom	1%	4.85%	Y

Table 3: BR206 Methodology Results (Block A1 & A2 – Old Standard)

Block A1 & A2 – New Standard

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
2BED	A	Kitchen	100.0%	Y	70.7%	Y
	B	Living/Dining	82.5%	N	30.1%	N
	C	Bedroom 1	100.0%	Y	100.0%	Y
	D	Bedroom 2	100.0%	Y	100.0%	Y
2BED	E	Kitchen	100.0%	Y	77.0%	Y
	F	Living/Dining	95.1%	Y	32.5%	N
	G	Bedroom 1	100.0%	Y	100.0%	Y
	H	Bedroom 2	100.0%	Y	100.0%	Y
2BED	I	Kitchen	100.0%	Y	75.4%	Y
	J	Living/Dining	97.4%	Y	31.7%	N
	K	Bedroom 1	100.0%	Y	100.0%	Y
	L	Bedroom 2	100.0%	Y	100.0%	Y
2BED	M	Kitchen	100.0%	Y	69.5%	Y
	N	Living/Dining	100.0%	Y	83.4%	Y
	O	Bedroom 1	100.0%	Y	100.0%	Y
	P	Bedroom 2	100.0%	Y	100.0%	Y
1BED	Q	Bedroom	100.0%	Y	99.0%	Y
	R	Living/Dining	100.0%	Y	74.8%	Y
2BED	S	Living/Dining	100.0%	Y	100.0%	Y
	T	Bedroom	100.0%	Y	100.0%	Y
	U	Bedroom	100.0%	Y	100.0%	Y
3BED	V	Living/Dining	100.0%	Y	100.0%	Y
	W	Bedroom	100.0%	Y	100.0%	Y
	X	Bedroom	100.0%	Y	100.0%	Y
	Y	Bedroom	100.0%	Y	100.0%	Y
3BED	Z	Bedroom	100.0%	Y	100.0%	Y
	AA	Bedroom	100.0%	Y	99.0%	Y
	AB	Bedroom	100.0%	Y	100.0%	Y
	AC	Living/Dining	100.0%	Y	100.0%	Y
2BED	AD	Bedroom	100.0%	Y	100.0%	Y
	AE	Bedroom	100.0%	Y	100.0%	Y
	AF	Living/Dining	100.0%	Y	100.0%	Y

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
1BED	AG	Bedroom	100.0%	Y	99.0%	Y
	AH	Living/Dining	100.0%	Y	60.1%	Y
2BED	AI	Living/Dining	100.0%	Y	100.0%	Y
	AJ	Bedroom	100.0%	Y	100.0%	Y
	AK	Bedroom	100.0%	Y	100.0%	Y
3BED	AL	Living/Dining	100.0%	Y	100.0%	Y
	AM	Bedroom	100.0%	Y	100.0%	Y
	AN	Bedroom	100.0%	Y	100.0%	Y
	AO	Bedroom	100.0%	Y	100.0%	Y
3BED	AP	Bedroom	100.0%	Y	100.0%	Y
	AQ	Bedroom	100.0%	Y	100.0%	Y
	AR	Bedroom	100.0%	Y	100.0%	Y
	AS	Living/Dining	100.0%	Y	100.0%	Y
2BED	AT	Bedroom	100.0%	Y	100.0%	Y
	AU	Bedroom	100.0%	Y	100.0%	Y
	AV	Living/Dining	100.0%	Y	100.0%	Y
2BED	AW	Kitchen	100.0%	Y	67.8%	Y
	AX	Living/Dining	85.8%	N	21.4%	N
	AY	Bedroom	100.0%	Y	100.0%	Y
	AZ	Bedroom	100.0%	Y	100.0%	Y
2BED	BA	Kitchen	100.0%	Y	72.6%	Y
	BB	Living/Dining	97.4%	Y	25.2%	N
	BC	Bedroom	100.0%	Y	100.0%	Y
	BD	Bedroom	100.0%	Y	100.0%	Y
2BED	BE	Kitchen	100.0%	Y	72.3%	Y
	BF	Living/Dining	98.5%	Y	24.4%	N
	BG	Bedroom	100.0%	Y	100.0%	Y
	BH	Bedroom	100.0%	Y	100.0%	Y
2BED	BI	Kitchen	100.0%	Y	68.8%	Y
	BJ	Living/Dining	100.0%	Y	99.0%	Y
	BK	Bedroom	100.0%	Y	100.0%	Y
	BL	Bedroom	100.0%	Y	100.0%	Y

Table 4: BR209 Methodology Results (Block A1 & A2 – New Standard)

Legends - Block B1 & B2

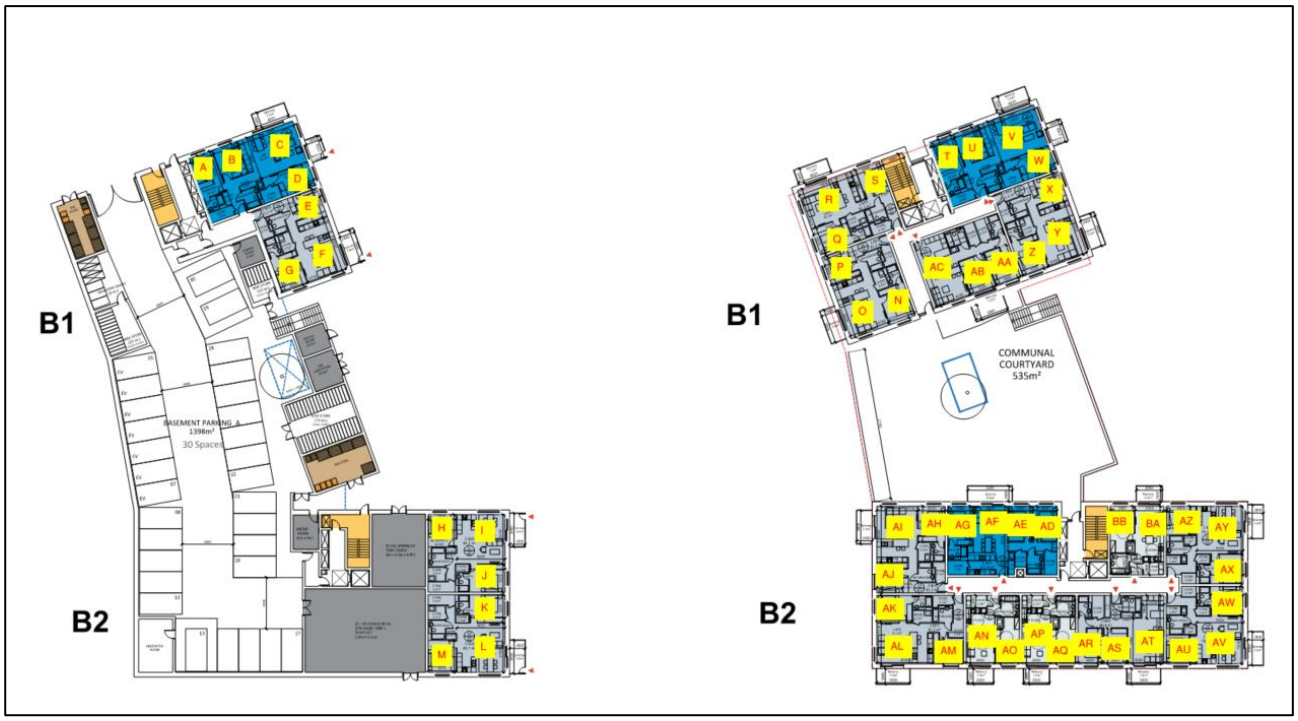


Figure 8: Block B1 & B2 – Level 00 & 01

Block B1 & B2 – Old Standard

Proposed Units – BR206 (Old) Standard					
Unit Type	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
3BED	A	Bedroom	1%	4.69%	Y
	B	Bedroom	1%	4.72%	Y
	C	Living/Dining	2%	5.10%	Y
	D	Bedroom	1%	4.03%	Y
2BED	E	Bedroom	1%	4.94%	Y
	F	Living/Dining	2%	4.19%	Y
	G	Bedroom	1%	4.26%	Y
2BED	H	Bedroom	1%	6.70%	Y
	I	Living/Dining	2%	6.80%	Y
	J	Bedroom	1%	1.24%	N
2BED	K	Bedroom	1%	8.81%	Y
	L	Living/Dining	2%	5.50%	Y
	M	Bedroom	1%	5.80%	Y
2BED	N	Bedroom	2%	2.57%	Y
	O	Living/Dining	2%	3.39%	Y
	P	Bedroom	1%	3.26%	Y
2BED	Q	Bedroom	1%	2.76%	Y
	R	Living/Dining	2%	3.18%	Y
	S	Bedroom	1%	3.69%	Y
3BED	T	Bedroom	1%	3.88%	Y
	U	Bedroom	1%	3.90%	Y
	V	Living/Dining	2%	4.30%	Y
	W	Bedroom	1%	3.48%	Y
2BED	X	Bedroom	1%	4.36%	Y
	Y	Living/Dining	2%	3.70%	Y
	Z	Bedroom	1%	3.75%	Y
2BED	AA	Bedroom	1%	3.41%	Y

