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1.0. INTRODUCTION

This report compiles the daylight and sunlight analysis as undertaken by Black & White for the Proposed development at Cherrywood – Lehaunstown Housing, Co Dublin.

The report has been prepared as a desktop exercise with 3D massing and survey information provided by others. No site visits took place as the information provided included all relevant required information and our understanding is that any survey information or 3D models provided were carried out by relevant suitably qualified professionals.

IES VE 2023 (Radiance module) program was utilized in the analysis of the proposed development.

The following standards and guidance documents have been consulted when compiling this report to ensure compliance with the various Daylight and Sunlight requirements as applicable and relevant:

- a) The Building Research Establishment’s (BRE) Site Layout Planning for Daylight and Sunlight: A guide to good practice (BRE 209) 3rd edition/ 2022 edition, (the “**BRE Guide**”).
- b) British Standard BS EN 17037:2018 – Daylight in Buildings (the “**2018 British EN Standard**”).
- c) Irish Standard IS EN 17037:2018 (the “**2018 Irish EN Standard**”).

It should be noted at the outset that the 2008 British Standard has been superseded by the 2018 British Standard, and BRE Guide 2nd Edition has been superseded by BRE Guide 2022 edition. Both previous revisions have now been withdrawn.

EN 17037:2018, which was approved by the CEN on 29 July 2018 has been adopted in the UK as BS EN 17037:2018, and in Ireland as IS EN 17037:2018. The texts of the 2018 British Standard and the 2018 Irish Standard are the same, with one exception. The exception is that the 2018 British Standard contains an additional “National Annex” which specifically sets out requirements within dwellings, to ensure some similarity to the now superseded 2008 British Standard.

Appendix I Guidance with regard to Sunlight and Daylight Assessment of Proposed Developments

“Proposals for development should include technical assessments in accordance with BR209 Site Layout Planning for Daylight & Sunlight A Guide to Good Practice Third Edition – 2022 and the Irish Standard IS EN 17037:2018 which differs from BS EN 17037. There is cognizance of the fact that IS EN 17037 does not currently include a localizing National Annex. An Applicant may wish to additionally provide results in terms of the BS EN 17037 National Annex NA and should support this with commentary for consideration. “

The following parameters were assessed as a part of Sunlight and Daylight analysis for the proposed development.

1. Exposure to Sunlight
2. Internal Daylight Analysis
 - a. Minimum target illuminance (E_{TM})
 - b. Daylight factor (D_T)

2.0. DEVELOPMENT DESCRIPTION

The subject site for this Daylight and Sunlight Analysis report is the proposed residential development at Lehaunstown Land, Cherrywood.

The subject site for this Lighting Impact Assessment report is the proposed residential development at Lehaunstown Land, Cherrywood.

The site is located off Lehaunstown Lane, Laughanstown, Co Dublin. It consists of a rectangular plot of land in agricultural use with an area of approximately 3.58 hectares.

The development, accessed via a new road connecting the development site to The Parade, consists of 109 residential units made up of terraced houses, duplexes and apartment buildings ranging in height from 2 to 4 storeys organised around a hierarchy of pedestrian-oriented spaces together with associated surface and underground parking, ESB substations, cycle parking, communal and public open space and associated landscaping.



Figure A - Proposed Site Plan

3.0. EXPOSURE TO SUNLIGHT (ASSESSMENT METHODOLOGY)

Exposure to sunlight is an important quality criterion of an interior space and can contribute to human well-being. Minimum exposure to sunlight should be provided in patient rooms in hospitals, playrooms in nurseries and at least one habitable space in dwellings. This is achieved through the expression of the minimum number of hours during which this space receives direct sunlight, for a clear cloudless reference day in the year.

In general, a dwelling, or non-domestic building that has a particular requirement for sunlight, will appear reasonably sunlit provided:

- at least one main window wall faces within 90° of due south and
- a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March. This is assessed at the inside center of the window(s); sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double counted.

When applying the recommendation to a whole dwelling, the proposal is that at least one habitable room in the dwelling should have at least exposure to sunlight per below table.

Level of recommendation for exposure to sunlight	Sunlight exposure
Minimum	1,5 h
Medium	3,0 h
High	4,0 h

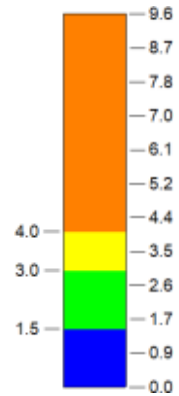
Table A.6 – BS/IS EN 17037-2018 Recommendation for daily sunlight exposure.

4.0. SUNLIGHT EXPOSURE (21ST MARCH) RESULTS

An analysis was undertaken for each unit in the proposed development to assess the exposure to sunlight that each unit can receive, assessing initially KLD's and where these were found to be non-compliant, a check was undertaken to determine whether a Bedroom could achieve adequate sunlight in accordance with the methodology.

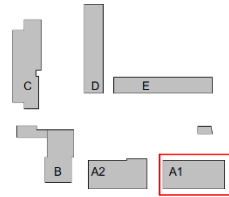
Results as presented within the report to indicate their Exposure to Sunlight classification in accordance with BR.209/ISp EN.17037 may be interpreted as follows:

- Orange – High (4.0 + hrs.)
- Yellow – Medium (3.0 - 4.0 hrs.)
- Green – Minimum (1.5 - 3.0 hrs.)
- Blue – Low/ Non-Compliant (<1.5 hrs.)

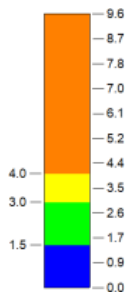


Block A1 – Ground Floor (Level 00)

Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.

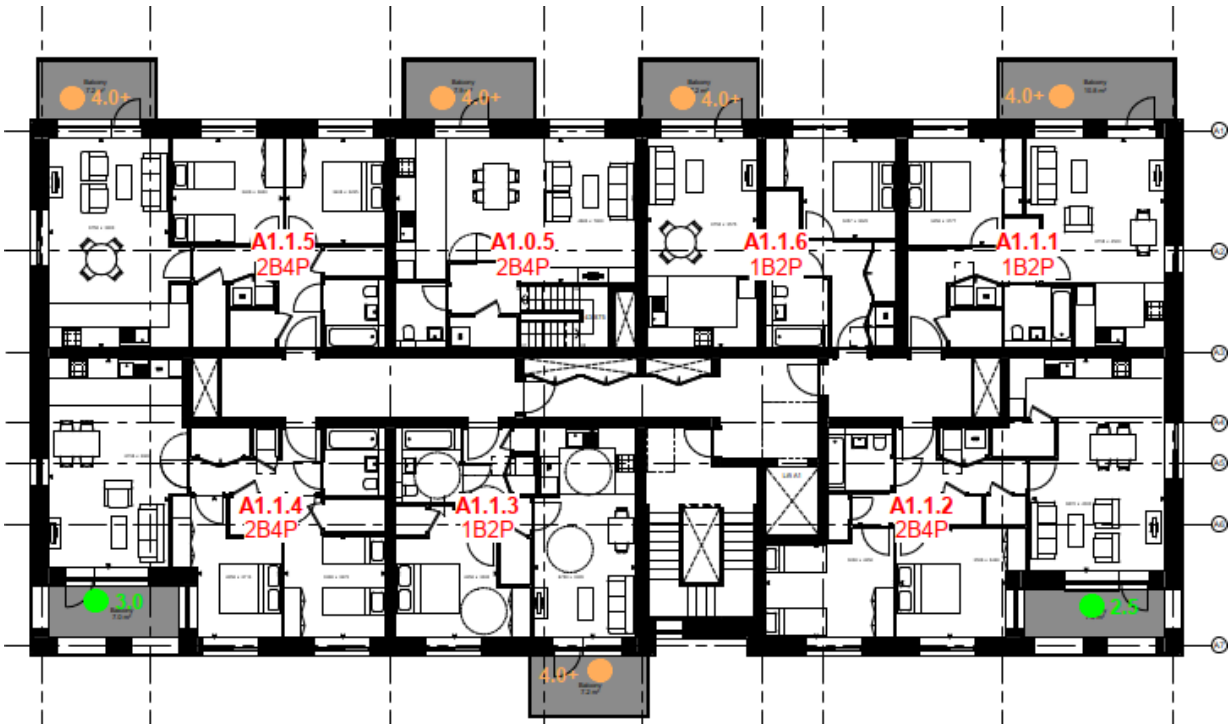
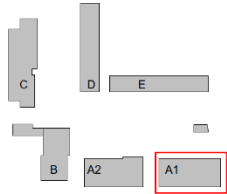


Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
A1.0.1	Block-A1	4+ Hrs.	PASS
A1.0.2	Block-A1	4+ Hrs.	PASS
A1.0.3	Block-A1	4+ Hrs.	PASS
A1.0.4	Block-A1	4+ Hrs.	PASS
A1.0.5	Block-A1	4+ Hrs.	PASS

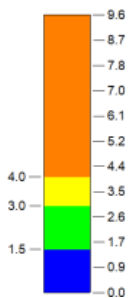


Block A1 – First Floor (Level 01)

Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.

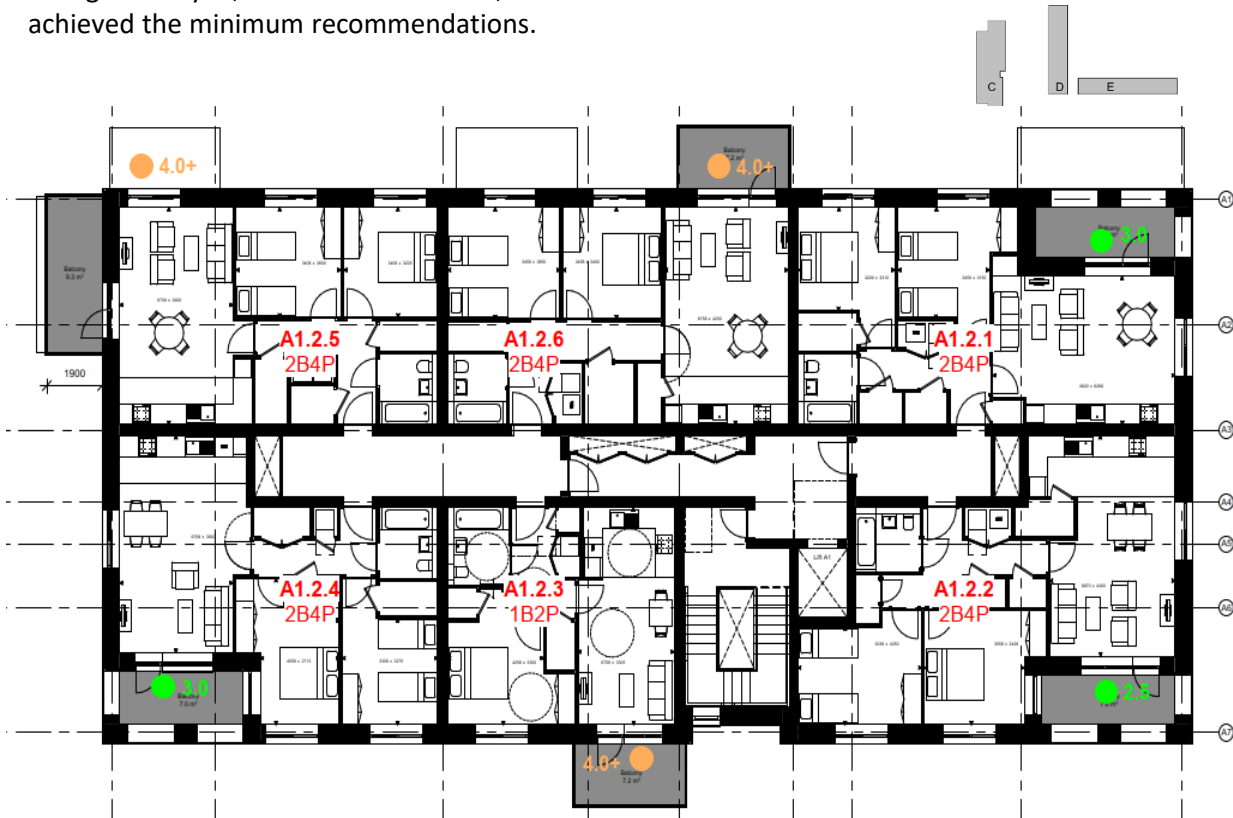


Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
A1.1.1	Block-A1	4+ Hrs.	PASS
A1.1.2	Block-A1	2.5 Hrs.	PASS
A1.1.3	Block-A1	4+ Hrs.	PASS
A1.1.4	Block-A1	3.0 Hrs.	PASS
A1.1.5	Block-A1	4+ Hrs.	PASS
A1.0.5	Block-A1	4+ Hrs.	PASS
A1.1.6	Block-A1	4+ Hrs.	PASS



Block A1 – Second Floor (Level 02)

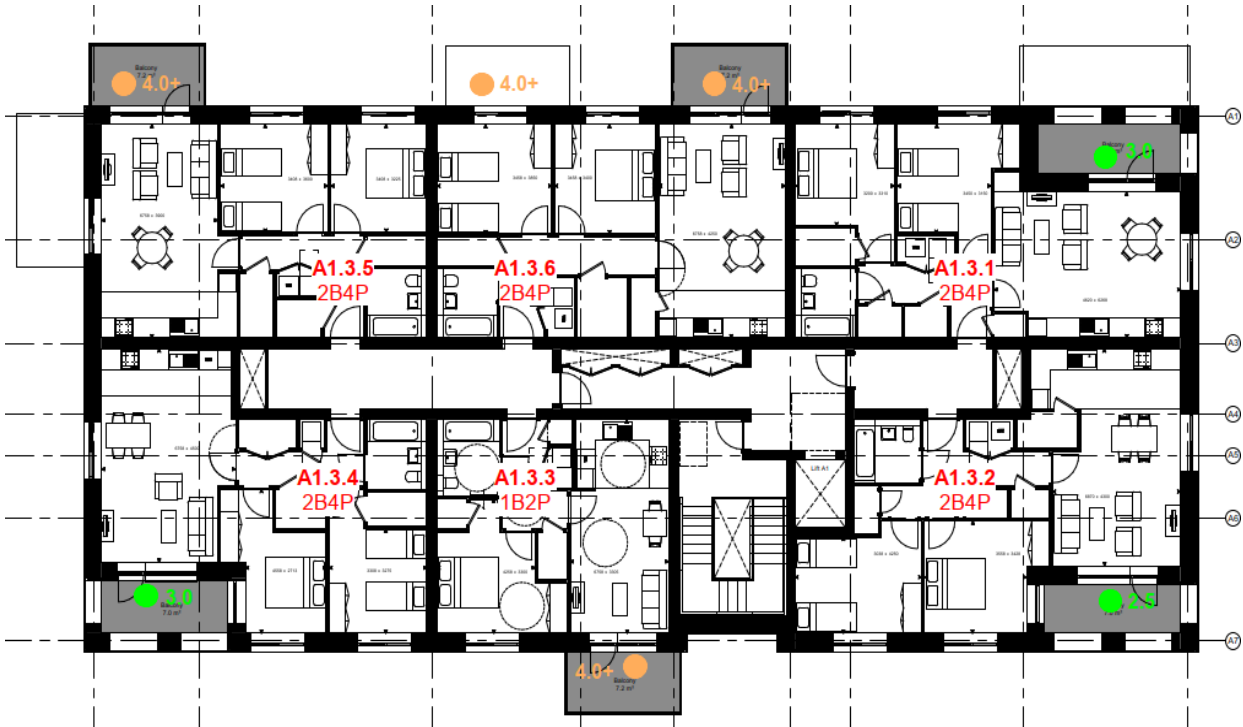
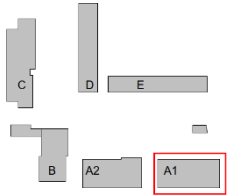
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



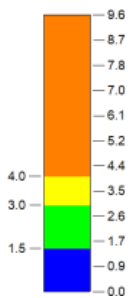
Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
A1.2.1	Block-A1	3.0 Hrs.	PASS
A1.2.2	Block-A1	2.5 Hrs.	PASS
A1.2.3	Block-A1	4+ Hrs.	PASS
A1.2.4	Block-A1	3.0 Hrs.	PASS
A1.2.5	Block-A1	4+ Hrs.	PASS
A1.2.6	Block-A1	4+ Hrs.	PASS
A1.2.1	Block-A1	3.0 Hrs.	PASS

Block A1 – Third Floor (Level 03)

Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.