Proposed Units – BR206 (Old) Standard					
Unit Type	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
	AB	Bedroom	1%	3.31%	Y
	AC	Living/Dining	2%	1.63%	N
3BED	AD	Bedroom	2%	2.76%	Y
	AE	Bedroom	1%	2.74%	Y
	AF	Living/Dining	2%	1.88%	N
	AG	Bedroom	1%	2.30%	Y
2BED	AH	Bedroom	1%	2.44%	Y
	AI	Living/Dining	2%	3.31%	Y
	AJ	Bedroom	1%	3.09%	Y
2BED	AK	Bedroom	1%	2.63%	Y
	AL	Living/Dining	2%	3.34%	Y
	AM	Bedroom	1%	3.00%	Y
1BED	AN	Bedroom	1%	2.72%	Y
	AO	Living/Dining	2%	2.40%	Y
1BED	AP	Living/Dining	2%	2.75%	Y
	AQ	Bedroom	1%	2.45%	Y
2BED	AR	Bedroom	1%	2.76%	Y
	AS	Bedroom	1%	2.82%	Y
	AT	Living/Dining	2%	2.13%	Y
2BED	AU	Bedroom	1%	2.90%	Y
	AV	Living/Dining	2%	3.20%	Y
	AW	Bedroom	1%	3.60%	N
2BED	AX	Bedroom	1%	3.40%	Y
	AY	Living/Dining	2%	3.40%	Y
	AZ	Bedroom	1%	2.50%	Y
1BED	BA	Living/Dining	2%	5.30%	N
	BB	Bedroom	1%	2.56%	Y

Table 5: BR206 Methodology Results (Block B1 & B2– Old Standard)

Block B1 & B2 – New Standard

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
3BED	A	Bedroom	99.0%	Y	81.1%	Y
	B	Bedroom	100.0%	Y	85.9%	Y
	C	Living/Dining	100.0%	Y	92.1%	Y
	D	Bedroom	100.0%	Y	83.0%	Y
2BED	E	Bedroom	100.0%	Y	86.0%	Y
	F	Living/Dining	100.0%	Y	91.1%	Y
	G	Bedroom	91.8%	N	67.0%	Y
2BED	H	Bedroom	100.0%	Y	78.4%	Y
	I	Living/Dining	100.0%	Y	91.7%	Y
	J	Bedroom	100.0%	Y	84.7%	Y
2BED	K	Bedroom	100.0%	Y	87.4%	Y
	L	Living/Dining	100.0%	Y	93.8%	Y
	M	Bedroom	100.0%	Y	89.3%	Y
2BED	N	Bedroom	100.0%	Y	75.4%	Y
	O	Living/Dining	100.0%	Y	100.0%	Y
	P	Bedroom	100.0%	Y	100.0%	Y
2BED	Q	Bedroom	100.0%	Y	100.0%	Y
	R	Living/Dining	100.0%	Y	100.0%	Y
	S	Bedroom	99.0%	Y	100.0%	Y
3BED	T	Bedroom	99.0%	Y	74.7%	Y

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
	U	Bedroom	100.0%	Y	78.9%	Y
	V	Living/Dining	100.0%	Y	100.0%	Y
	W	Bedroom	100.0%	Y	75.0%	Y
2BED	X	Bedroom	100.0%	Y	75.9%	Y
	Y	Living/Dining	100.0%	Y	100.0%	Y
	Z	Bedroom	100.0%	Y	79.5%	Y
2BED	AA	Bedroom	100.0%	Y	78.9%	Y
	AB	Bedroom	100.0%	Y	100.0%	Y
	AC	Living/Dining	53.9%	N	37.9%	N
3BED	AD	Bedroom	98.0%	Y	65.3%	Y
	AE	Bedroom	98.1%	Y	64.9%	Y
	AF	Living/Dining	50.0%	N	32.5%	N
	AG	Bedroom	87.8%	N	56.0%	Y
2BED	AH	Bedroom	98.9%	Y	66.1%	Y
	AI	Living/Dining	100.0%	Y	100.0%	Y
	AJ	Bedroom	100.0%	Y	84.2%	Y
2BED	AK	Bedroom	100.0%	Y	81.4%	Y
	AL	Living/Dining	100.0%	Y	100.0%	Y
	AM	Bedroom	100.0%	Y	100.0%	Y
1BED	AN	Bedroom	100.0%	Y	100.0%	Y

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
	AO	Living/Dining	100.0%	Y	100.0%	Y
1BED	AP	Living/Dining	100.0%	Y	100.0%	Y
	AQ	Bedroom	100.0%	Y	100.0%	Y
2BED	AR	Bedroom	100.0%	Y	100.0%	Y
	AS	Bedroom	100.0%	Y	100.0%	Y
	AT	Living/Dining	96.3%	Y	68.3%	Y
2BED	AU	Bedroom	100.0%	Y	100.0%	Y

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
	AV	Living/Dining	100.0%	Y	100.0%	Y
	AW	Bedroom	100.0%	Y	100.0%	Y
2BED	AX	Bedroom	100.0%	Y	100.0%	Y
	AY	Living/Dining	100.0%	Y	100.0%	Y
	AZ	Bedroom	100.0%	Y	80.2%	Y
1BED	BA	Living/Dining	100.0%	Y	59.6%	Y
	BB	Bedroom	100.0%	Y	64.5%	Y

Table 6: BR209 Methodology Results (Block B1 & B2 – New Standard)

Legends - Block B3 & B4

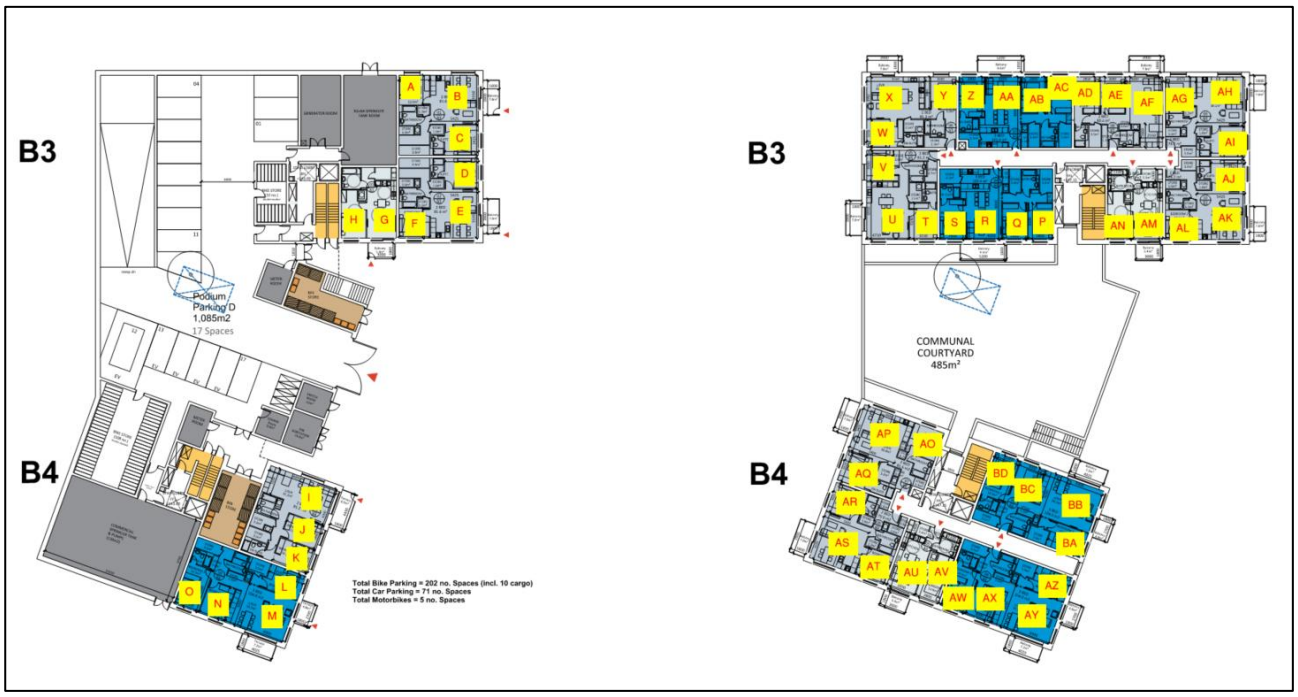


Figure 9: Block B3 & B4 – Level 00 & 01

Block B3 & B4 – Old Standard

Proposed Units – BR206 (Old) Standard					
Unit Type	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
2BED	A	Bedroom	1%	4.39%	Y
	B	Living/Dining	2%	6.80%	Y
	C	Bedroom	1%	4.85%	Y
2BED	D	Bedroom	1%	5.05%	Y
	E	Living/Dining	2%	7.71%	Y
	F	Bedroom	1%	5.23%	Y
1BED	G	Living/Dining	2%	3.82%	Y
	H	Bedroom	1%	3.47%	Y
2BED	I	Living/Dining	2%	6.89%	Y
	J	Bedroom	1%	7.20%	Y
	K	Bedroom	1%	7.60%	Y
3BED	L	Bedroom	1%	7.58%	Y
	M	Living/Dining	2%	9.99%	Y
	N	Bedroom	1%	6.25%	Y
	O	Bedroom	1%	7.86%	Y
3BED	P	Bedroom	1%	4.19%	Y
	Q	Bedroom	1%	3.62%	Y
	R	Living/Dining	2%	1.97%	N
	S	Bedroom	1%	2.67%	Y
2BED	T	Bedroom	1%	3.48%	Y
	U	Living/Dining	2%	3.88%	Y
	V	Bedroom	1%	3.90%	Y
2BED	W	Bedroom	1%	4.01%	Y
	X	Living/Dining	2%	3.67%	Y
	Y	Bedroom	1%	4.24%	Y
3BED	Z	Bedroom	1%	3.09%	Y
	AA	Living/Dining	2%	1.98%	N
	AB	Bedroom	1%	3.28%	Y

Proposed Units – BR206 (Old) Standard					
Unit Type	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
	AC	Bedroom	1%	4.02%	Y
2BED	AD	Bedroom	1%	4.02%	Y
	AE	Bedroom	1%	3.98%	Y
	AF	Living/Dining	2%	1.90%	N
2BED	AG	Bedroom	1%	3.63%	Y
	AH	Living/Dining	2%	6.58%	Y
	AI	Bedroom	1%	4.01%	Y
2BED	AJ	Bedroom	1%	4.19%	Y
	AK	Living/Dining	2%	8.26%	Y
	AL	Bedroom	1%	4.26%	Y
1BED	AM	Living/Dining	2%	2.86%	Y
	AN	Bedroom	1%	3.56%	Y
2BED	AO	Bedroom	1%	3.65%	Y
	AP	Living/Dining	2%	4.66%	Y
	AQ	Bedroom	1%	3.49%	Y
2BED	AR	Bedroom	1%	3.40%	Y
	AS	Living/Dining	2%	5.84%	Y
	AT	Bedroom	1%	3.93%	Y
1BED	AU	Living/Dining	2%	2.97%	Y
	AV	Bedroom	1%	3.65%	Y
3BED	AW	Bedroom	1%	4.73%	Y
	AX	Bedroom	1%	3.05%	Y
	AY	Living/Dining	2%	7.80%	Y
	AZ	Bedroom	1%	4.59%	Y
3BED	BA	Bedroom	1%	4.50%	Y
	BB	Living/Dining	2%	6.05%	Y
	BC	Bedroom	1%	2.58%	Y
	BD	Bedroom	1%	4.35%	Y

Table 7: BR206 Methodology Results (Block B3 & B4 – Old Standard)

Block B3 & B4 – New Standard

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
2BED	A	Bedroom	96.9%	Y	93.3%	Y
	B	Living/Dining	100.0%	Y	100.0%	Y
	C	Bedroom	100.0%	Y	97.4%	Y
2BED	D	Bedroom	99.5%	Y	98.9%	Y
	E	Living/Dining	100.0%	Y	100.0%	Y
	F	Bedroom	100.0%	Y	100.0%	Y
1BED	G	Living/Dining	100.0%	Y	100.0%	Y
	H	Bedroom	100.0%	Y	84.5%	Y
2BED	I	Living/Dining	100.0%	Y	100.0%	Y
	J	Bedroom	100.0%	Y	100.0%	Y
	K	Bedroom	100.0%	Y	100.0%	Y
3BED	L	Bedroom	100.0%	Y	100.0%	Y
	M	Living/Dining	100.0%	Y	100.0%	Y
	N	Bedroom	100.0%	Y	100.0%	Y
	O	Bedroom	99.0%	Y	99.3%	Y
3BED	P	Bedroom	99.0%	Y	99.0%	Y
	Q	Bedroom	98.0%	Y	99.0%	Y
	R	Living/Dining	100.0%	Y	100.0%	Y
	S	Bedroom	100.0%	Y	96.3%	Y
2BED	T	Bedroom	100.0%	Y	100.0%	Y
	U	Living/Dining	100.0%	Y	100.0%	Y
	V	Bedroom	100.0%	Y	95.0%	Y
2BED	W	Bedroom	100.0%	Y	99.5%	Y
	X	Living/Dining	100.0%	Y	98.9%	Y
	Y	Bedroom	100.0%	Y	93.5%	Y
3BED	Z	Bedroom	100.0%	Y	66.2%	Y
	AA	Living/Dining	100.0%	Y	54.2%	Y
	AB	Bedroom	100.0%	Y	77.3%	Y

Proposed Units – BR209 (New) Standard						
Unit Type	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
	AC	Bedroom	100.0%	Y	88.2%	Y
2BED	AD	Bedroom	100.0%	Y	89.1%	Y
	AE	Bedroom	100.0%	Y	96.3%	Y
	AF	Living/Dining	94.9%	Y	44.8%	N
2BED	AG	Bedroom	100.0%	Y	87.1%	Y
	AH	Living/Dining	100.0%	Y	100.0%	Y
	AI	Bedroom	100.0%	Y	80.0%	Y
2BED	AJ	Bedroom	100.0%	Y	94.2%	Y
	AK	Living/Dining	100.0%	Y	100.0%	Y
	AL	Bedroom	100.0%	Y	100.0%	Y
1BED	AM	Living/Dining	100.0%	Y	100.0%	Y
	AN	Bedroom	100.0%	Y	100.0%	Y
2BED	AO	Bedroom	100.0%	Y	94.3%	Y
	AP	Living/Dining	100.0%	Y	100.0%	Y
	AQ	Bedroom	100.0%	Y	99.0%	Y
2BED	AR	Bedroom	100.0%	Y	95.5%	Y
	AS	Living/Dining	100.0%	Y	100.0%	Y
	AT	Bedroom	100.0%	Y	99.4%	Y
1BED	AU	Living/Dining	100.0%	Y	100.0%	Y
	AV	Bedroom	100.0%	Y	100.0%	Y
3BED	AW	Bedroom	100.0%	Y	99.5%	Y
	AX	Bedroom	100.0%	Y	99.0%	Y
	AY	Living/Dining	100.0%	Y	100.0%	Y
	AZ	Bedroom	100.0%	Y	100.0%	Y
3BED	BA	Bedroom	100.0%	Y	97.0%	Y
	BB	Living/Dining	100.0%	Y	100.0%	Y
	BC	Bedroom	100.0%	Y	83.6%	Y
	BD	Bedroom	100.0%	Y	95.9%	Y

Table 8: BR209 Methodology Results (Block B3 & B4 – New Standard)

Legends - Block C1



Figure 10: Block C1 – Level 00 & 01

Block C1 – Old Standard

Proposed Units – BR206 (Old) Standard						
Unit Type	Block Legend	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
Duplex	1	A	Living/Dining	2%	2.62%	Y
		B	Bedroom	1%	8.20%	Y
Duplex		C	Bedroom	1%	8.08%	Y
		D	Living/Dining	2%	2.76%	Y
Duplex		E	Bedroom	1%	3.40%	Y
		F	Bedroom	1%	7.00%	Y
		G	Bedroom	1%	8.00%	Y
Duplex		H	Bedroom	1%	6.00%	Y
		I	Bedroom	1%	8.34%	Y
		J	Bedroom	1%	3.77%	Y
Duplex	2	A	Living/Dining	2%	2.64%	Y
		B	Bedroom	1%	8.19%	Y
Duplex		C	Bedroom	1%	8.07%	Y
		D	Living/Dining	2%	2.75%	Y
Duplex		E	Bedroom	1%	3.30%	Y
		F	Bedroom	1%	7.80%	Y
		G	Bedroom	1%	8.00%	Y
Duplex		H	Bedroom	1%	7.00%	Y
		I	Bedroom	1%	8.34%	Y
		J	Bedroom	1%	3.77%	Y
Duplex	3	A	Living/Dining	2%	1.40%	N
		B	Bedroom	1%	6.06%	Y
Duplex		C	Bedroom	1%	6.22%	Y
		D	Living/Dining	2%	1.72%	N
Duplex		E	Bedroom	1%	3.41%	Y
		F	Bedroom	1%	7.60%	Y
		G	Bedroom	1%	6.86%	Y
Duplex		H	Bedroom	1%	6.77%	Y
		I	Bedroom	1%	7.36%	Y
		J	Bedroom	1%	3.96%	Y
Duplex	4	A	Living/Dining	2%	2.05%	Y
		B	Bedroom	1%	7.11%	Y
Duplex		C	Bedroom	1%	6.83%	Y
		D	Living/Dining	2%	2.05%	Y
Duplex		E	Bedroom	1%	3.65%	Y