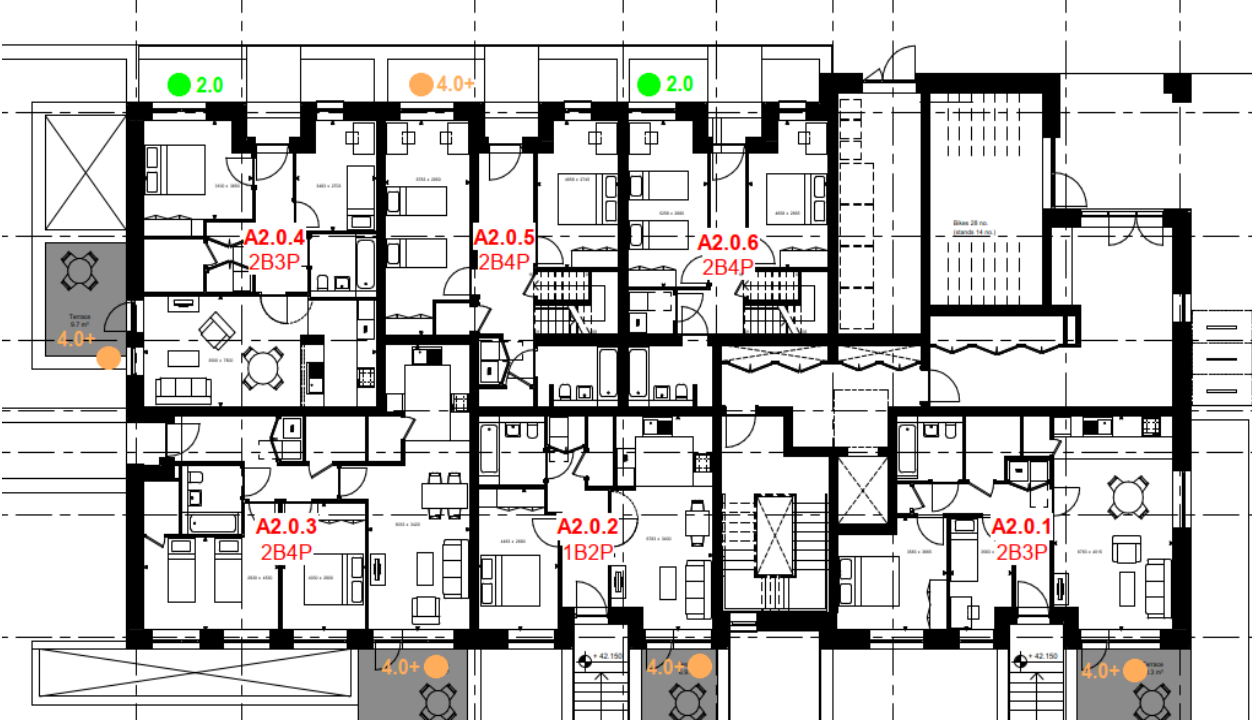
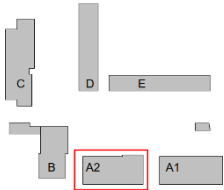


Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
A1.3.1	Block-A1	3.0 Hrs.	PASS
A1.3.2	Block-A1	2.5 Hrs.	PASS
A1.3.3	Block-A1	4+ Hrs.	PASS
A1.3.4	Block-A1	3.0 Hrs.	PASS
A1.3.5	Block-A1	4+ Hrs.	PASS
A1.3.6	Block-A1	4+ Hrs.	PASS
A1.3.1	Block-A1	3.0 Hrs.	PASS



Block A2 – Ground Floor (Level 00)

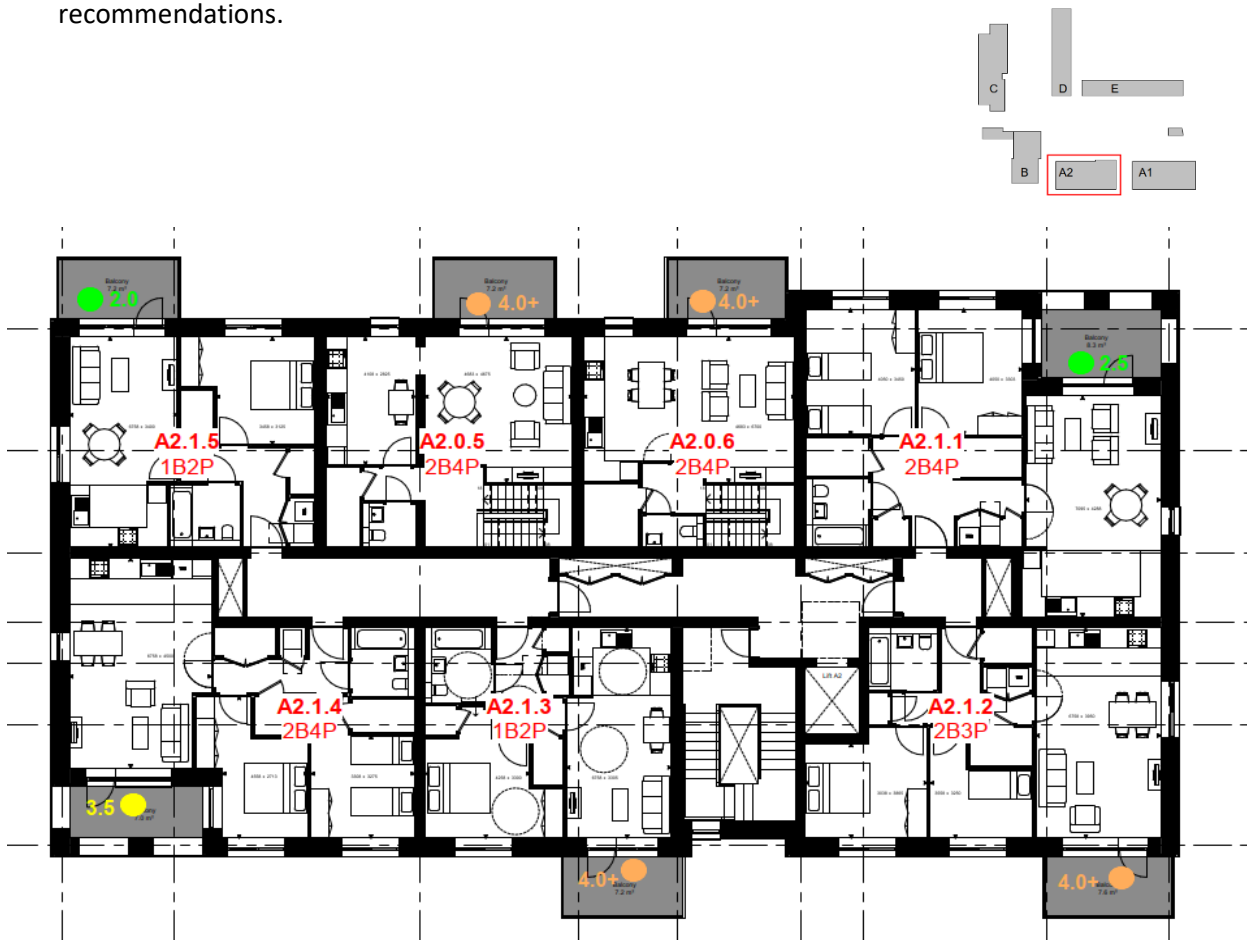
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
A2.0.1	Block-A2	4+ Hrs.	PASS
A2.0.2	Block-A2	4+ Hrs.	PASS
A2.0.3	Block-A2	4+ Hrs.	PASS
A2.0.4	Block-A2	2.0 Hrs.	PASS
A2.0.5	Block-A2	4+ Hrs.	PASS
A2.0.6	Block-A2	2.0 Hrs.	PASS

Block A2 – First Floor (Level 01)

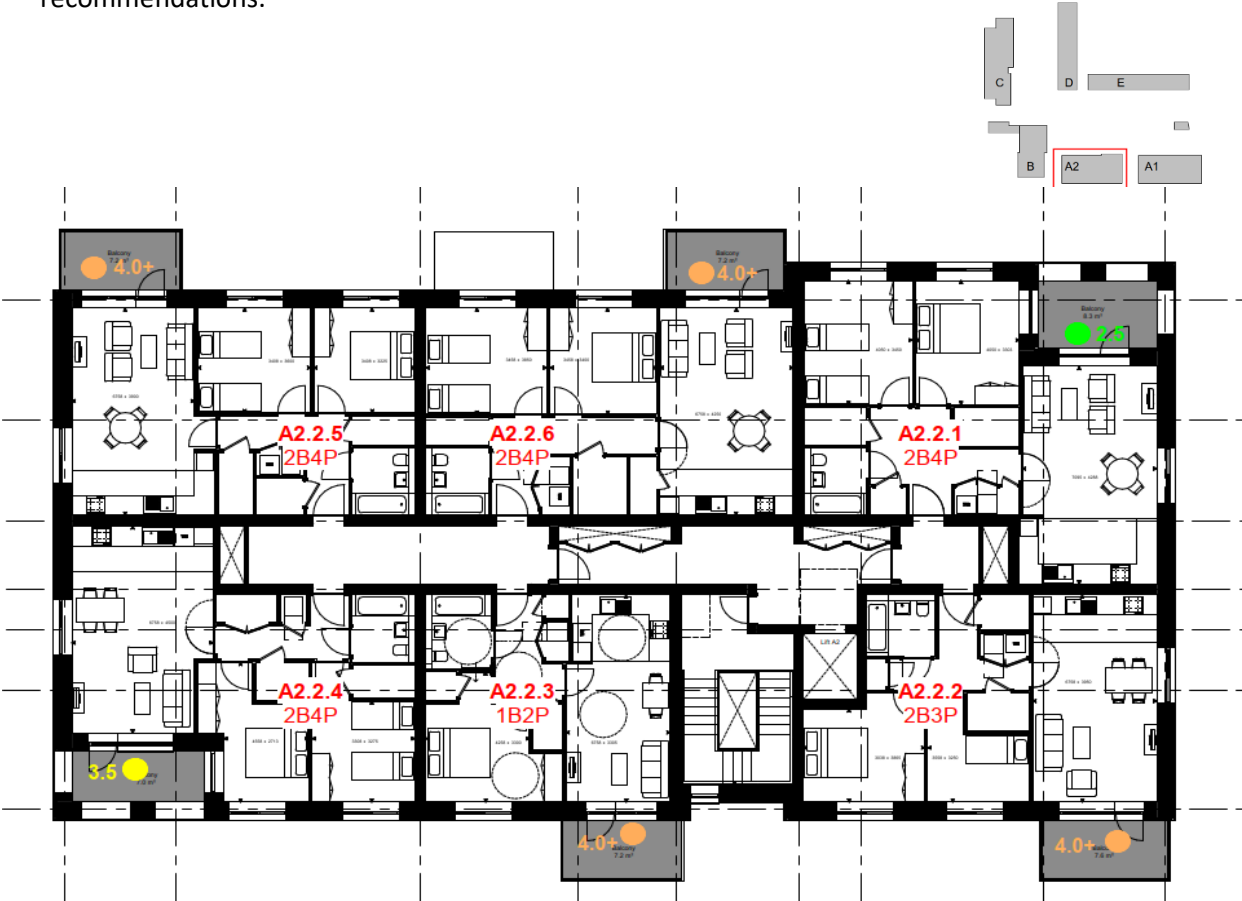
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
A2.1.1	Block-A2	2.5 Hrs.	PASS
A2.1.2	Block-A2	4+ Hrs.	PASS
A2.1.3	Block-A2	4+ Hrs.	PASS
A2.1.4	Block-A2	3.5 Hrs.	PASS
A2.1.5	Block-A2	2.0 Hrs.	PASS
A2.0.5	Block-A2	4+ Hrs.	PASS
A2.0.6	Block-A2	4+ Hrs.	PASS

Block A2 – Second Floor (Level 02)

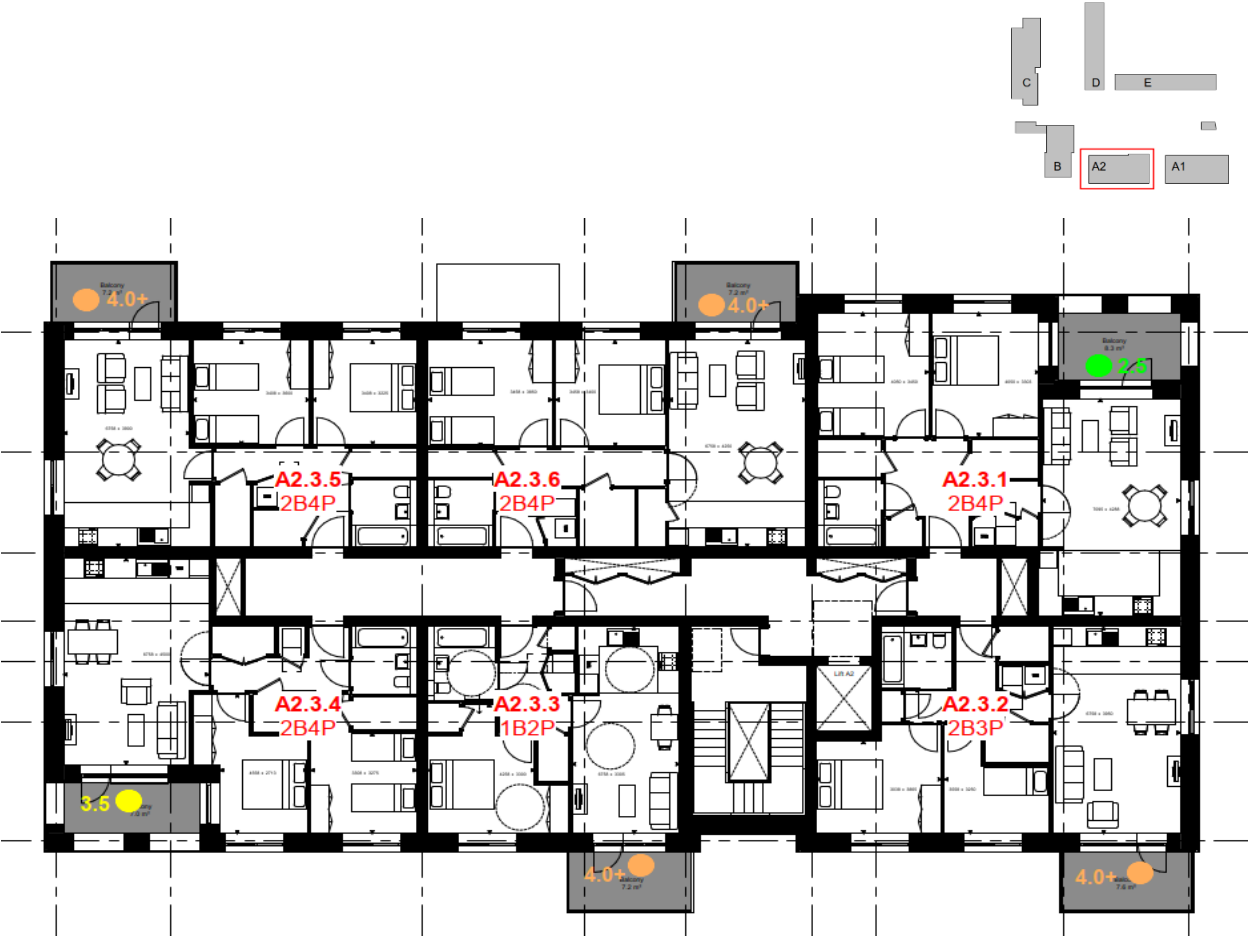
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or fail
A2.2.1	Block-A2	2.5 Hrs.	PASS
A2.2.2	Block-A2	4+ Hrs.	PASS
A2.2.3	Block-A2	4+ Hrs.	PASS
A2.2.4	Block-A2	3.5 Hrs.	PASS
A2.2.5	Block-A2	4+ Hrs.	PASS
A2.2.6	Block-A2	4+ Hrs.	PASS
A2.2.1	Block-A2	2.5 Hrs.	PASS

Block A2 – Third Floor (Level 03)

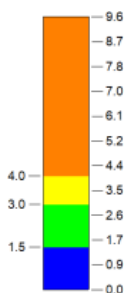
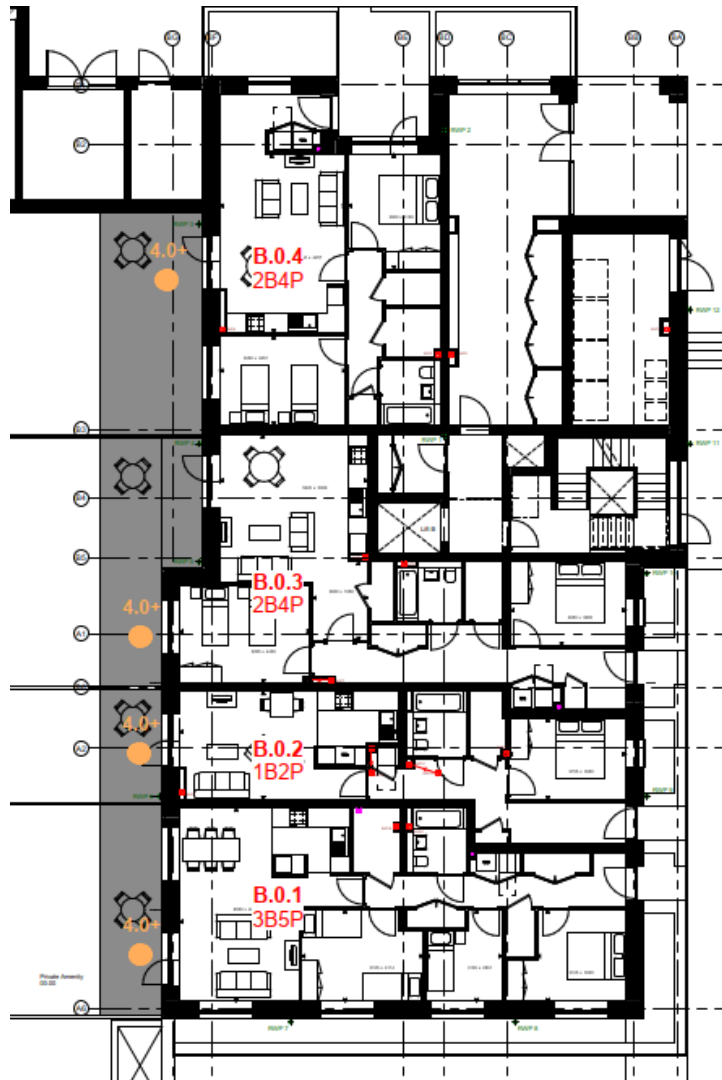
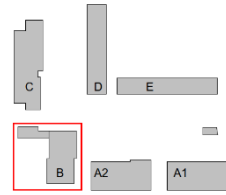
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or fail
A2.3.1	Block-A2	2.5 Hrs.	PASS
A2.3.2	Block-A2	4+ Hrs.	PASS
A2.3.3	Block-A2	4+ Hrs.	PASS
A2.3.4	Block-A2	3.5 Hrs.	PASS
A2.3.5	Block-A2	4+ Hrs.	PASS
A2.3.6	Block-A2	4+ Hrs.	PASS
A2.3.1	Block-A2	2.5 Hrs.	PASS

Block B – Ground Floor (Level 00)