Proposed Units – BR206 (Old) Standard						
Unit Type	Block Legend	Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
	4	F	Bedroom	1%	8.24%	Y
		G	Bedroom	1%	7.40%	Y
Duplex		H	Bedroom	1%	7.16%	Y
		I	Bedroom	1%	7.60%	Y
		J	Bedroom	1%	3.04%	Y
Duplex	5	A	Living/Dining	2%	1.68%	N
		B	Bedroom	1%	6.25%	Y
Duplex		C	Bedroom	1%	6.04%	Y
		D	Living/Dining	2%	1.63%	N
Duplex		E	Bedroom	1%	3.57%	Y
		F	Bedroom	1%	7.57%	Y
		G	Bedroom	1%	6.83%	Y
Duplex		H	Bedroom	1%	6.66%	Y
		I	Bedroom	1%	7.21%	Y
		J	Bedroom	1%	3.99%	Y
Duplex	6	A	Living/Dining	2%	2.07%	Y
		B	Bedroom	1%	7.14%	Y
Duplex		C	Bedroom	1%	6.83%	Y
		D	Living/Dining	2%	2.06%	Y
Duplex		E	Bedroom	1%	4.08%	Y
		F	Bedroom	1%	8.26%	Y
		G	Bedroom	1%	7.43%	Y
Duplex		H	Bedroom	1%	7.17%	Y
		I	Bedroom	1%	7.63%	Y
		J	Bedroom	1%	3.32%	Y
Duplex	7	A	Living/Dining	2%	2.29%	Y
		B	Bedroom	1%	7.61%	Y
Duplex		C	Bedroom	1%	7.55%	Y
		D	Living/Dining	2%	2.41%	Y
Duplex		E	Bedroom	1%	2.68%	Y
		F	Bedroom	1%	8.36%	Y
		G	Bedroom	1%	7.63%	Y
Duplex		H	Bedroom	1%	7.57%	Y
		I	Bedroom	1%	8.20%	Y
		J	Bedroom	1%	3.23%	Y

Table 9: BR206 Methodology Results (Block C1 – Old Standard)

Block C1 – New Standard

Proposed Units – BR209 (New) Standard							
Unit Type	Block Legend	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
Duplex	1	A	Living/Dining	100%	Y	51%	Y
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	100%	Y	64%	Y
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y
		I	Bedroom	100%	Y	100%	Y
		J	Bedroom	100%	Y	100%	Y
Duplex	2	A	Living/Dining	100%	Y	54%	Y
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	100%	Y	57%	Y
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y
		I	Bedroom	100%	Y	100%	Y
		J	Bedroom	100%	Y	100%	Y
Duplex	3	A	Living/Dining	83%	N	41%	N
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	86%	N	42%	N
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y
		I	Bedroom	100%	Y	100%	Y

Proposed Units – BR209 (New) Standard							
Unit Type	Block Legend	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
		J	Bedroom	100%	Y	100%	Y
Duplex	4	A	Living/Dining	97%	Y	43%	N
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	89%	N	45%	N
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y
		I	Bedroom	100%	Y	100%	Y
		J	Bedroom	100%	Y	100%	Y
Duplex	5	A	Living/Dining	88%	N	42%	N
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	83%	N	40%	N
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y
		I	Bedroom	100%	Y	100%	Y
		J	Bedroom	100%	Y	100%	Y
Duplex	6	A	Living/Dining	99%	Y	44%	N
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	97%	Y	46%	N
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y

Proposed Units – BR209 (New) Standard							
Unit Type	Block Legend	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
		I	Bedroom	100%	Y	100%	Y
		J	Bedroom	100%	Y	100%	Y
Duplex	7	A	Living/Dining	100%	Y	53%	Y
		B	Bedroom	100%	Y	100%	Y
Duplex		C	Bedroom	100%	Y	100%	Y
		D	Living/Dining	100%	Y	53%	Y

Proposed Units – BR209 (New) Standard							
Unit Type	Block Legend	Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
Duplex		E	Bedroom	100%	Y	100%	Y
		F	Bedroom	100%	Y	100%	Y
		G	Bedroom	100%	Y	100%	Y
Duplex		H	Bedroom	100%	Y	100%	Y
		I	Bedroom	100%	Y	100%	Y
		J	Bedroom	100%	Y	100%	Y

Table 10: BR209 Methodology Results (Block C1 – New Standard)

Legends - Block C2



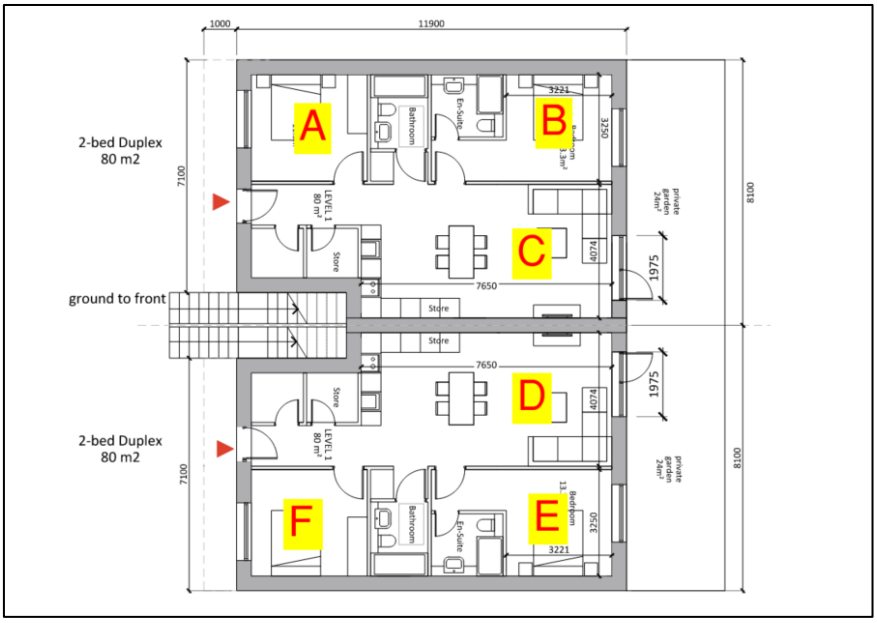


Figure 11: Block C2 – Level 00

Block C2 – Old Standard

Proposed Units – BR206 (Old) Standard						
Unit Type	Block Legend	Space Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
Duplex	8	A	Bedroom	1%	3.50%	Y
		B	Bedroom	1%	8.47%	Y
		C	Living/Dining	2%	4.18%	Y
Duplex		D	Living/Dining	2%	3.88%	Y
		E	Bedroom	1%	8.10%	Y
		F	Bedroom	1%	3.30%	Y
Duplex	9	A	Bedroom	1%	3.48%	Y
		B	Bedroom	1%	7.88%	Y
		C	Living/Dining	2%	3.90%	Y
Duplex		D	Living/Dining	2%	3.68%	Y
		E	Bedroom	1%	7.84%	Y
		F	Bedroom	1%	3.20%	Y
Duplex	10	A	Bedroom	1%	3.71%	Y
		B	Bedroom	1%	8.02%	Y
		C	Living/Dining	2%	4.03%	Y
Duplex		D	Living/Dining	2%	3.65%	Y
		E	Bedroom	1%	7.67%	Y
		F	Bedroom	1%	3.08%	Y

Table 11: BR206 Methodology Results (Block C2 – Old Standard)

Block C2 – New Standard

Proposed Units – BR209 (New) Standard							
Unit Type	Block Legend	Space Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
Duplex	8	A	Bedroom	100.00%	Y	100.00%	Y
		B	Bedroom	100.00%	Y	100.00%	Y
		C	Living/Dining	100.00%	Y	71.31%	Y
Duplex		D	Living/Dining	100.00%	Y	70.81%	Y
		E	Bedroom	100.00%	Y	100.00%	Y
		F	Bedroom	100.00%	Y	100.00%	Y
Duplex	9	A	Bedroom	100.00%	Y	99.00%	Y
		B	Bedroom	100.00%	Y	100.00%	Y
		C	Living/Dining	100.00%	Y	94.54%	Y
Duplex		D	Living/Dining	99.00%	Y	75.88%	Y
		E	Bedroom	100.00%	Y	100.00%	Y
		F	Bedroom	100.00%	Y	93.87%	Y
Duplex	10	A	Bedroom	100.00%	Y	100.00%	Y
		B	Bedroom	100.00%	Y	100.00%	Y
		C	Living/Dining	100.00%	Y	100.00%	Y
Duplex		D	Living/Dining	87.44%	N	65.21%	Y
		E	Bedroom	100.00%	Y	100.00%	Y
		F	Bedroom	100.00%	Y	100.00%	Y

Table 12: BR209 Methodology Results (Block C2 – New Standard)

Legends - Block D

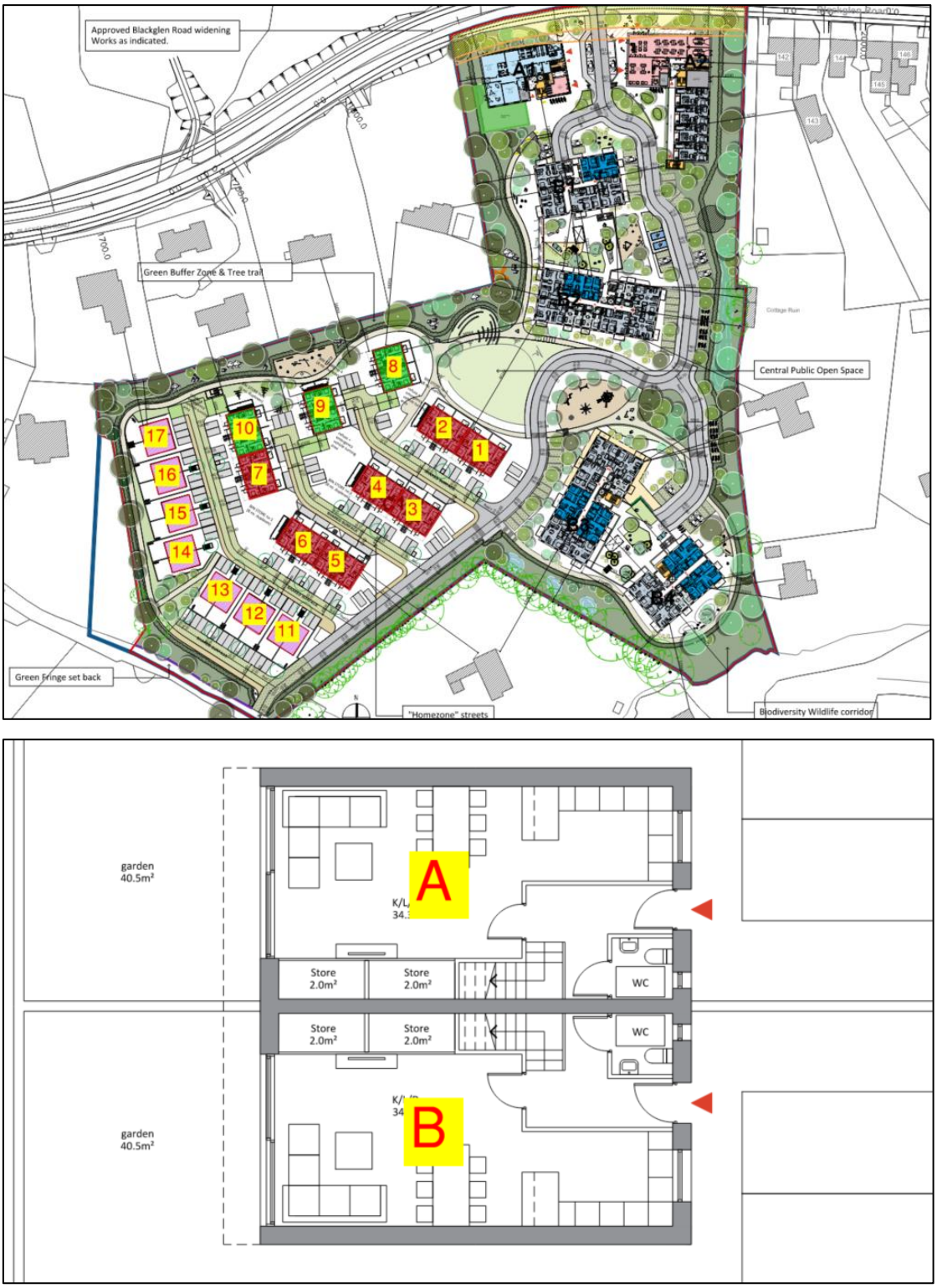


Figure 12: Block D – Level 00

Block D – Old Standard

Proposed Units – BR206 (Old) Standard						
Unit Type	Block Legend	Space Legend	Space	BS 8206 ADF requirement (%)	ADF results (%)	Meets minimum BS 8206 ADF criteria
Duplex	11	A	Living/Dining	2%	5.40%	Y
Duplex		D	Living/Dining	2%	5.29%	Y
Duplex	12	A	Living/Dining	2%	5.29%	Y
Duplex		D	Living/Dining	2%	5.34%	Y
Duplex	13	A	Living/Dining	2%	5.28%	Y
Duplex		D	Living/Dining	2%	5.36%	Y
Duplex	14	A	Living/Dining	2%	5.50%	Y
Duplex		D	Living/Dining	2%	5.56%	Y
Duplex	15	A	Living/Dining	2%	5.44%	Y
Duplex		D	Living/Dining	2%	5.37%	Y
Duplex	16	A	Living/Dining	2%	5.43%	Y
Duplex		D	Living/Dining	2%	5.46%	Y
Duplex	17	A	Living/Dining	2%	5.57%	Y
Duplex		D	Living/Dining	2%	5.48%	Y

Table 13: BR206 Methodology Results (Block D – Old Standard)

Block D – New Standard

Proposed Units – BR209 (New) Standard							
Unit Type	Block Legend	Space Legend	Space	2022 Methodology Criterion 1 (%) (Compliance at ≥ 95% @100lux)	2022 Methodology Criterion 1 Compliance	2022 Methodology Criterion 2 (%) (Compliance at ≥ 50% @300lux)	2022 Methodology Criterion 2 Compliance
Duplex	11	A	Living/Dining	100.00%	Y	99.70%	Y
Duplex		D	Living/Dining	100.00%	Y	98.80%	Y
Duplex	12	A	Living/Dining	100.00%	Y	99.69%	Y
Duplex		D	Living/Dining	100.00%	Y	99.50%	Y
Duplex	13	A	Living/Dining	100.00%	Y	99.00%	Y
Duplex		D	Living/Dining	100.00%	Y	97.00%	Y
Duplex	14	A	Living/Dining	100.00%	Y	100.00%	Y
Duplex		D	Living/Dining	100.00%	Y	97.75%	Y
Duplex	15	A	Living/Dining	100.00%	Y	97.33%	Y
Duplex		D	Living/Dining	100.00%	Y	100.00%	Y
Duplex	16	A	Living/Dining	100.00%	Y	97.02%	Y
Duplex		D	Living/Dining	100.00%	Y	94.70%	Y
Duplex	17	A	Living/Dining	100.00%	Y	99.00%	Y
Duplex		D	Living/Dining	100.00%	Y	98.00%	Y

Table 14: BR209 Methodology Results (Block D – New Standard)

7 SUNLIGHT & OVERSHADOWING ASSESSMENT TO AMENITY SPACES WITHIN THE DEVELOPMENT

BRE Guide Second Edition (2011) & BRE Guide Third Edition (2022) recommend that for external amenity spaces to appear adequately sunlit throughout the year, at least half of the garden or amenity space should receive at least two hours of sunlight on March 21st.

In order to show the sunlight levels within the proposed scheme design, a sunlight study has been carried out for the amenity space surrounding the development.

SUNLIGHT COMMUNAL AMENITY SPACES

The red squares in Figure 13 below illustrate the areas that receive a minimum of 2 hours of sunlight on the 21st of March for the proposed schemes. It is clear that the majority of the communal amenity space receive 2 hours or more of sunlight on March 21st. Therefore, compliance with BRE Guidelines is considered as achieved with regards to amenity space sunlight.