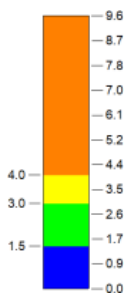
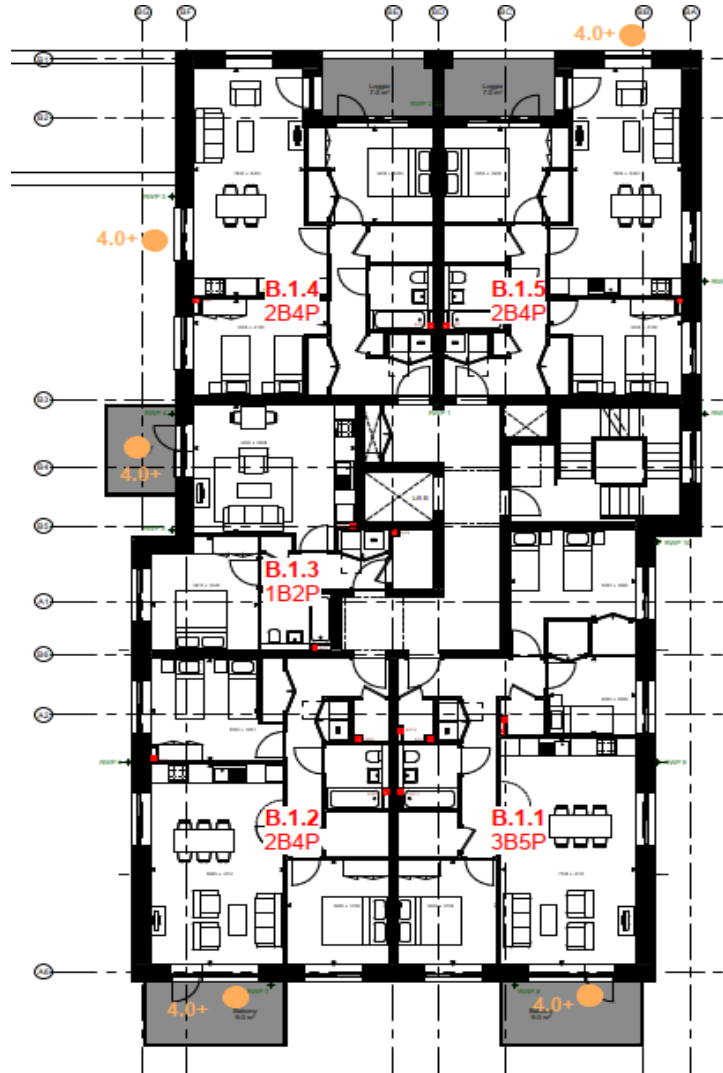
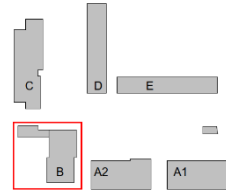
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
B.0.1	Block-B	4+ Hrs.	PASS
B.0.2	Block-B	4+ Hrs.	PASS
B.0.3	Block-B	4+ Hrs.	PASS
B.0.4	Block-B	4+ Hrs.	PASS

Block B – First Floor (Level 01)

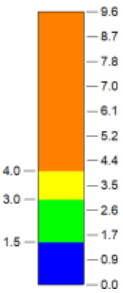
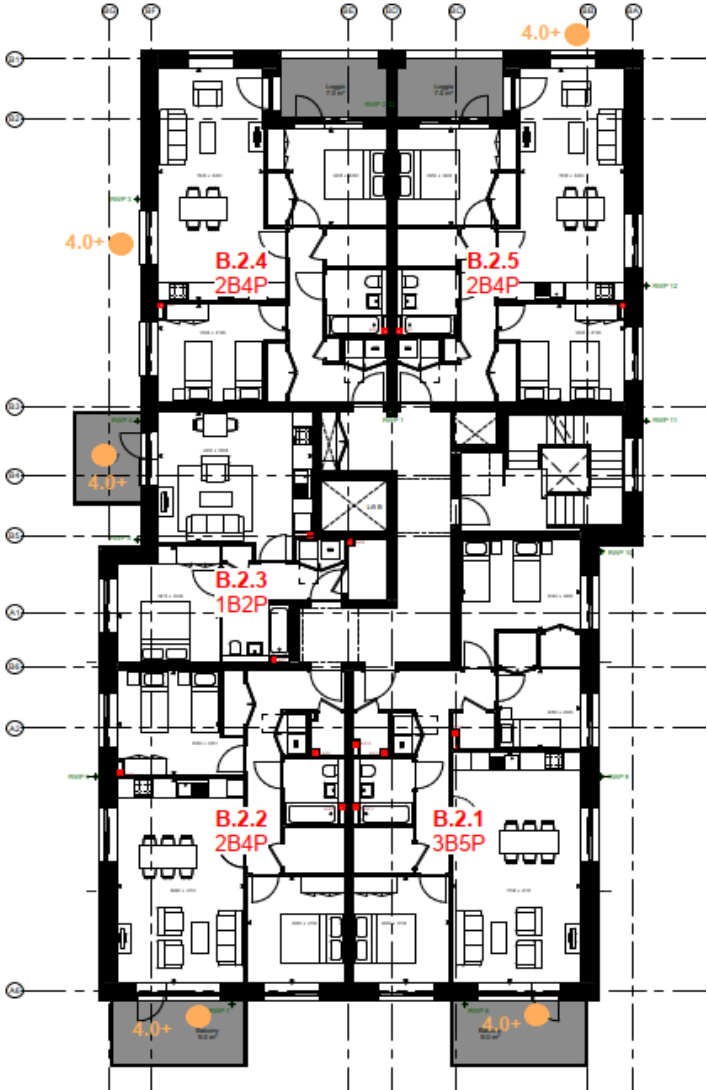
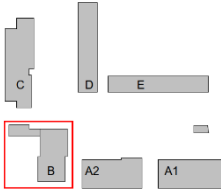
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
B.1.1	Block-B	4+ Hrs.	PASS
B.1.2	Block-B	4+ Hrs.	PASS
B.1.3	Block-B	4+ Hrs.	PASS
B.1.4	Block-B	4+ Hrs.	PASS
B.1.5	Block-B	4+ Hrs.	PASS

Block B – Second Floor (Level 02)

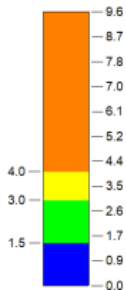
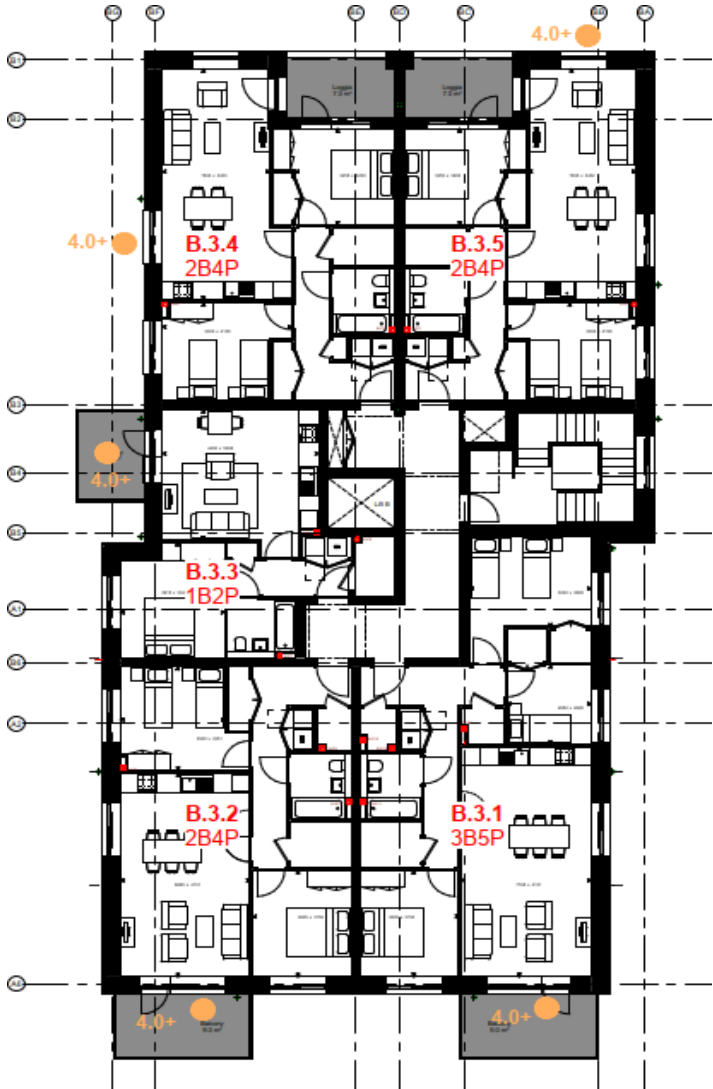
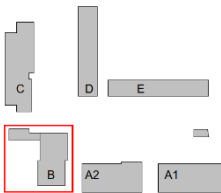
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
B.2.1	Block-B	4+ Hrs.	PASS
B.2.2	Block-B	4+ Hrs.	PASS
B.2.3	Block-B	4+ Hrs.	PASS
B.2.4	Block-B	4+ Hrs.	PASS
B.2.5	Block-B	4+ Hrs.	PASS

Block B – Third Floor (Level 03)

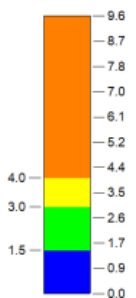
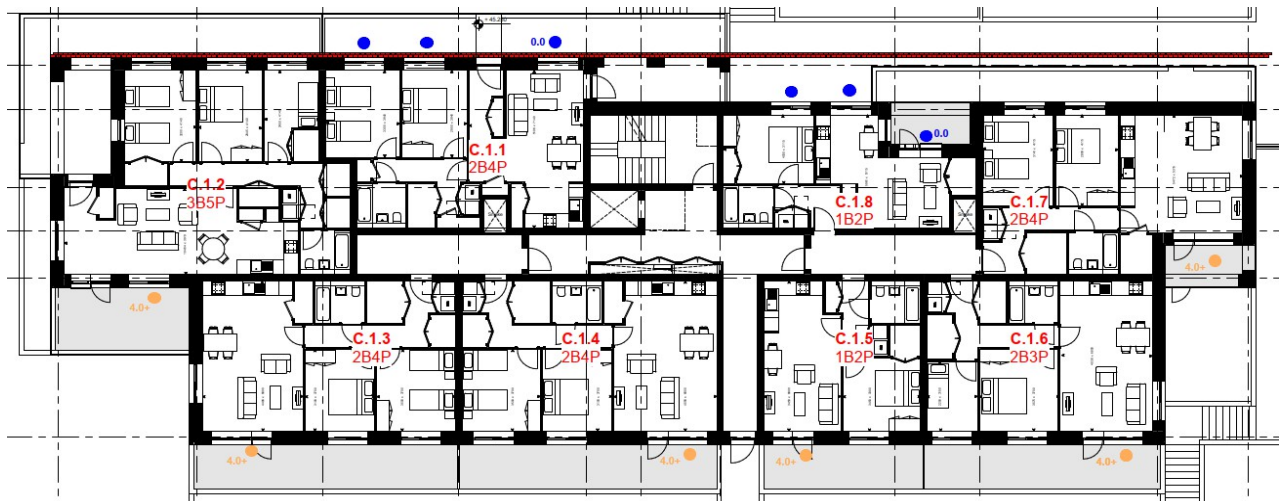
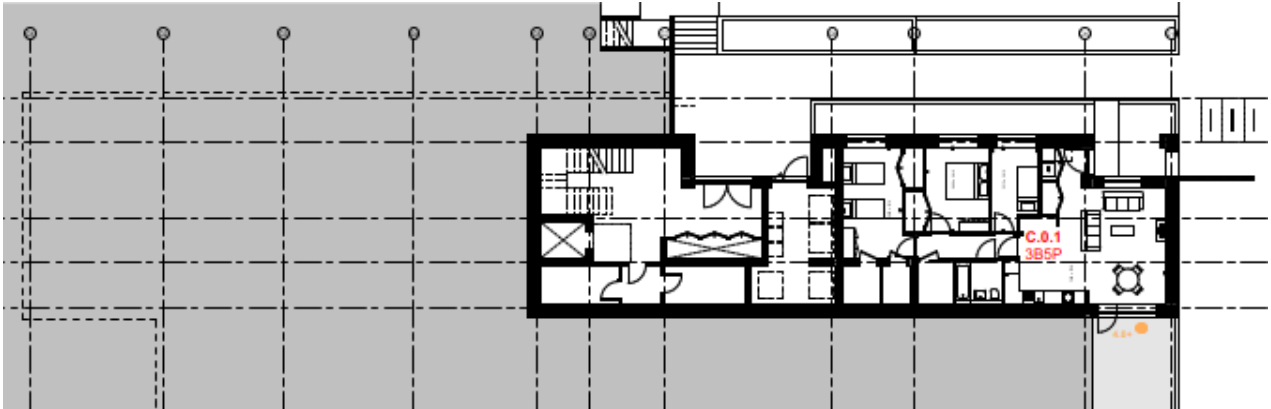
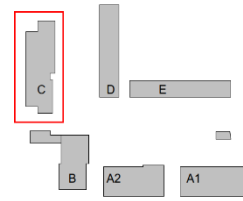
Sunlight Analysis, as illustrated below, determined all units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
B.3.1	Block-B	4+ Hrs.	PASS
B.3.2	Block-B	4+ Hrs.	PASS
B.3.3	Block-B	4+ Hrs.	PASS
B.3.4	Block-B	4+ Hrs.	PASS
B.3.5	Block-B	4+ Hrs.	PASS

Block C – Ground and First Floor (Level 00 and Level 01)

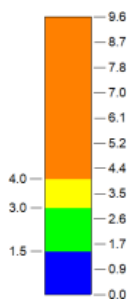
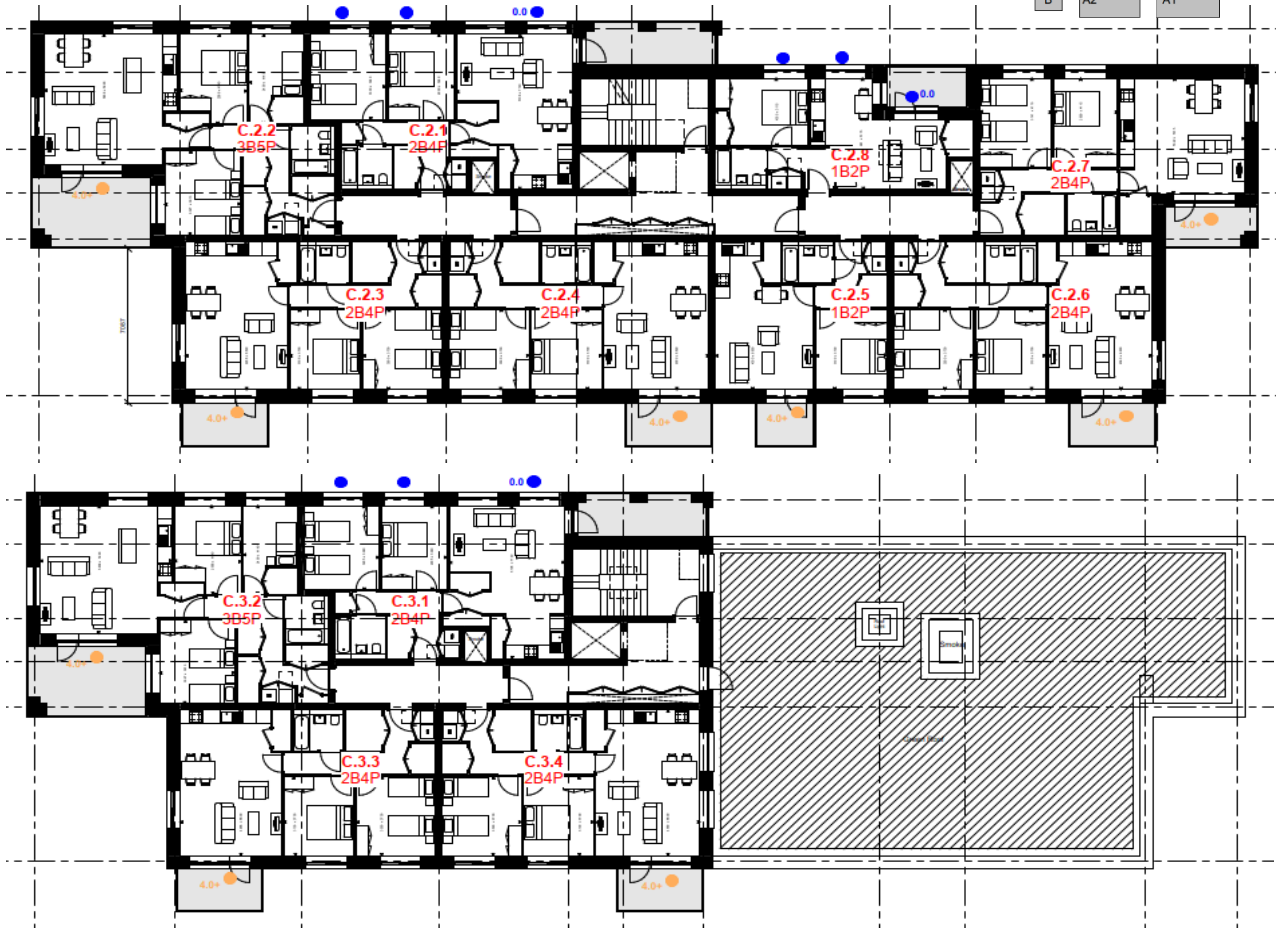
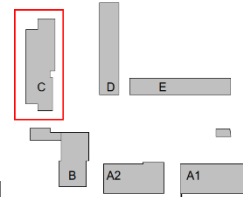
Sunlight Analysis, as illustrated below, determined 7 out of 9 units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
C.0.1	Block-C	4+ Hrs.	PASS
C.1.1	Block-C	0 Hrs.	FAIL
C.1.2	Block-C	4+ Hrs.	PASS
C.1.3	Block-C	4+ Hrs.	PASS
C.1.4	Block-C	4+ Hrs.	PASS
C.1.5	Block-C	4+ Hrs.	PASS
C.1.6	Block-C	4+ Hrs.	PASS
C.1.7	Block-C	4+ Hrs.	PASS
C.1.8	Block-C	0 Hrs.	FAIL

Block C – Second and Third Floor (Level 02 and Level 03)