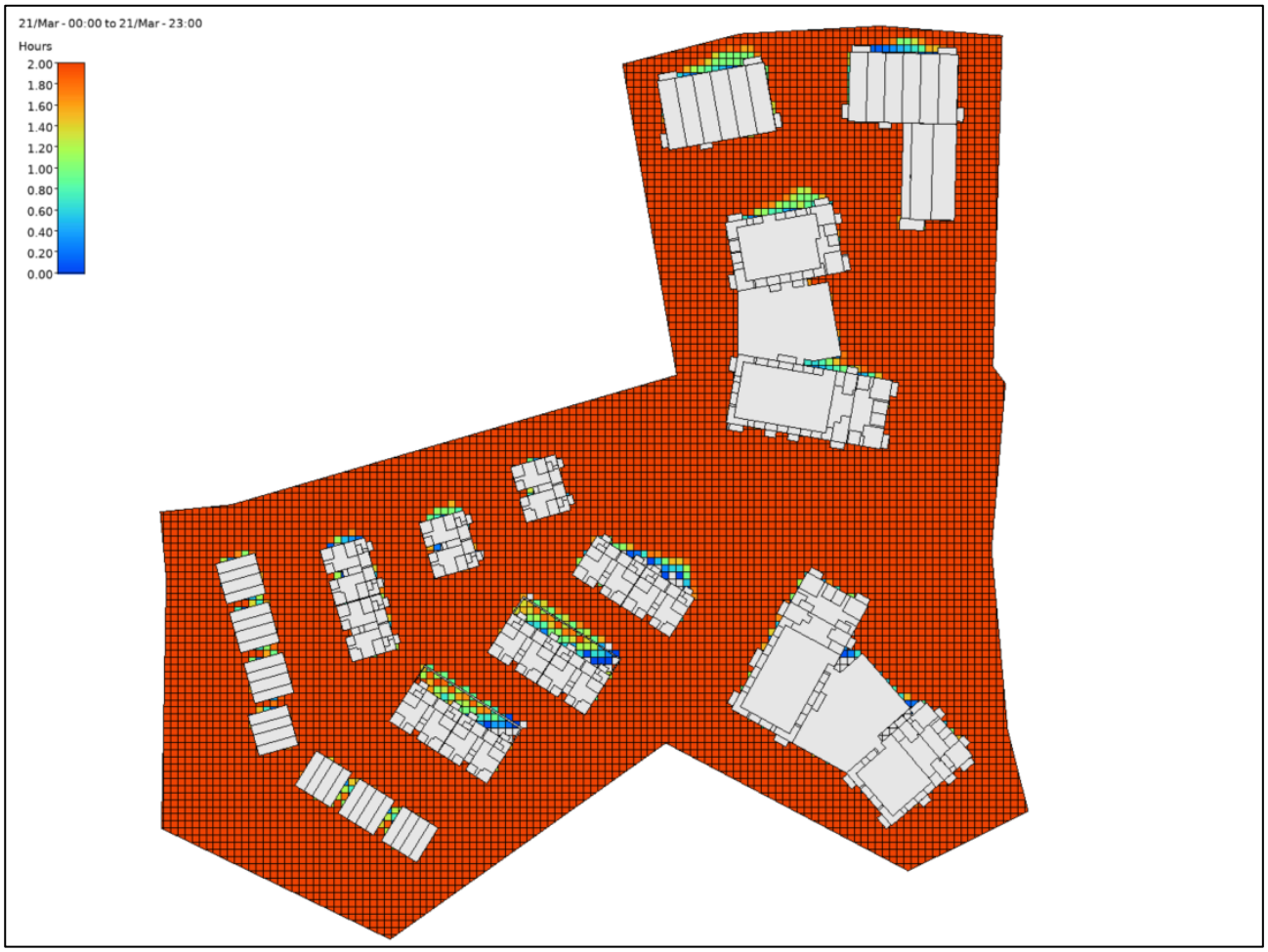
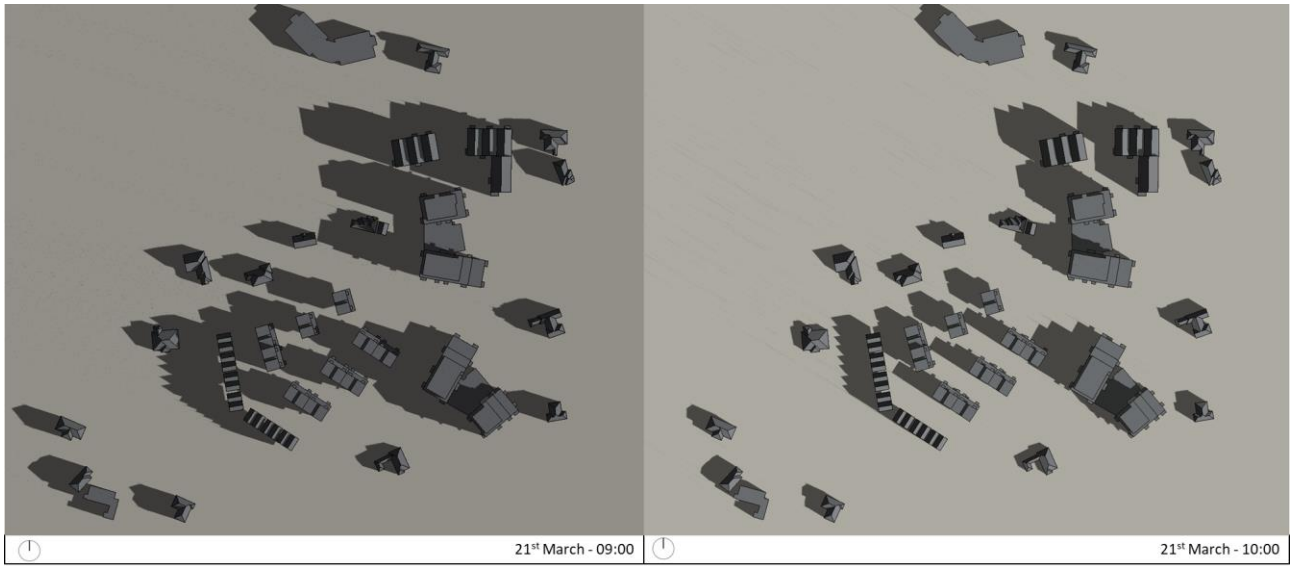
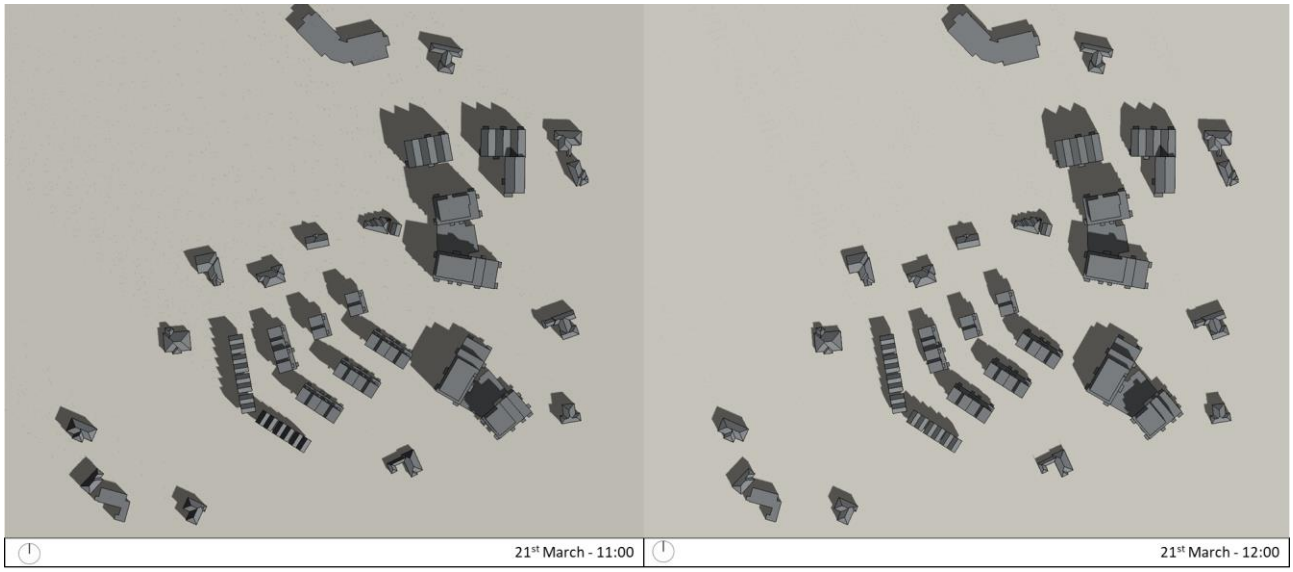
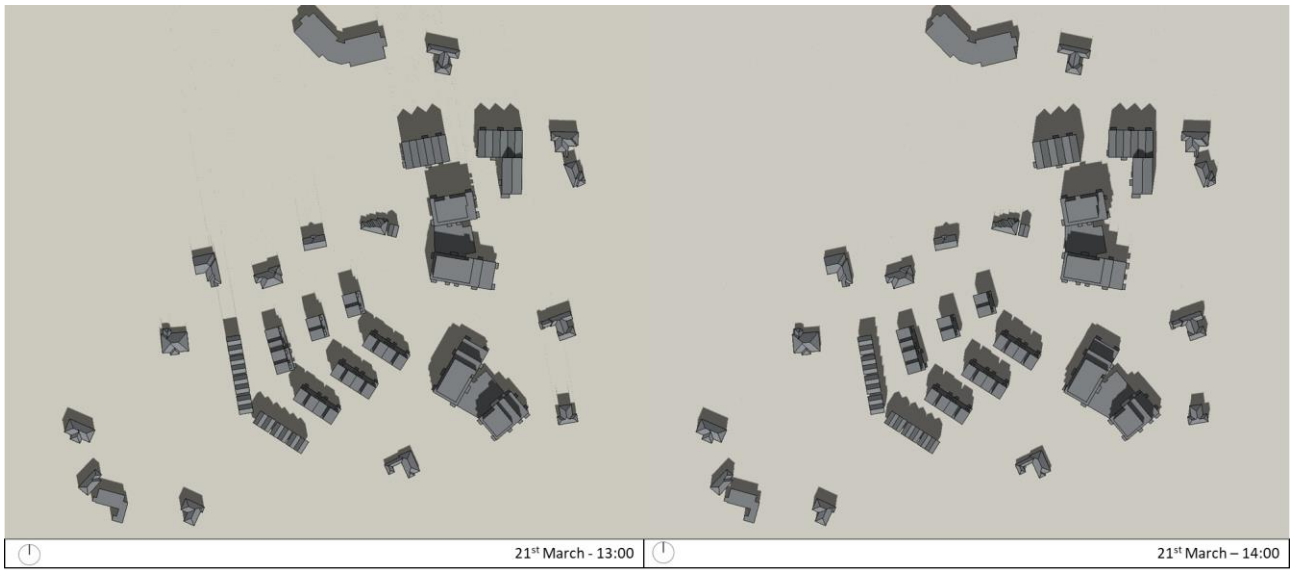


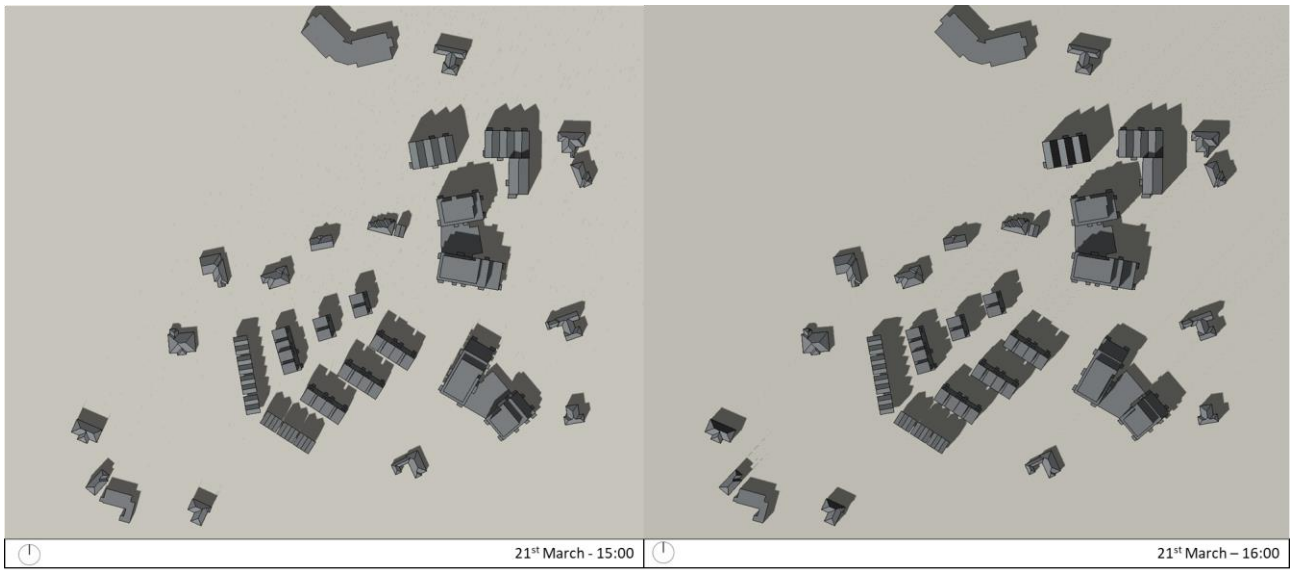
Figure 13: Public Amenity Spaces (Proposed Design) - Hours of Sunlight on March 21st

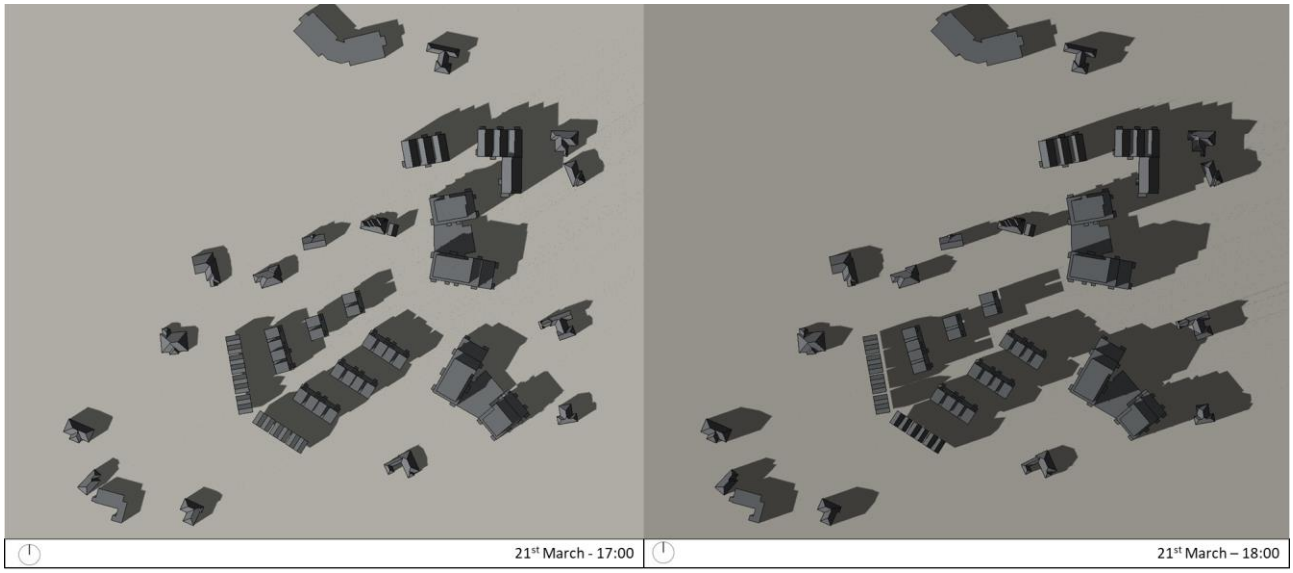
OVERSHADOWING IMAGES (PROPOSED DEVELOPMENT)








21st March - 15:00
21st March – 16:00


21st March - 17:00
21st March – 18:00

8 SUNLIGHT ASSESSMENT TO ADJACENT UNITS (APSH)

In order to assess the amount of sunlight that is received by windows within the proposed development, the Annual Probable Sunlight Hours (APSH) calculation methods as outlined in BRE Guide Second Edition (2011) and Third Edition (2022) have been used.

BRE Guidelines outline that in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day but especially in the afternoon. BRE Guidelines also state that sunlight is less important in bedrooms and kitchens, however, all windows to occupied rooms within the development have been included within the analysis.

Sunlight access was firstly assessed against the methodology detailed in BRE Guide Second Edition. This methodology requires that a given window receives greater than or equal to 25% of available sunlight hours across the year, and greater than equal to 5% of available sunlight hours across the winter months in order to achieve compliance.

It must be noted that the results within this report should be treated with certain degree of flexibility, based on the following statement in the BRE Guidelines:

"the guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design".

In addition, BRE Guidelines states that "the degree of satisfaction is related to the expectation of sunlight. If a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary".

SUNLIGHT ASSESSMENT – (2011 METHODOLOGY)

Sunlight access is also assessed against the methodology detailed in BRE Guide Second Edition. This methodology requires that a given window receives greater than or equal to 25% of available sunlight hours across the year, and greater than equal to 5% of available sunlight hours across the winter months.

	BRE Guidelines Check 1 APSH > 25% Annual Period	BRE Guidelines Check 2 APSH > 5% Winter Period
Windows Passing	559	587
Total No. of Windows Analysed	948	948
Percentage of Compliance	59%	62%

Table 15: Proposed Scheme – APSH Summary Table

9 ASSESSING THE IMPACT ON SURROUNDING PROPERTIES

DAYLIGHT & SUNLIGHT IMPACT METHODOLOGY

As per the BRE Guidelines it is important to safeguard the daylight to nearby buildings, from a proposed development, where a reasonable expectation of daylight is required. The flow matrix below outlines the criteria to be assessed, as per the BRE Guidelines, in order to ascertain any potential impact to adjacent buildings from the proposed development.

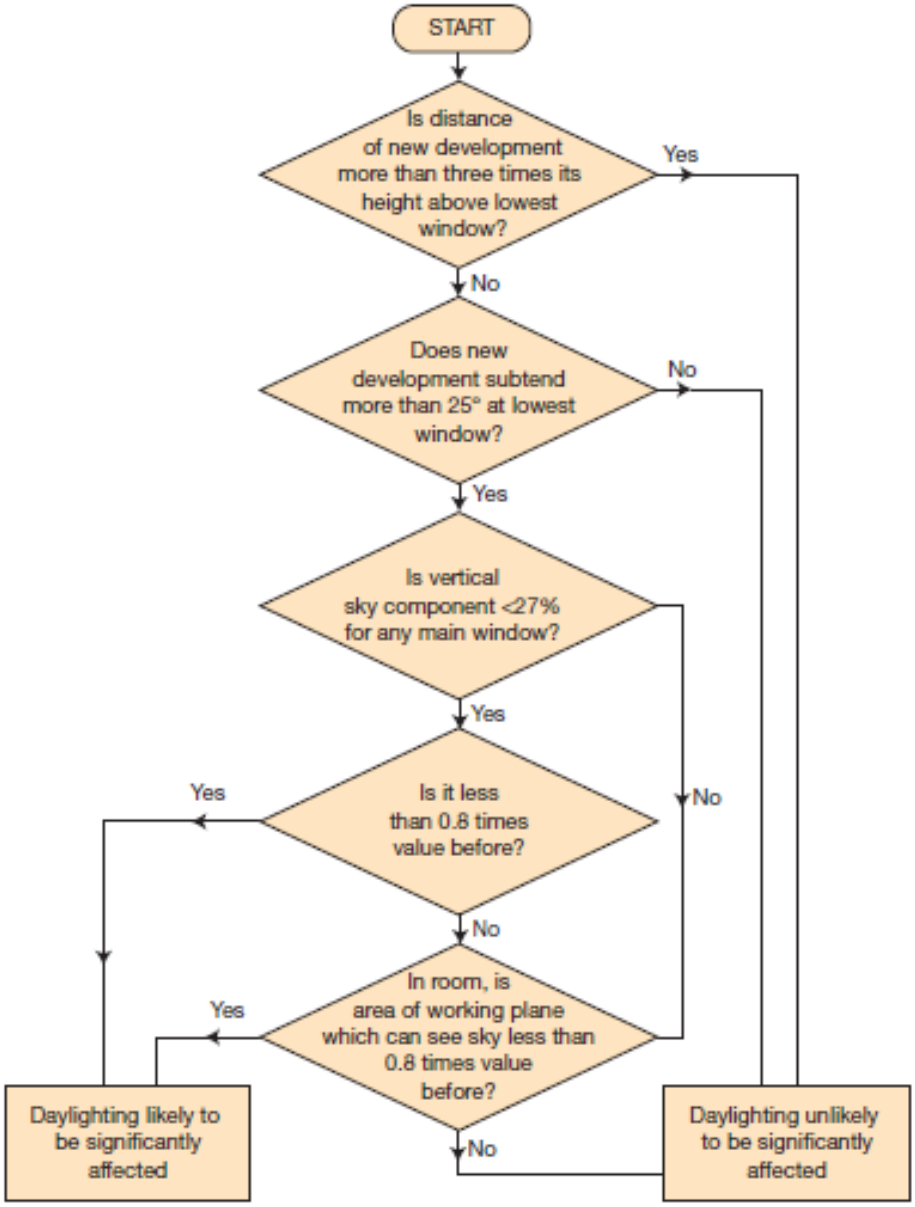


Figure 14: Daylight Assessment Methodology

DISTANCE FROM THE PROPOSED DEVELOPMENT – STEP 1

As per the flow matrix, the loss of light to existing windows is not required to be analysed if the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing windows. Otherwise, BRE guideline provide the following methods for assessing daylight availability.