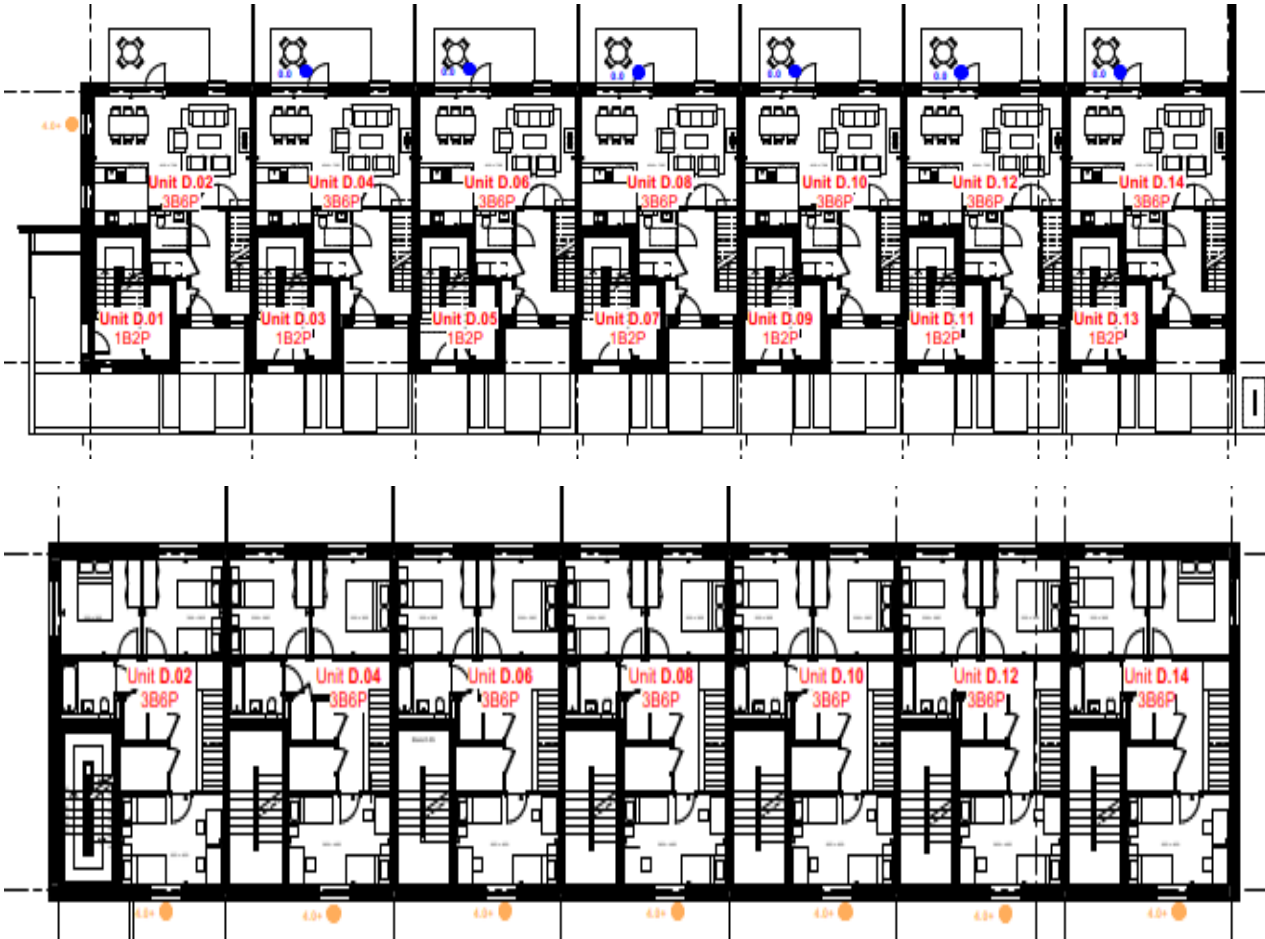
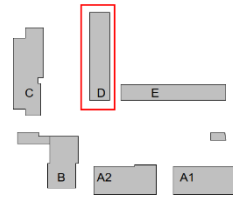
Sunlight Analysis, as illustrated below, determined 6 out of 8 units on this floor achieved the minimum recommendations.



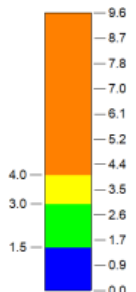
Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
C.2.1	Block-C	0 Hrs.	FAIL
C.2.2	Block-C	4+ Hrs.	PASS
C.2.3	Block-C	4+ Hrs.	PASS
C.2.4	Block-C	4+ Hrs.	PASS
C.2.5	Block-C	4+ Hrs.	PASS
C.2.6	Block-C	4+ Hrs.	PASS
C.2.7	Block-C	4+ Hrs.	PASS
C.2.8	Block-C	0 Hrs.	FAIL
C.3.1	Block-C	0 Hrs.	FAIL
C.3.2	Block-C	4+ Hrs.	PASS
C.3.3	Block-C	4+ Hrs.	PASS
C.3.4	Block-C	4+ Hrs.	PASS

Block D – First and Second Floor (Level 00 & Level 01)

Sunlight Analysis, as illustrated below, determined 7 out of 7 Duplex units on this floor achieved the minimum recommendations.

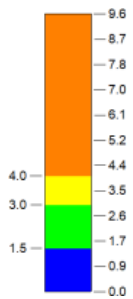
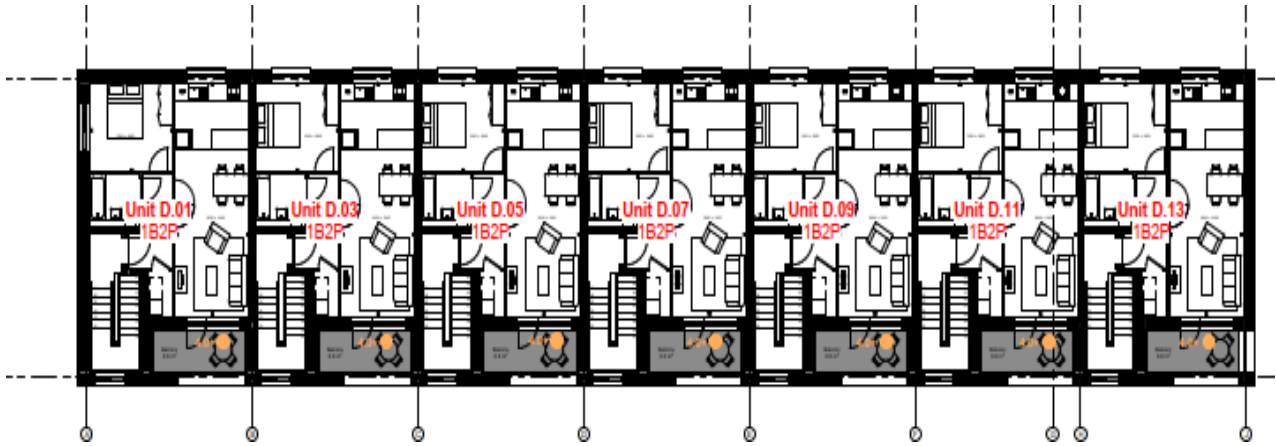
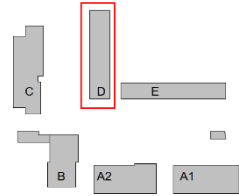


Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
D.0.2	Block-D	4+ Hrs.	PASS
D.0.4	Block-D	4+ Hrs.	PASS
D.0.6	Block-D	4+ Hrs.	PASS
D.0.8	Block-D	4+ Hrs.	PASS
D.0.10	Block-D	4+ Hrs.	PASS
D.0.12	Block-D	4+ Hrs.	PASS
D.0.14	Block-D	4+ Hrs.	PASS



Block D – Third Floor (Level 03)

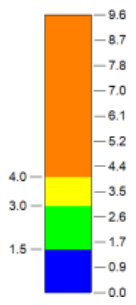
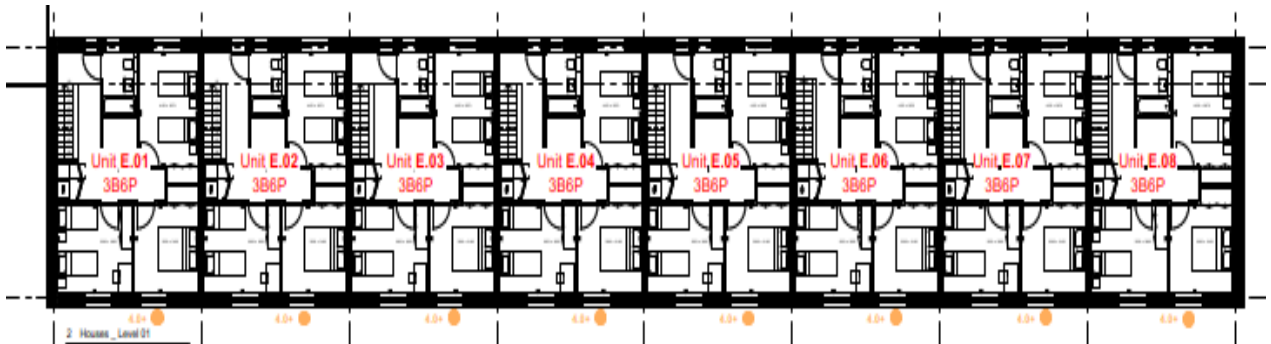
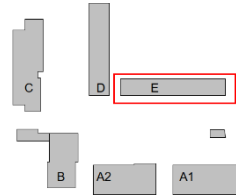
Sunlight Analysis, as illustrated below, determined 7 out of 7 units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
D.0.1	Block-D	4+ Hrs.	PASS
D.0.3	Block-D	4+ Hrs.	PASS
D.0.5	Block-D	4+ Hrs.	PASS
D.0.7	Block-D	4+ Hrs.	PASS
D.0.9	Block-D	4+ Hrs.	PASS
D.0.11	Block-D	4+ Hrs.	PASS
D.0.13	Block-D	4+ Hrs.	PASS

Block E – First and Second Floor (Level 00 & Level 01)

Sunlight Analysis, as illustrated below, determined 8 out of 8 Duplex units on this floor achieved the minimum recommendations.



Apartment Tag	Block Tag	Sunlight Exposure on March 21st	Pass or Fail
E.0.1	Block-E	4+ Hrs.	PASS
E.0.2	Block-E	4+ Hrs.	PASS
E.0.3	Block-E	4+ Hrs.	PASS
E.0.4	Block-E	4+ Hrs.	PASS
E.0.5	Block-E	4+ Hrs.	PASS
E.0.6	Block-E	4+ Hrs.	PASS
E.0.7	Block-E	4+ Hrs.	PASS
E.0.8	Block-E	4+ Hrs.	PASS

Block A1 – Overall Results

Block-A1	Pass	Fail	Total
Level 00	5	0	5
Level 01	6	0	6
Level 02	6	0	6
Level 03	6	0	6
Total	23	0	23
Percentage	100%	0%	

Block A2– Overall Results

Block-A2	Pass	Fail	Total
Level 00	6	0	6
Level 01	5	0	5
Level 02	6	0	6
Level 03	6	0	6
Total	23	0	23
Percentage	100%	0%	

Block B– Overall Results

Block-B	Pass	Fail	Total
Level 00	4	0	4
Level 01	5	0	5
Level 02	5	0	5
Level 03	5	0	5
Total	19	0	19
Percentage	100%	0%	

Block C– Overall Results

Block-C	Pass	Fail	Total
Level 00	1	0	1
Level 01	6	2	8
Level 02	6	2	8
Level 03	3	1	4
Total	16	5	21
Percentage	76%	24%	

Block D– Overall Results

Block-D	Pass	Fail	Total
Level 00	7	0	7
Level 01	0	0	0
Level 02	7	0	7
Total	14	0	14
Percentage	100%	0%	

Block E– Overall Results

Block-E	Pass	Fail	Total
Level 00	8	0	8
Level 01	0	0	0
Total	8	0	8
Percentage	100%	0%	

5.0. INTERNAL DAYLIGHT ANALYSIS (ASSESSMENT METHODOLOGY)

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

- The daylight levels (Daylight Factor) within the living and bedroom areas of selected apartments, to give an indication of the expected daylight levels throughout the proposed development.
- The expected daylight illuminance levels within the living areas and bedrooms in the proposed development.
-

The calculation methodology for daylight is based on the British Research Establishments “Site Layout Planning for Daylight and Sunlight: A Good Practice Guide” by PJ Littlefair, 2022 Third Edition. Using industry standard methodology as prescribed by BRE and British Standard guidance: we have made numerical analyses to ensure compliance with the recommended levels of change in daylight for the habitable rooms of the assess dwelling.

The main parameters used in this analysis to show compliance are:

- Daylight Factor (DF)
- Daylight illuminance in all habitable rooms

The Daylight Factor is ratio of total daylight illuminance at a reference point on the working plane within a space to outdoor illuminance on a horizontal plane due to an unobstructed CIE standard overcast sky.

Daylight illuminance is a measure of the amount of light falling on a surface, usually measured in lux.

Both are derived from BS EN 17037 and are complex representative calculation to determine natural internal luminance (daylight). The DF considers such factors as window size, number of windows available to the room, room size and layout, room surface reflectance, and the angle of visible sky reaching the window.

For daylight provision in buildings, BS/IS EN 17037 2018 provides two methodologies. One is based on target illuminances from daylight to be achieved over specified fractions of the reference plane (a plane at tabletop height covering the room) for at least half of the daylight hours in a typical year. The other, alternative, method is based on calculating the daylight factors achieved over specified fractions of the reference plane.

BS/IS EN 17037 2018 gives three levels of recommendation for daylight provision in interior spaces: minimum, medium, and high. For compliance with the standard, a daylit space should achieve the minimum level of recommendation.

5.1. Illuminance Method

This method involves using climatic data for the location of the site (via the use of an appropriate typical or average year, weather file within the software) to calculate the illuminance from daylight at point on an assessment grid on the reference plane at an at least hourly interval for a typical year.

A target illuminance (E_T) should be achieved across at least half of the reference plane in a daylight space for at least half of the daylight hours. Another target illuminance (E_{TM}) should also be achieved across 95% of the reference plane for at least half of the daylight hours; this is the minimum target illuminance to be achieved towards the back of the room.

The table below gives these target illuminances for side lit rooms.

Table – Target illuminances from daylight over at least half (50%) of the daylight hours		
Level of recommendation	Target illuminance E_T (lx) for half of assessment grid	Target illuminance E_{TM} (lx) for 95% of assessment grid
Minimum	300	100
Medium	500	300
High	750	500

Table A.1 – BS/IS EN 17037-2018 - Recommendations of daylight provision by daylight openings in vertical and inclined surface.

5.2. Daylight factor method

This method involves the computation of the daylight factor at each calculation point on an assessment grid. The daylight factor is the illuminance at a point on the reference plane in a space, divided by the illuminance on an unobstructed horizontal surface outdoors. The CIE standard overcast sky is used, and the ratio is usually expressed as a percentage.

D_T is the target daylight factor relative to a given illuminance to be exceeded for more than half of daylight hours, over 50 % of the reference plane. If, for instance, the criterion is to achieve at least 300lx, then D_T is equal to:

$$D_T = \frac{\text{illuminance level}}{E_{v,d,med}} = \frac{300 \text{ lx}}{E_{v,d,med}} \times 100 [\%]$$

Where,

$E_{v,d,med}$ is the median diffuse horizontal illuminance from the sky, Table A.3 from BS/IS EN 17037 gives the value of $E_{v,d,med}$ for each of the 33 capital cities of CEN national members. Table for few cities shown below.

Nation	Capital	Geographical latitude ϕ [°]	Median External Diffuse Illuminance $E_{v,d,med}$	D to exceed 100 lx	D to exceed 300 lx	D to exceed 500 lx	D to exceed 750 lx
Cyprus	Nicosia	34,88	18 100	0.60%	1.70%	2.80%	4.10%
Spain	Madrid	40,45	16 900	0.60%	1.80%	3.00%	4.40%
Italy	Rome	41,80	19 200	0.50%	1.60%	2.60%	3.90%
United Kingdom	London	51,51	14 100	0.70%	2.10%	3.50%	5.30%
North Ireland	Belfast	54,65	14 500	0.70%	2.10%	3.40%	5.20%
Ireland	Dublin	53,43	14 900	0.70%	2.00%	3.40%	5.00%

Table A.3– BS/IS EN 17037-2018 - Values of D for daylight openings to exceed an illuminance level of 100, 300, 500 or 750 lx for a fraction of daylight hours
 $F_{time, \%} = 50\%$ for 33 capitals of CEN national members

300 lx in the above equation can be replaced with the Target illuminance for room types in UK Dwellings, Given in Table NA.1 of BS EN 17037.

Room type	Target illuminance E_T (lx)
Bedroom	100
Living room	150
Kitchen	200

Table NA.1 – BS EN 17037-2018 - Values of target illuminance for room types in UK dwellings

The table below shows the daylight factor targets (calculated) to be achieved over at least 50% of the assessment grid in domestic habitable rooms with vertical and/or inclined daylight apertures.

Table – Target daylight factors (D_T) to achieve over at least 50% of the habitable rooms with vertical and/or inclined daylight apertures			
Location	D_T for 100 lx (Bedroom)	D_T for 150 lx (Living room)	D_T for 200 lx (Kitchen)
St Peter (Jersey)	0.60%	0.90%	1.20%
London (Gatwick Airport)	0.70%	1.10%	1.40%
Birmingham	0.60%	0.90%	1.20%
Hemsby (Norfolk)	0.60%	0.90%	1.30%
Finningley (Yorkshire)	0.70%	1.00%	1.30%
Aughton (Lancashire)	0.70%	1.10%	1.40%
Belfast	0.70%	1.05%	1.40%
Dublin	0.70%	1.00%	1.40%
Leuchars (Fife)	0.70%	1.10%	1.40%
Oban	0.80%	1.10%	1.50%
Aberdeen	0.70%	1.10%	1.40%

Table C3 – BRE 2022 (2018)

The recommendations are met if the median of the daylight factors calculated in a room meets or exceeds the specific target for room type and location. The proposed development location is near Dublin, hence target daylight factors of Dublin city shall be used as benchmark figures.