25º LINE CRITERIA – STEP 2

In the first instance, if a proposed development falls beneath a 25° angle taken from a point 1.6 metres above ground level from any adjacent properties, then the BRE Guidelines say that no further analysis is required in relation to impact on surrounding properties as adequate skylight will still be available. If the proposed development extends beyond the 25° line then further analysis is required (Step 3).

VERTICAL SKY COMPONENT – STEP 3

The following method is known as the Vertical Sky Component (VSC). The VSC calculation is the ratio of the direct sky illuminance falling on the outside of a window, to the simultaneous horizontal illuminance under an unobstructed sky. The BRE Guide sets out two guidelines for the VSC:

- If the VSC at the centre of the existing window exceeds 27% with the new development in place, then enough sky light should still be reaching the existing window;
- If the VSC with the new development in place is both less than 27% and less than 80% its former value, then the reduction in light to the window is likely to be noticeable;
- This means that even if the VSC is less than 27%, as long as the VSC value is still greater than 80% of its former value, this would be acceptable and thus the impact would be considered negligible.

It is important to note that the VSC is a simple geometrical calculation which provides an early indication of the potential for daylight entering the space. However, it does not assess or quantify the actual daylight levels inside the rooms. If the VSC standard is not met on any window, Step 4 is then followed.

NO SKY LINE – STEP 4

This method is the No Sky Line or Daylight Distribution Method. This method assesses the change in position of the No Sky Line between the existing and proposed situations. It does take into account the number and size of windows to a room, but still does not give any qualitative or quantitative assessment of the light in the room, only where sky can or cannot be seen. Thus, as this method is limited, Step 3 is considered more appropriate.

Next two sections on the following pages outline the details of the analysis undertaken.

IDENTIFYING SENSITIVE RECEPTORS

Prior to following the flow matrix, first the key sensitive receptors around the site need to be identified. According to the BRE Guide, sensitive receptors are described as:

- Habitable rooms in residential buildings, where the occupants have a reasonable expectation of daylight;
- Other sensitive receptors are gardens and open spaces on adjacent properties to the new scheme, excluding public footpaths, front gardens and car parks. In accordance with the BRE Guide, windows are selected as sensitive receptors on the basis of being a habitable room facing the proposed development.

Similarly, amenities and open spaces are selected on the basis of being in the immediate vicinity of the proposed development. The primary purpose of a daylight, sunlight and overshadowing assessment is to determine the likely loss of light to adjacent buildings resulting from the construction of the proposed development.

Therefore, in this case, the proposed development is identified as the potential source of impact. The sensitive receptors identified for this study are windows of habitable rooms facing the site where the occupants have a reasonable expectation of daylight. Table 16 identifies all sensitive receptors analysed, whilst Figure 15 identifies their location.

Development Ref.	Development name	Status
X-1	Nearby houses to the north side	Existing
X-2	Nearby houses to the east side	Existing
X-3	Nearby houses to the east side	Existing
X-4	Nearby houses to the east side	Existing
X-5	Nearby houses to the east side	Existing
X-6	Nearby houses to the south side	Existing
X-7	Nearby houses to the west side	Existing
X-8	Nearby houses to the west side	Existing
X-9	Nearby houses to the west side	Existing
X-10	Nearby houses to the west side	Existing
X-11	Nearby houses to the west side	Existing

Table 16: Sensitive Receptors surrounding the proposed development



Figure 15: Location of sensitive receptors

DAYLIGHT IMPACT ON SURROUNDING PROPERTIES

25º line criteria

BRE Guidelines state that if a proposed development falls beneath a 25° line taken from a point 1.6 metres above ground level from any adjacent properties, then no impact is perceived, and further analysis is not required. This methodology was followed for this analysis (to assess the impact of the reduction in block heights), as it was followed for the initial assessment for the permitted.

As the sensitivity receptors fall above the 25° line (Step 2), a VSC assessment was then carried out (Step 3).

VSC > 27%

As previously outlined, sensitive receptor ref. X-1 to 11 have been selected for VSC analysis. A sample of 'worst case' windows located at the lower levels were modelled to give a good indication of the daylight impact that will be perceived by sensitive receptor. Since the VSC with the proposed development in place is greater than 80% of its former value to all spaces, then no further action is required in accordance with BRE Guideline.

Ref.	Window	VSC received proposed scheme (%)	VSC received before proposed scheme (%)	Percentage of its former value (%)	Meets BRE Guidelines VSC>80% of its former value
X-1	West Window	37.04	36.96	100%	Y
	South Window	33.75	38.50	88%	Y
X-2	West Window 1	31.25	36.33	86%	Y
	West Window 2	31.43	37.60	83%	Y
	South Window	32.29	34.76	93%	Y
X-3	West Window	31.79	38.26	83%	Y
X-4	West Window	25.40	26.72	95%	Y
X-5	West Window	27.57	33.46	82%	Y
X-6	North Window 1	34.50	38.40	90%	Y
	North Window 2	34.70	38.25	91%	Y
X-7	South Window	36.41	37.81	96%	Y
	East Window	34.90	37.86	92%	Y
X-8	South Window 1	36.34	37.81	96%	Y
	South Window 2	30.52	31.98	95%	Y
	East Window	38.83	39.31	99%	Y
X-9	South Window	32.98	36.82	90%	Y
X-10	South Window	35.14	37.83	93%	Y
X-11	South-East Window	34.85	37.33	93%	Y

Table 17: VSC for Sensitive Receptors surrounding the proposed development

***Note:** We have revised the VSC results for X-2 based on the latest available site survey drawings. The updated analysis confirms that X-2 meets the VSC requirements.*

10 CONCLUSION

The Blackglen Road residential development has been analysed in order to determine the following:

- The daylight levels within the living and bedroom areas on selected lower floor units within the development;
- The quality of amenity space being provided as part of the development, in relation to sunlight – with proposed scheme;
- A secondary assessment has also been carried out assessing all apartments against the BRE Guide Third Edition (2022);
- The impact of the amended scheme to the adjacent properties surrounding the proposed development.

Calculations and methodology used are in accordance with BRE Guidelines for daylight and sunlight and based on the British Research Establishments "Site Layout Planning for Daylight and Sunlight: A Good Practice Guide" by PJ Littlefair, 2022 Third Edition, and 2011 Second Edition. However, the following text from BS 8206 should be reiterated as previously outlined:

"The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather that constrain the designer. Although it gives numeral guidelines these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design"

Internal Daylight

The analysis confirms that the majority of spaces not only meet but greatly exceed the recommendations outlined within the BRE Guidelines 2011 guidance - achieving a 93% compliance rate with the Second Edition (2011) methodology. In relation to the Third Edition (2022) methodology, 95% for Criterion 1 and 94% for Criterion 2 of proposed development has been achieved.

Sunlight

Sunlight analysis has shown that excellent levels of amenity sunlight will be achieved within the proposed development. At least 2 hours of sunlight are achieved on March 21st on the majority of the amenity spaces provided, both with and without the amended scheme - thus complying with BRE Guidelines.

Overshadowing

The overshadowing images have shown that there is a negligible impact to the surrounding units when the proposed schemes are assessed on the 21st March test day.

Impact to neighbouring properties

Following the incorporation of the proposed modifications, the VSC at all the windows assessed within the surrounding properties, when analysing the VSC of the proposed scenario a daylight impact will not be perceived for sensitive receptor as the VSC remains greater than 80% of its former value. The analysis confirms that proposed development, on the adjacent buildings has not perceived any impacts.

Note: *We have revised the VSC results for X-2 based on the latest available site survey drawings. The updated analysis confirms that X-2 meets the VSC requirements.*

11 VERIFICATION

This report was compiled and verified by:

Ashish Nautiyal [B.Tech. Mechanical Engineering]

Senior Sustainability Engineer

O'Connor Sutton Cronin & Associates

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