To analyze the DF and Daylight illuminance within the proposed residential development, simulations have been completed within the IES VE (Module – Radiance and FluxDL) Software package. A detailed model of the development has been constructed using the software. This study has been calculated in accordance with recommended BRE methodology, using.

- An CIE overcast sky.
- Glass transmission at 70% (double glazing with low-emissivity coating)
- Grid height above ground at 0.85m.
- Internal floor reflectance at 20%.
- Internal wall reflectance at 50%.
- External material reflectance at 70%
- Area weighted reflectance of room surfaces at 0.5.

An analysis was undertaken for 8 Sample units from different blocks and different floors in the proposed development to assess the Internal Daylight in terms of Daylight factor (D_T) and Target illuminance (E_T).

Further to the Planning Authority’s request for a daylight assessment of all 101 proposed apartments, We wish to provide clarification regarding the methodology adopted.

The eight apartments included within the submitted assessment were selected by Black & White following a review of the scheme layout, orientation, and massing relationships.

These units were intentionally chosen as they represent the most constrained daylight scenarios within the overall development.

The sample includes north-facing units, north-eastern and north-western corner units, ground floor apartments with reduced sky visibility, and dual-aspect units incorporating northerly orientations.

The purpose of this targeted selection was to test what are considered the “worst-case” daylight conditions across the scheme.

The results of the analysis demonstrate that these identified units exceed the relevant daylight performance targets for habitable rooms. Given that these apartments represent the most challenging orientation and obstruction scenarios within the development, it follows that apartments benefiting from more favourable orientation, increased sky exposure, or reduced overlooking mass will achieve equal or improved daylight performance.

On this basis, the assessment provides a robust and proportionate technical evaluation of the development as a whole. Extending the modelling exercise to all 101 units would not reasonably be expected to produce a materially different compliance outcome, given that the most constrained conditions have already been tested and shown to exceed target values.

It is further noted that Site Layout Planning for Daylight and Sunlight provides guidance rather than mandatory statutory requirements and does not prescribe that every individual dwelling must be separately modelled where representative worst-case analysis has been undertaken.

Accordingly, from a technical and coordinated design perspective, I am satisfied that the methodology adopted is appropriate, proportionate, and consistent with established daylight assessment practice for residential developments.

6.0. DAYLIGHT FACTOR (DT) AND TARTGET ILLUMINANCE (ET) RESULTS

This section outlines the apartment units that were selected for assessment of internal daylight levels for the proposed Cherrywood - Lehaunstown Housing development. The results of the analysis are outlined in the accompanying tables.



Figure 1 –Block A1 – 2 Bed apartment, Parking floor, assessed rooms highlighted in red.

Unit	D_T Target Daylight Factors (%)	DF results (%)	Meets recommended D_T ?
A Bedroom 01	0.7%	8.3%	YES
B Bedroom 02	0.7%	4.1%	YES
C Living/ Kitchen	1.4%	5.7%	YES

Table 1A – Target daylight factors (D_T) results

Unit	Target illuminance met ? E_T (300lx) for half of assessment grid	Target illuminance met ? E_{TM} (100lx) for 95% of assessment grid
A Bedroom 01	YES	YES
B Bedroom 02	YES	YES
C Living/ Kitchen	YES	YES

Table 1B – Target illuminance (E_T) results

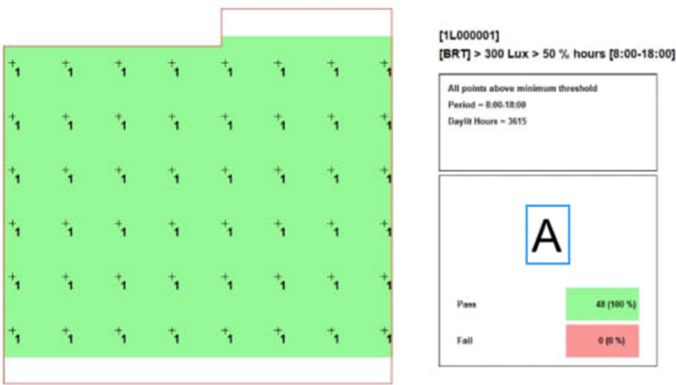


Fig 1C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

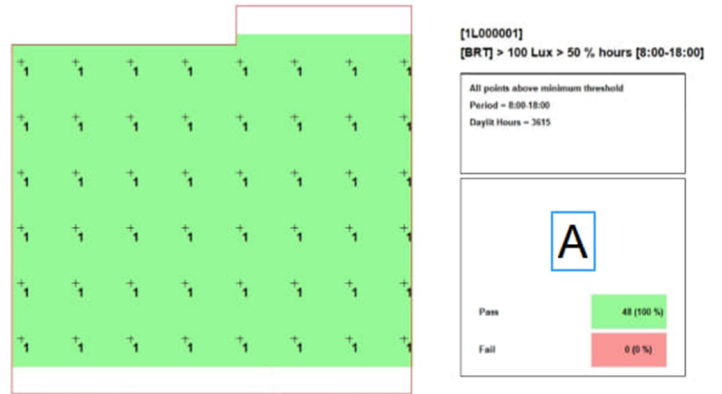


Fig 1D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

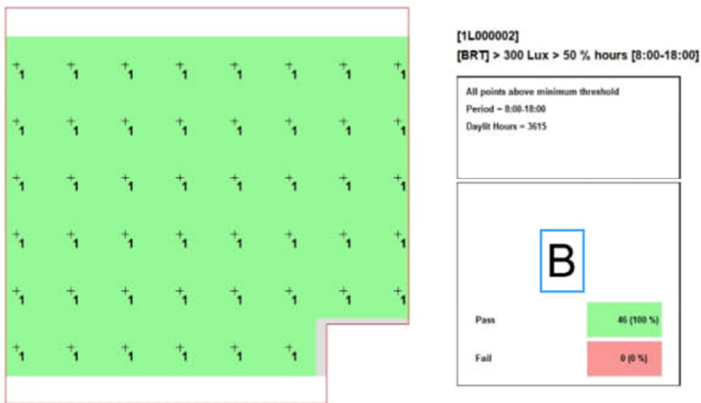


Fig 1E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid

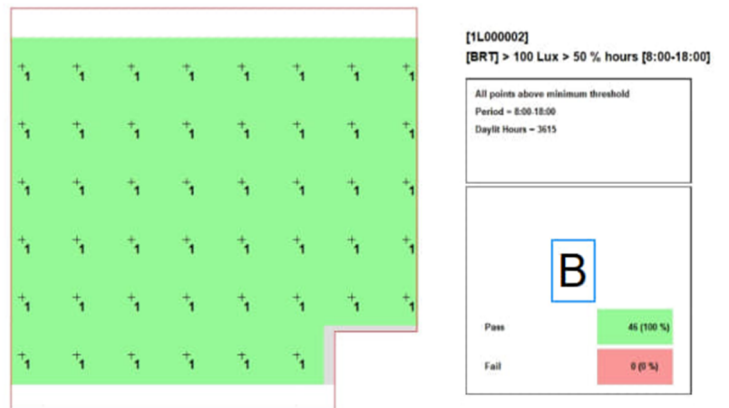


Fig 1F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

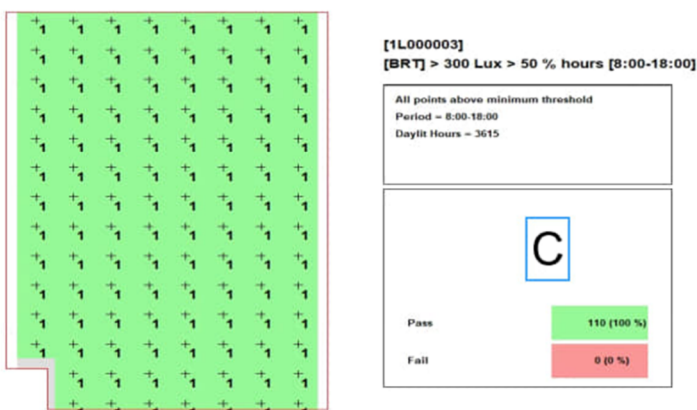


Fig 1G – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

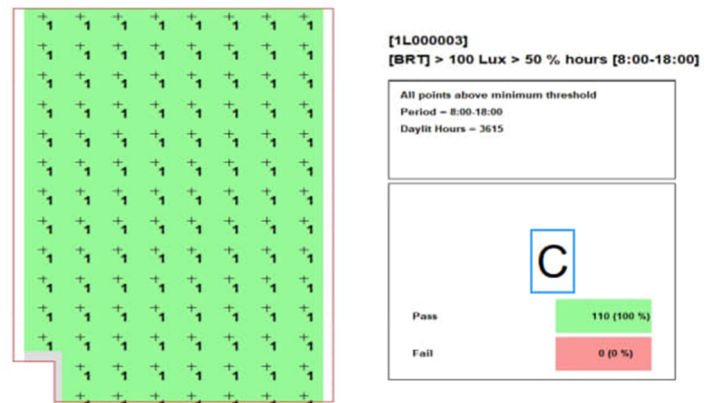


Fig 1H – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

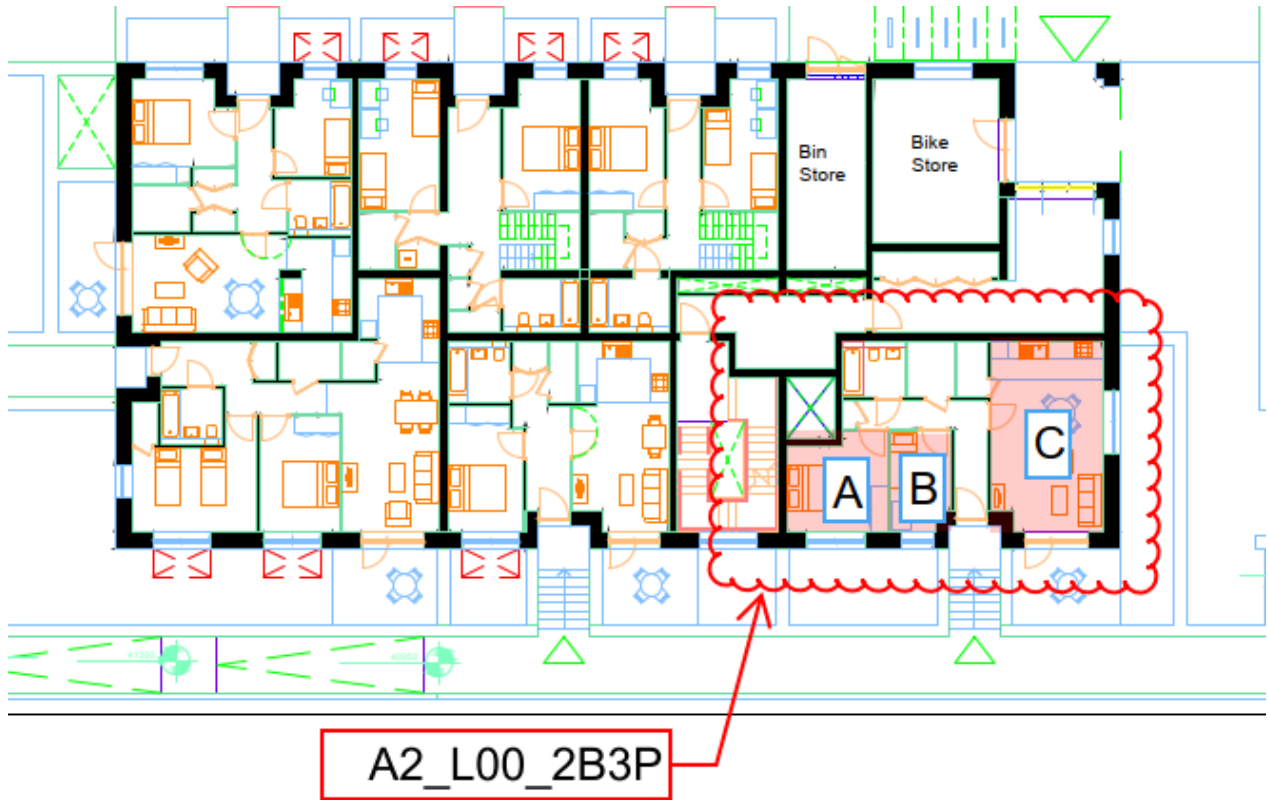


Figure 2 –Block A2 – 2 Bed apartment, Ground floor, assessed rooms Highlighted in red.

Unit		D_T Target Daylight Factors (%)	DF results (%)	Meets recommended D_T ?
A	Bedroom 01	0.7%	7.3%	YES
B	Bedroom 02	0.7%	4.1%	YES
C	Living/ Kitchen	1.4%	6.0%	YES

Table 2A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E_T (300lx) for half of assessment grid	Target illuminance met ? E_{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Bedroom 02	YES	YES
C	Living/ Kitchen	YES	YES

Table 2B – Target illuminance (E_T) results

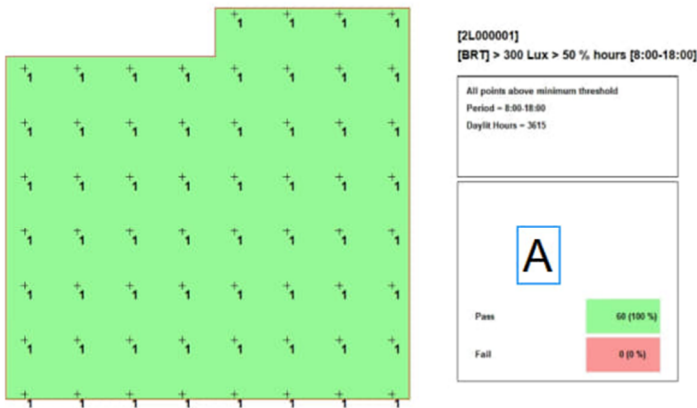


Fig 2C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

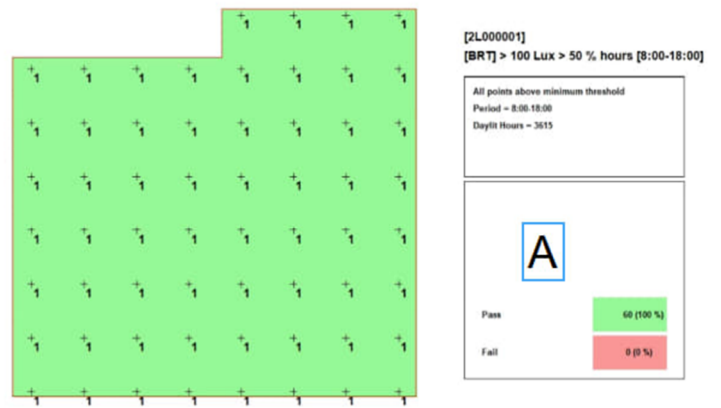


Fig 2D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

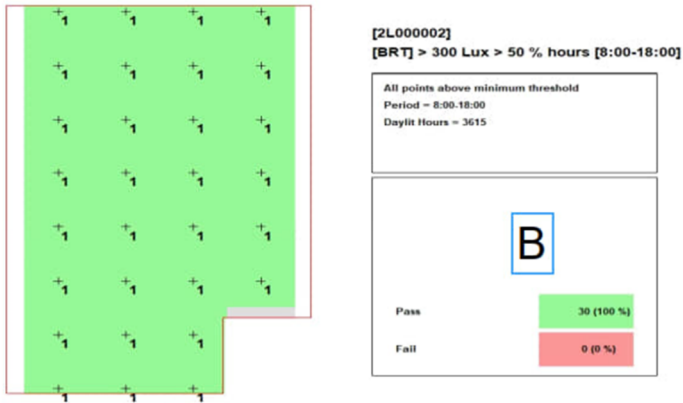


Fig 2E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid

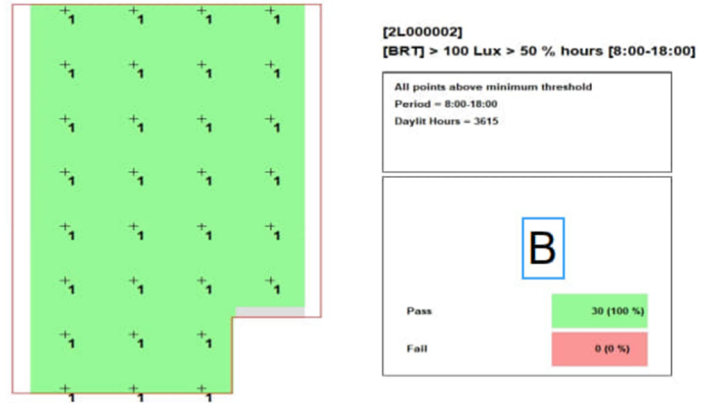


Fig 2F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

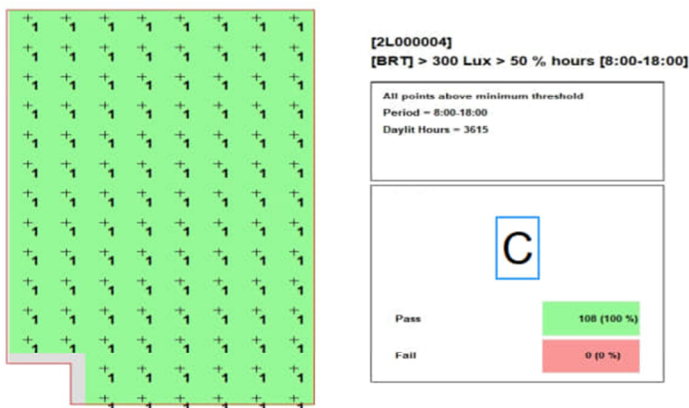


Fig 2G – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

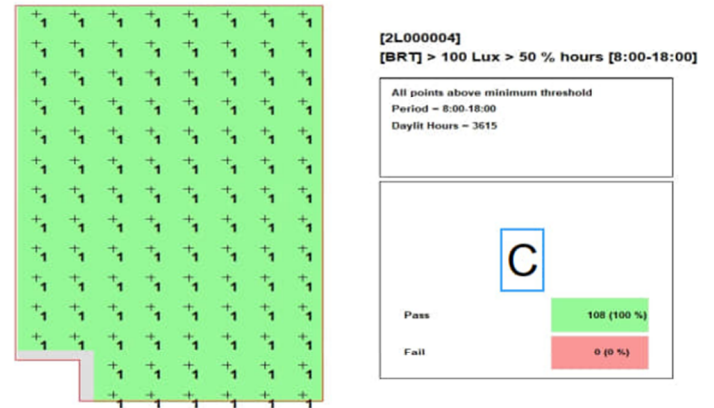


Fig 2H – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

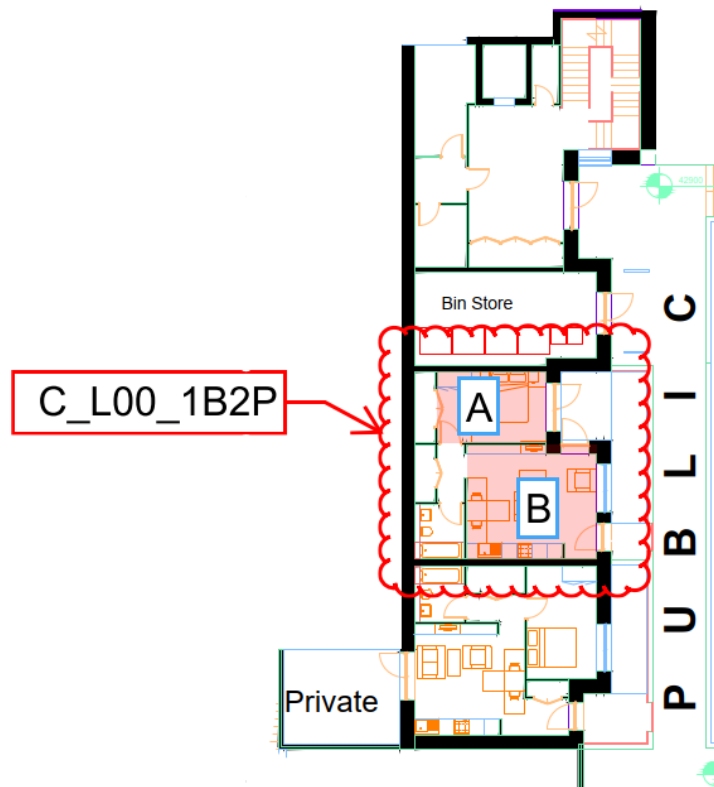


Figure 3 –Block C – 1 Bed apartment, Ground floor, assessed rooms Highlighted in red.

Unit		D_T Target Daylight Factors (%)	DF results (%)	Meets recommended D_T ?
A	Bedroom 01	0.7%	3.9%	YES
B	Living/ Kitchen	1.4%	3.2%	YES

Table 3A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E_T (300lx) for half of assessment grid	Target illuminance met ? E_{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Living/ Kitchen	YES	YES

Table 3B – Target illuminance (E_T) results

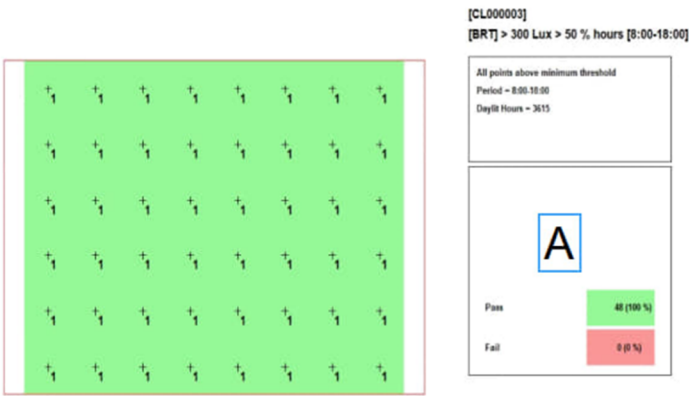


Fig 3C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

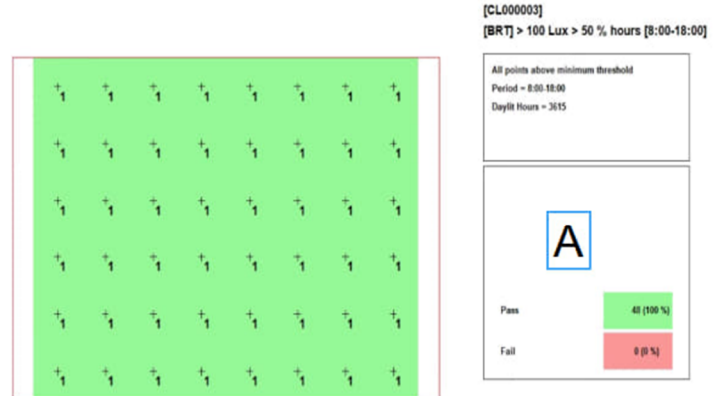


Fig 3D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

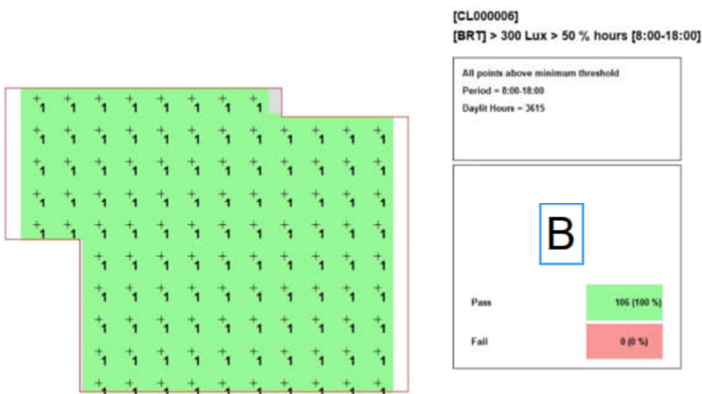


Fig 3E – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

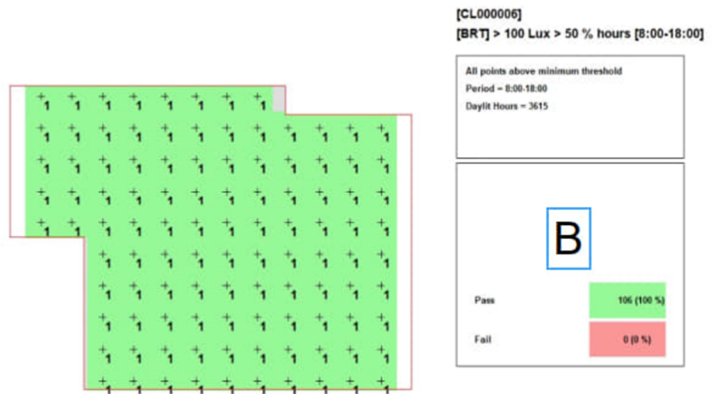


Fig 3F – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

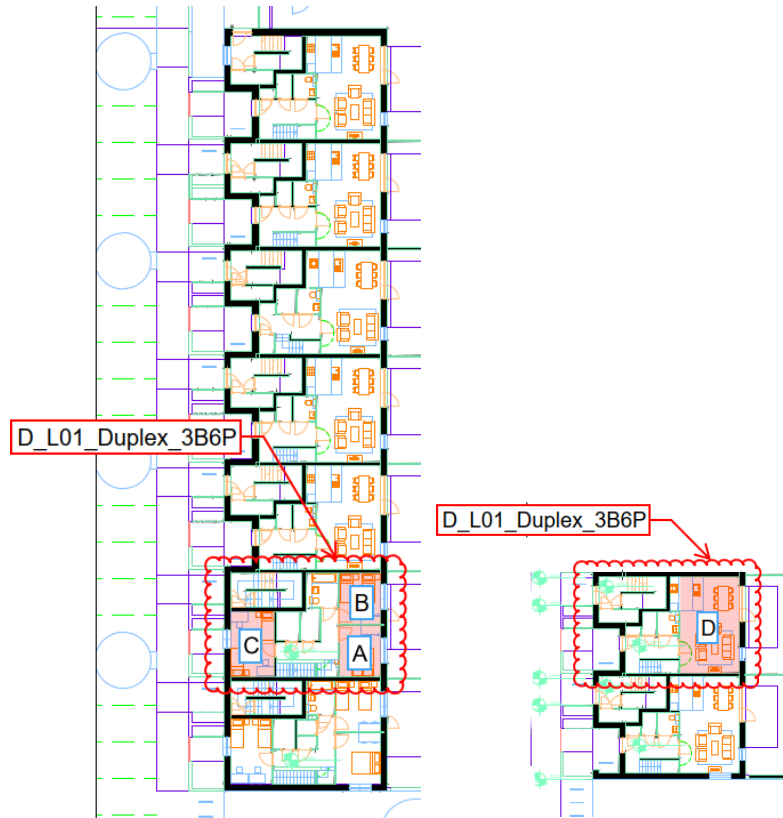


Figure 4 –Block D – 3 Bed duplex apartment, Ground and first floor, assessed rooms highlighted in red.

Unit		D _T Target Daylight Factors (%)	DF results (%)	Meets recommended D _T ?
A	Bedroom 01	0.7%	5.1%	YES
B	Bedroom 02	0.7%	5.7%	YES
C	Bedroom 03	0.7%	3.7%	YES
D	Living/ Kitchen	1.4%	3.3%	YES

Table 4A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E _T (300lx) for half of assessment grid	Target illuminance met ? E _{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Bedroom 02	YES	YES
C	Bedroom 03	YES	YES
D	Living/ Kitchen	YES	YES

Table 4B – Target illuminance (E_T) results

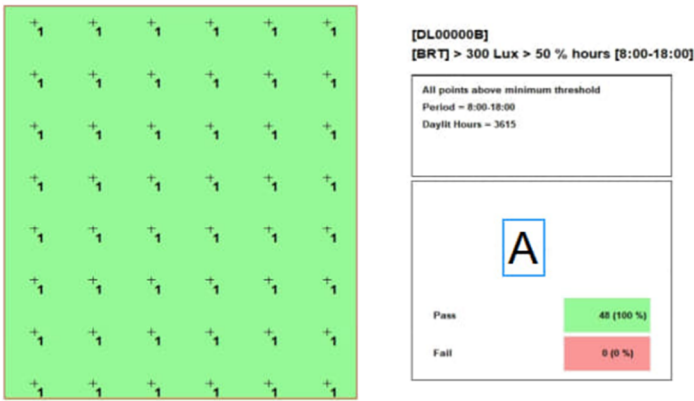


Fig 4C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

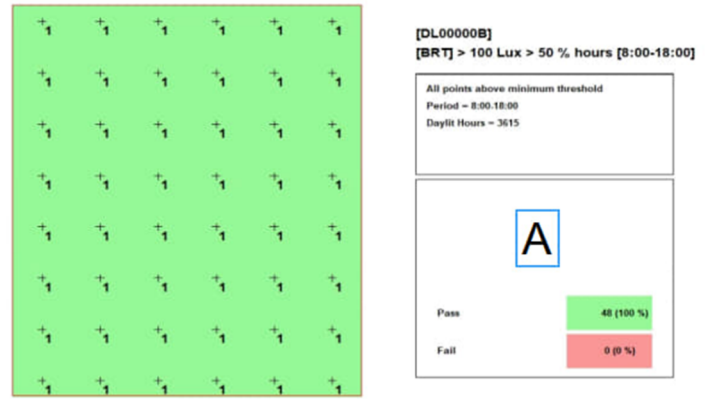


Fig 4D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

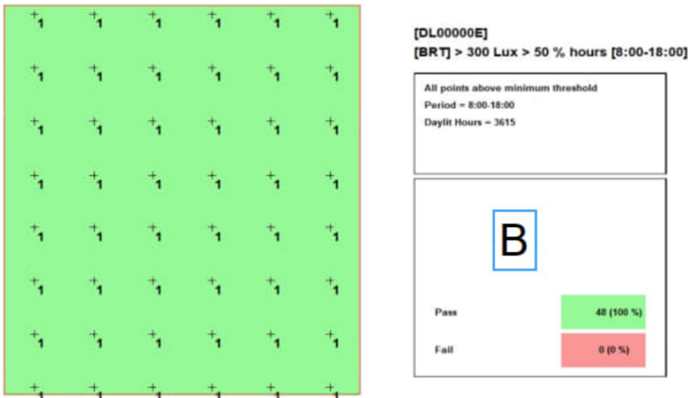


Fig 4E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid

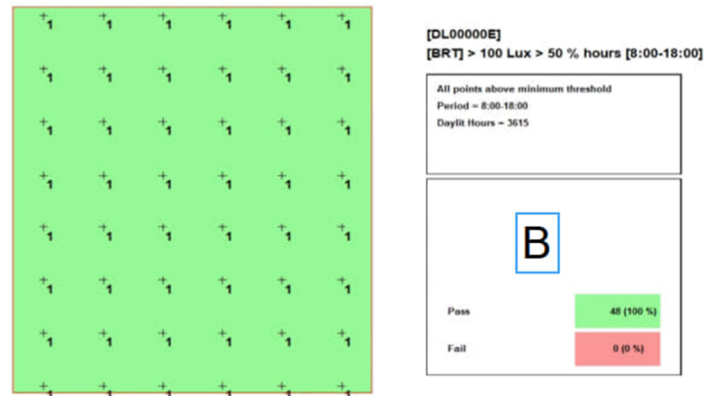


Fig 4F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

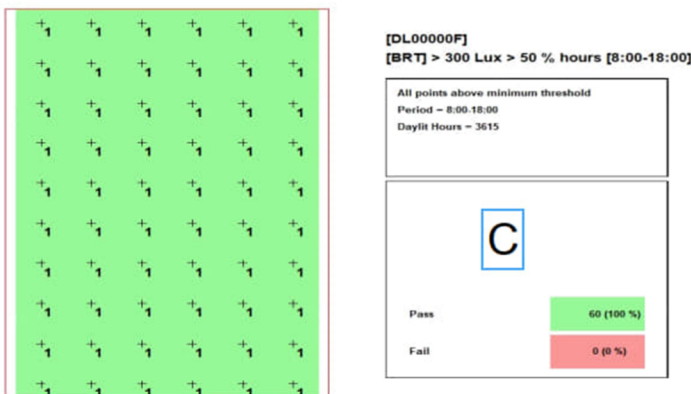


Fig 4G – Bedroom03 - Target illuminance E_T (300lx) for half of assessment grid

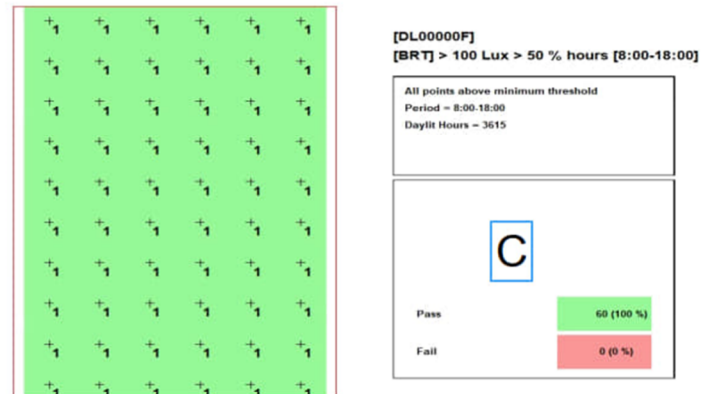


Fig 4H – Bedroom03 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

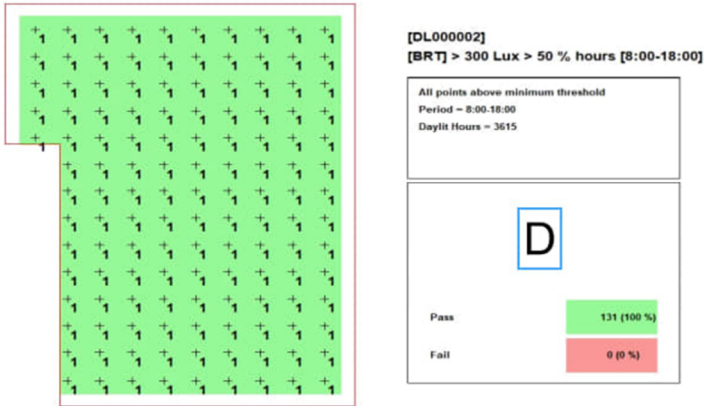


Fig 4I – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

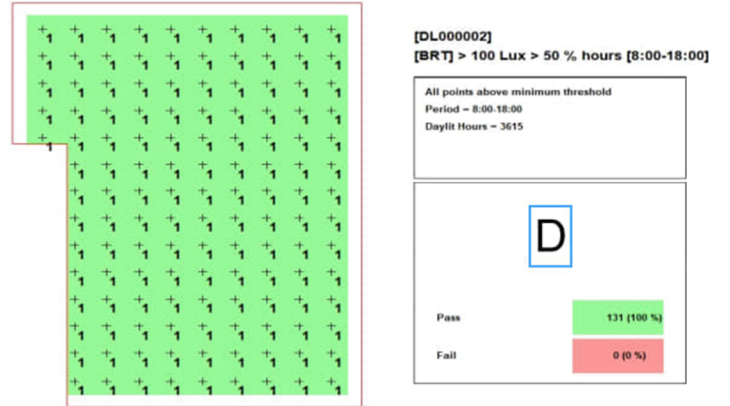


Fig 4J – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

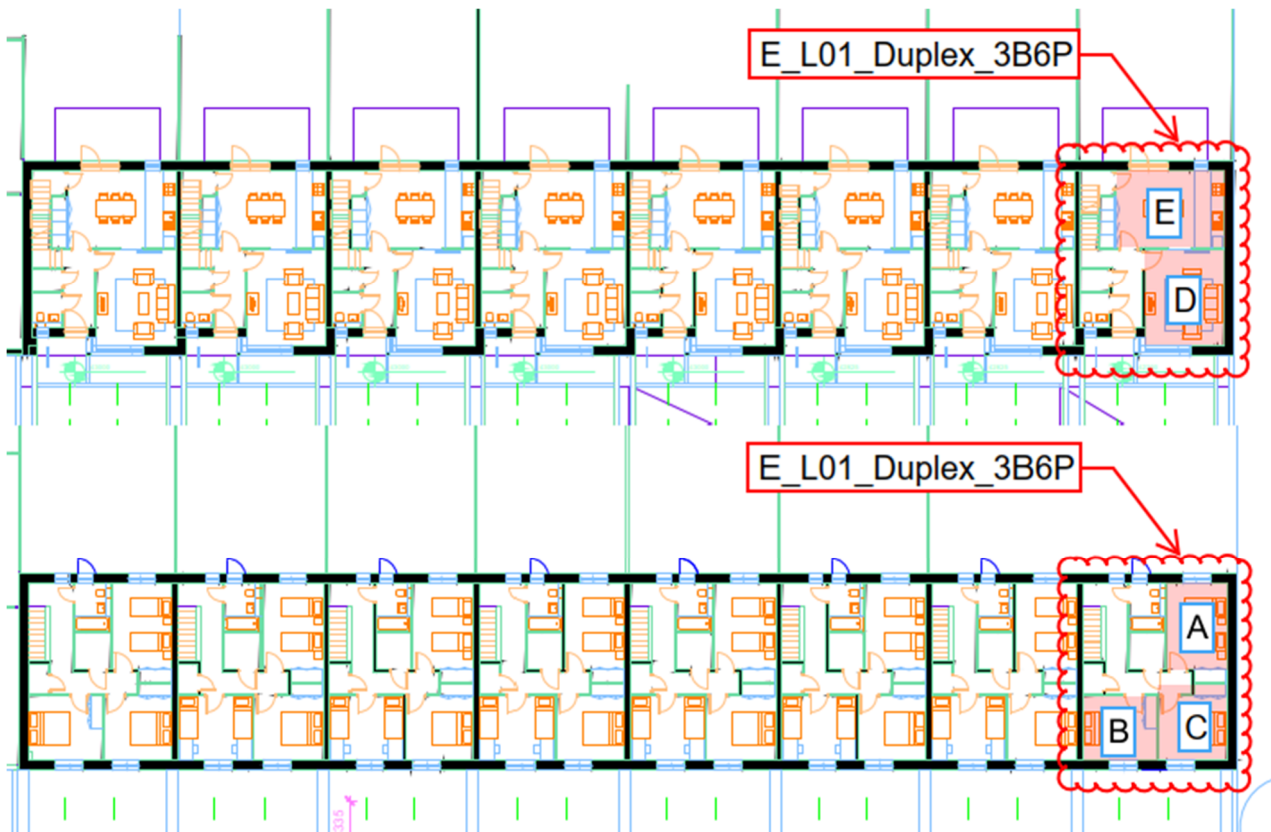


Figure 5 –Block E – 3 Bed duplex apartment, Ground and first floor, assessed rooms highlighted in red.

Unit		D _T Target Daylight Factors (%)	DF results (%)	Meets recommended D _T ?
A	Bedroom 01	0.7%	3.8%	YES
B	Bedroom 02	0.7%	3.7%	YES
C	Bedroom 03	0.7%	3.4%	YES
D	Living room	1.0%	3.5%	YES
E	Kitchen/Dining	1.4%	4.4%	YES

Table 5A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E _T (300lx) for half of assessment grid	Target illuminance met ? E _{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Bedroom 02	YES	YES
C	Bedroom 03	YES	YES
D	Living room	YES	YES
E	Kitchen/Dining	YES	YES

Table 5B – Target illuminance (E_T) results

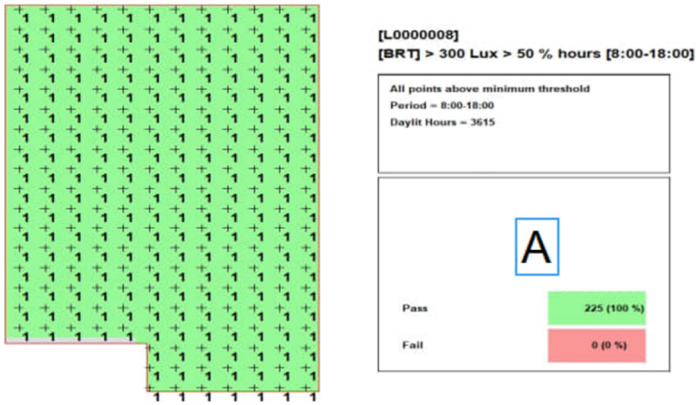


Fig 5C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

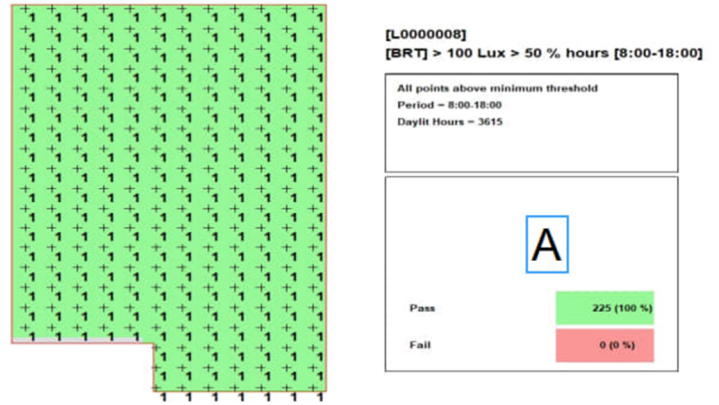


Fig 5D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

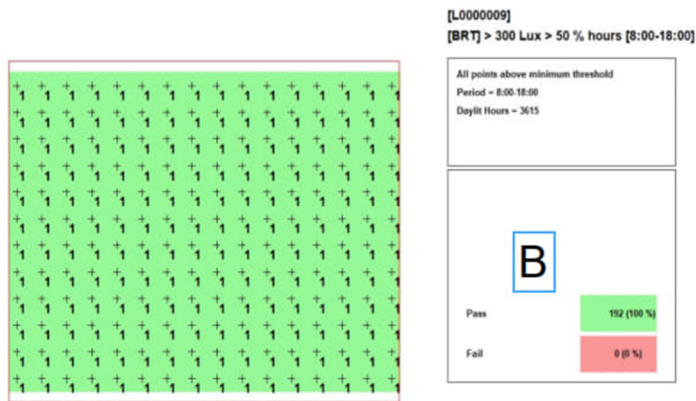


Fig 5E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid

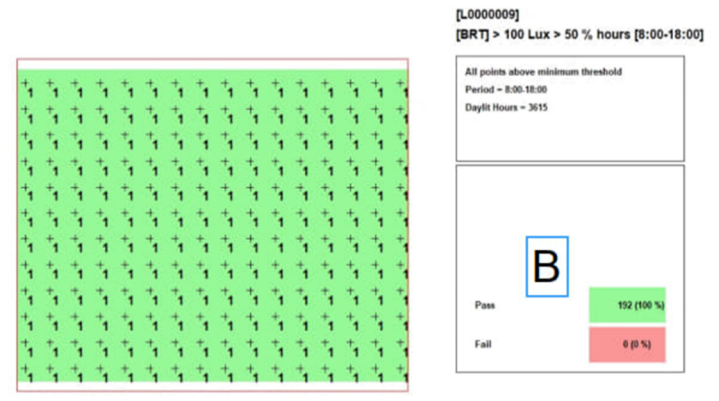


Fig 5F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

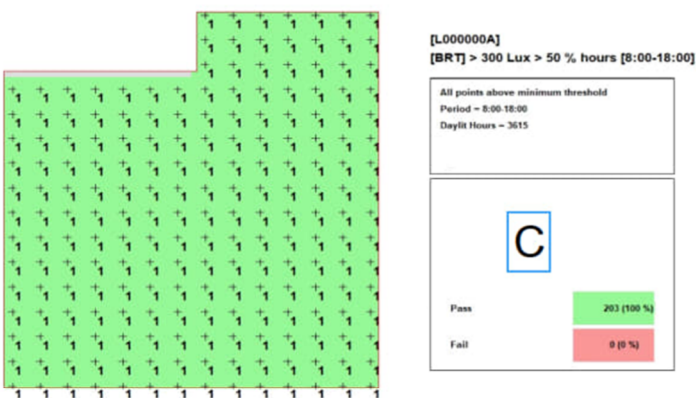


Fig 5G – Bedroom03- Target illuminance E_T (300lx) for half of assessment grid

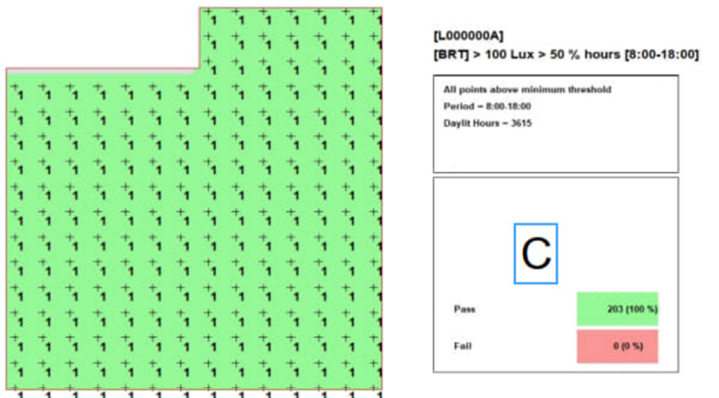


Fig 5H – Bedroom03- Target illuminance E_{TM} (100lx) for 95% of assessment grid

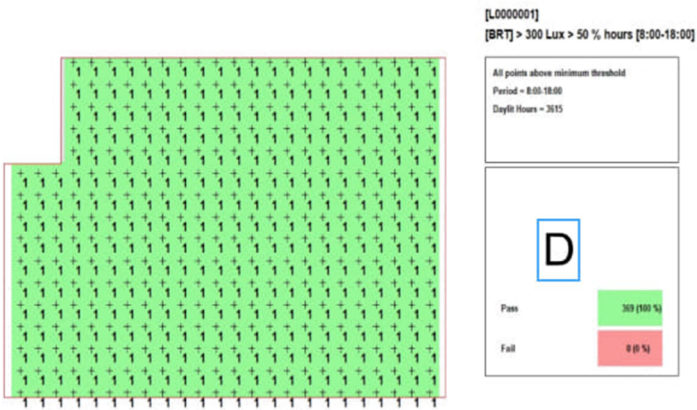


Fig 5I – Kitchen/Dining - Target illuminance E_T (300lx) for half of assessment grid

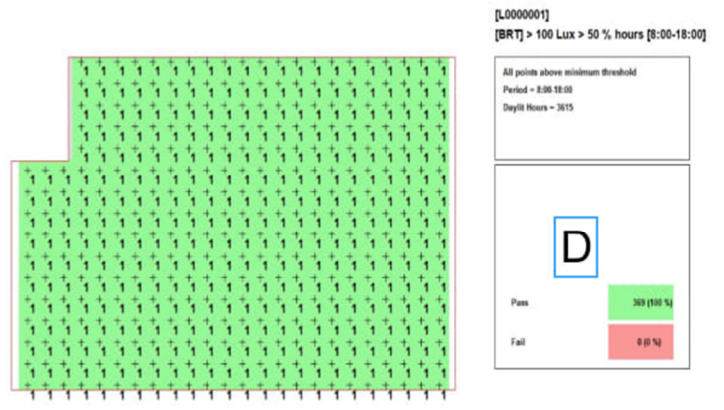


Fig 5J – Kitchen/Dining - Target illuminance E_{TM} (100lx) for 95% of assessment grid

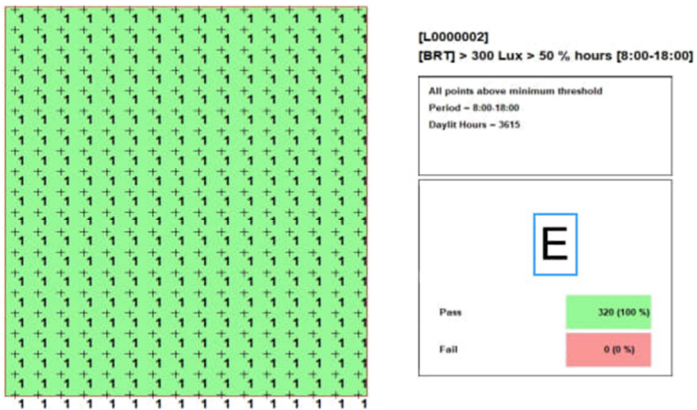


Fig 5E – Living room- Target illuminance E_T (300lx) for half of assessment grid

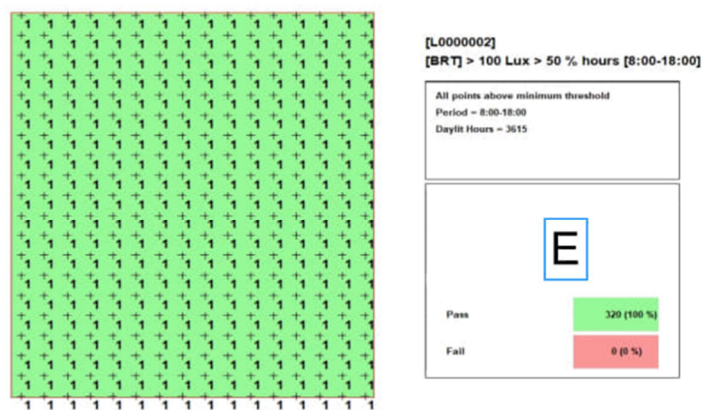


Fig 5F – Living room - Target illuminance E_{TM} (100lx) for 95% of assessment grid

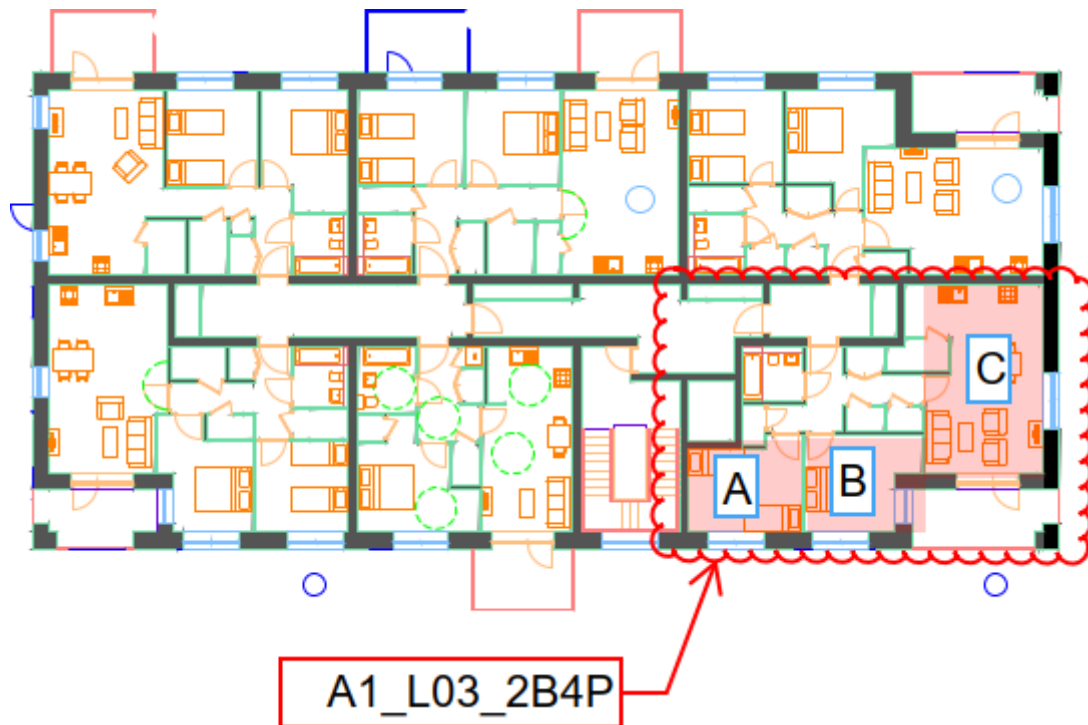


Figure 6 –Block A1 – 2 Bed apartment, third floor, assessed rooms highlighted in red.

Unit		D_T Target Daylight Factors (%)	DF results (%)	Meets recommended D_T ?
A	Bedroom 01	0.7%	6.6%	YES
B	Bedroom 02	0.7%	9.7%	YES
C	Living/ Kitchen	1.4%	6.5%	YES

Table 6A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E_T (300lx) for half of assessment grid	Target illuminance met ? E_{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Bedroom 02	YES	YES
C	Living/ Kitchen	YES	YES

Table 6B – Target illuminance (E_T) results

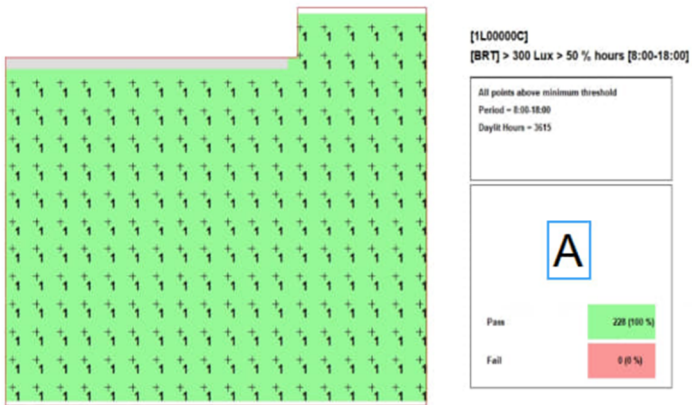


Fig 6C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

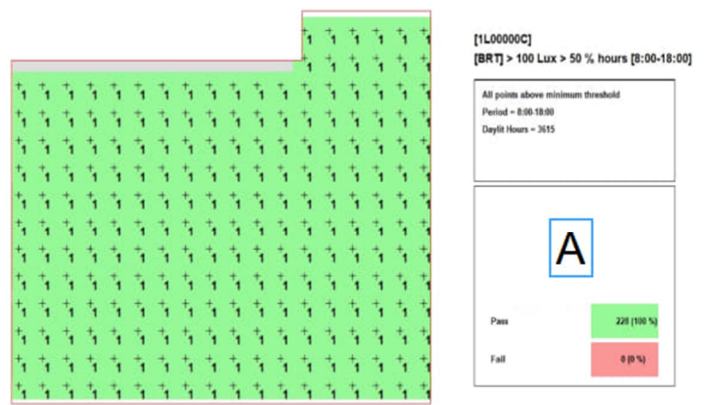


Fig 6D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid



Fig 6E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid

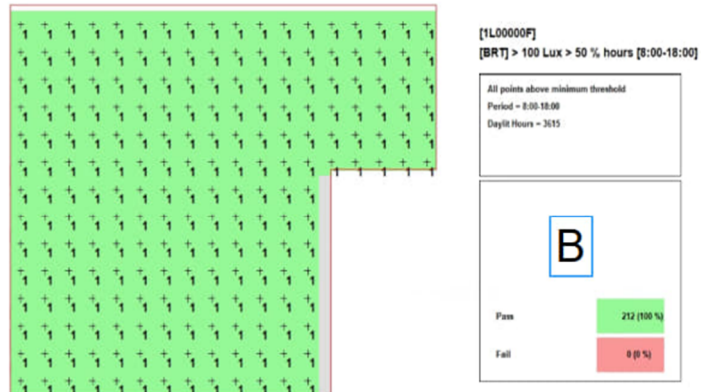


Fig 6F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

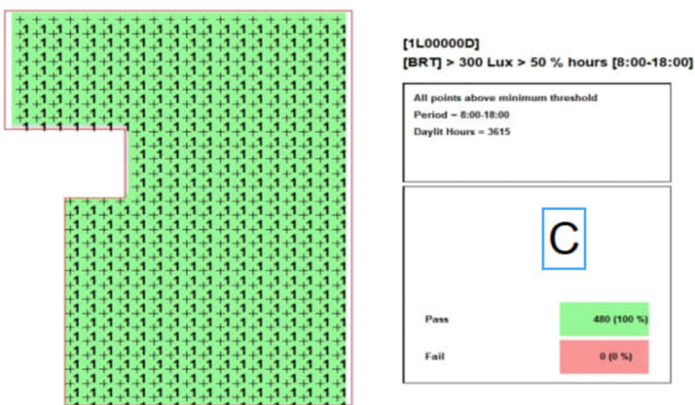


Fig 6G – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

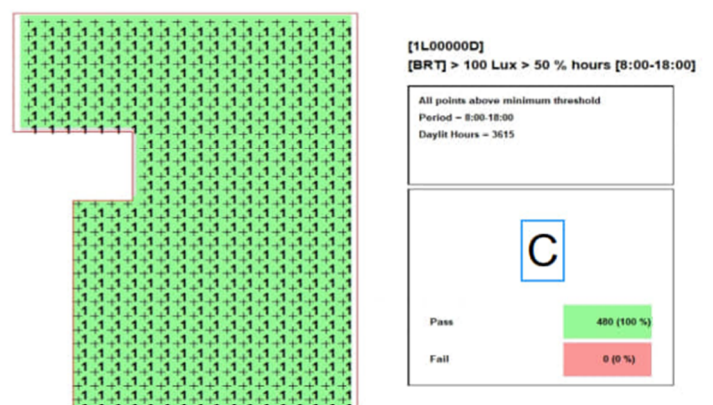


Fig 6H – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

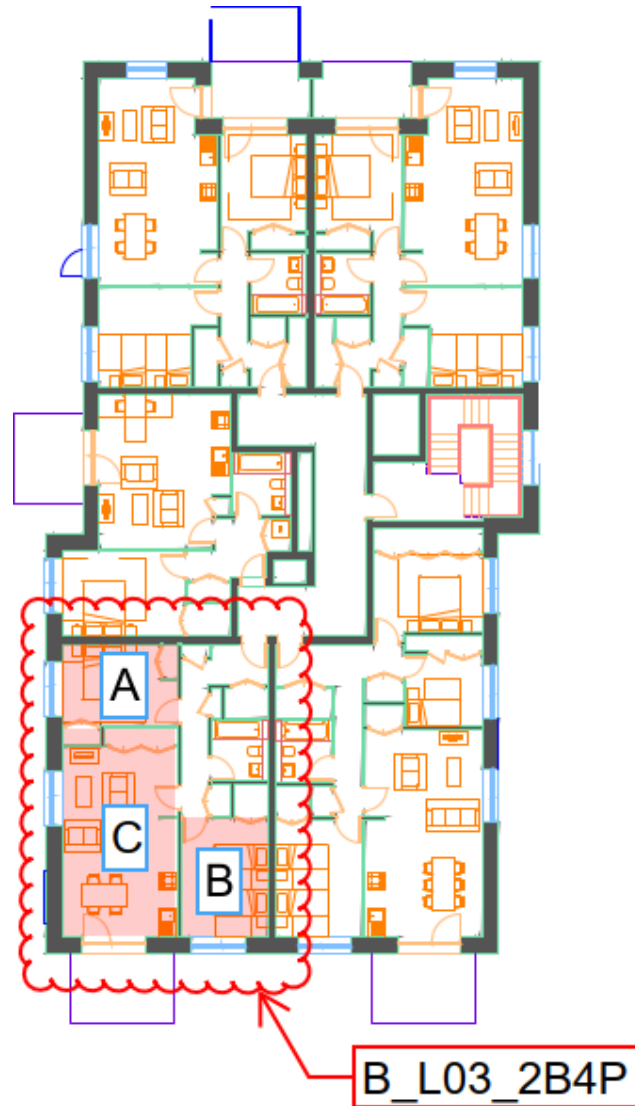


Figure 7 –Block B – 2 Bed apartment, third floor, assessed rooms highlighted in red.

Unit		D _T Target Daylight Factors (%)	DF results (%)	Meets recommended D _T ?
A	Bedroom 01	0.7%	5.5%	YES
B	Bedroom 02	0.7%	4.7%	YES
C	Living/ Kitchen	1.4%	5.1%	YES

Table 7A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E _T (300lx) for half of assessment grid	Target illuminance met ? E _{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Bedroom 02	YES	YES
C	Living/ Kitchen	YES	YES

Table 7B – Target illuminance (E_T) results



Fig 7C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

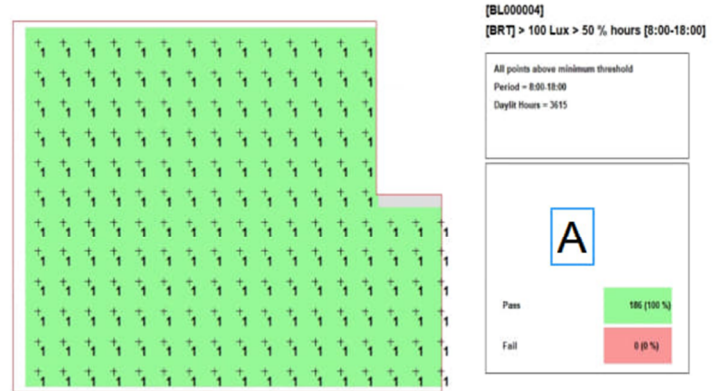


Fig 7D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid



Fig 7E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid

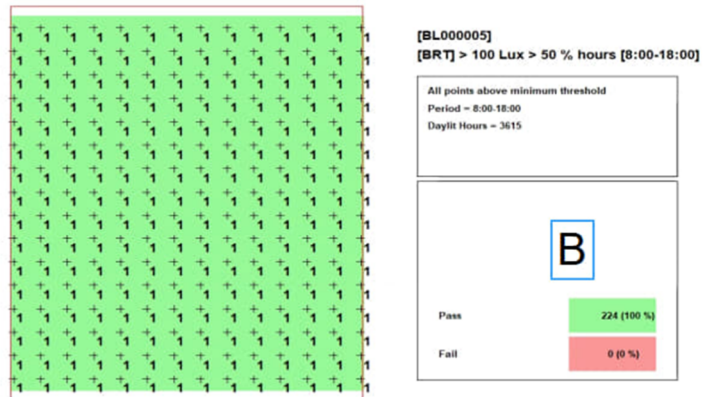


Fig 7F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

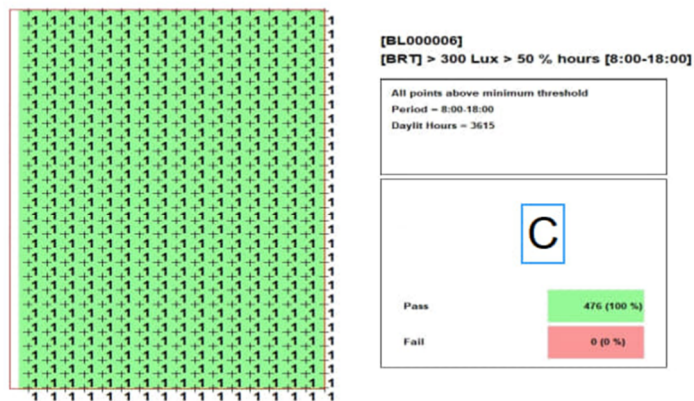


Fig 7G – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

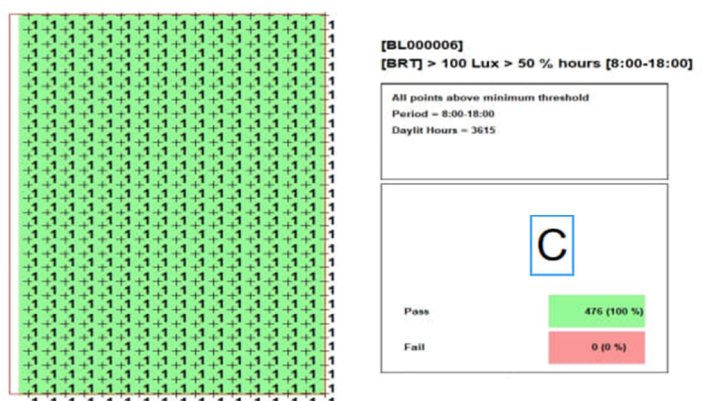


Fig 7H – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

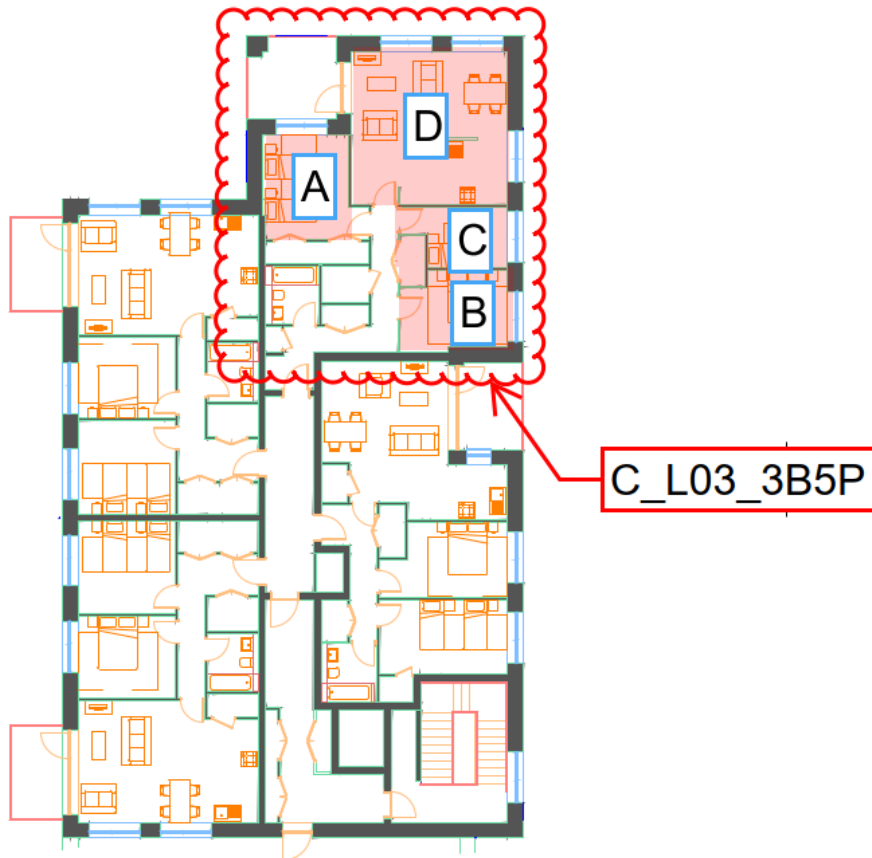


Figure 8 –Block C – 3 Bed apartment, third floor, assessed rooms highlighted in red.

Unit		D_T Target Daylight Factors (%)	DF results (%)	Meets recommended D_T ?
A	Bedroom 01	0.7%	4.6%	YES
B	Bedroom 02	0.7%	5.9%	YES
C	Bedroom 03	0.7%	8.3%	YES
D	Living/ Kitchen	1.4%	9.4%	YES

Table 4A – Target daylight factors (D_T) results

Unit		Target illuminance met ? E_T (300lx) for half of assessment grid	Target illuminance met ? E_{TM} (100lx) for 95% of assessment grid
A	Bedroom 01	YES	YES
B	Bedroom 02	YES	YES
C	Bedroom 03	YES	YES
D	Living/ Kitchen	YES	YES

Table 4B – Target illuminance (E_T) results

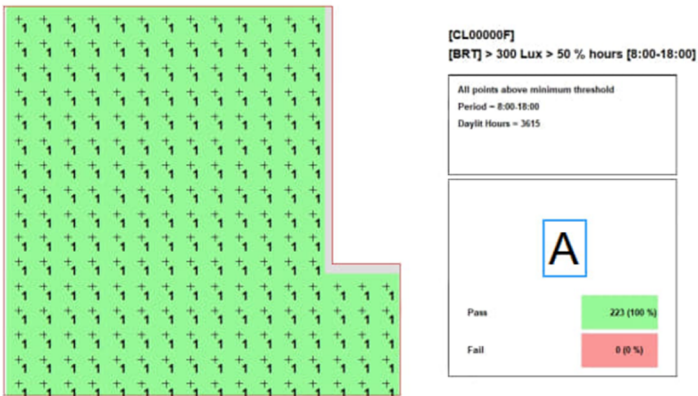


Fig 8C – Bedroom01 - Target illuminance E_T (300lx) for half of assessment grid

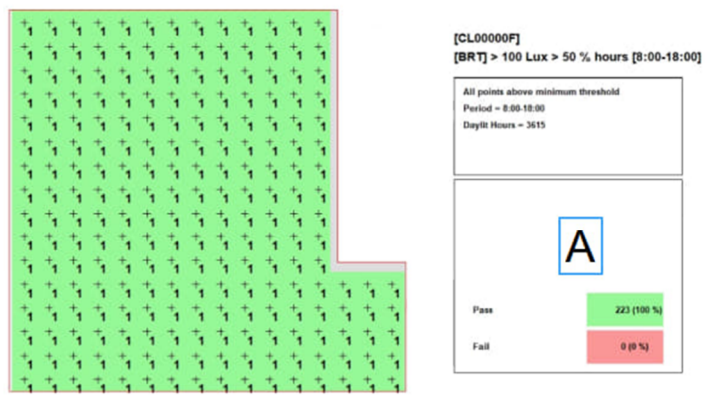


Fig 8D – Bedroom01 - Target illuminance E_{TM} (100lx) for 95% of assessment grid



Fig 8E – Bedroom02 - Target illuminance E_T (300lx) for half of assessment grid



Fig 8F – Bedroom02 - Target illuminance E_{TM} (100lx) for 95% of assessment grid

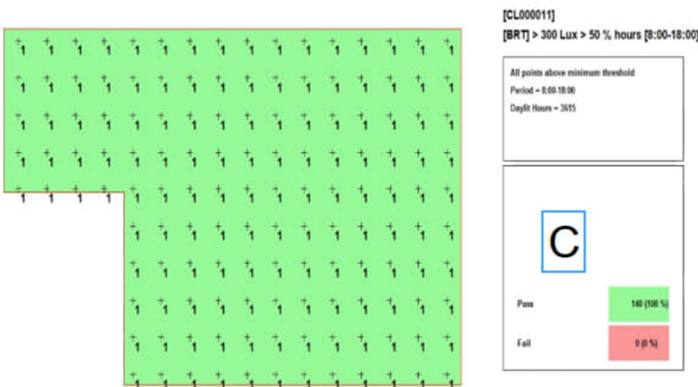


Fig 8G – Bedroom03- Target illuminance E_T (300lx) for half of assessment grid

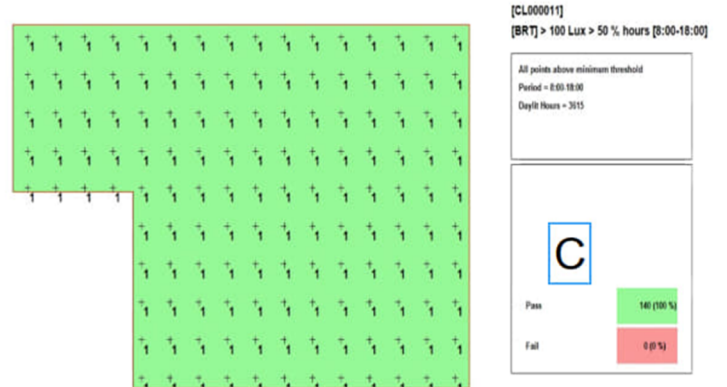


Fig 8H – Bedroom03- Target illuminance E_{TM} (100lx) for 95% of assessment grid

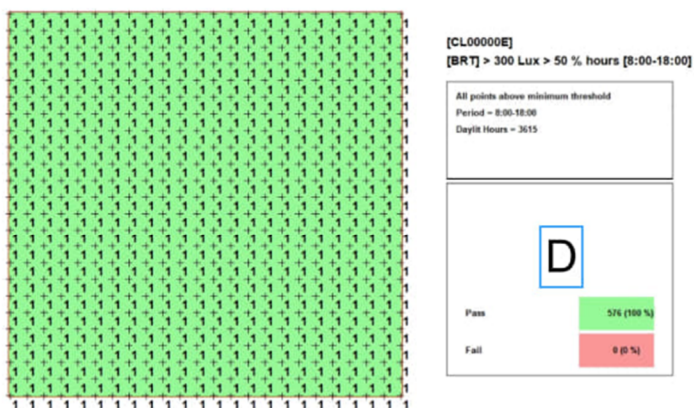


Fig 8I – Living/Kitchen - Target illuminance E_T (300lx) for half of assessment grid

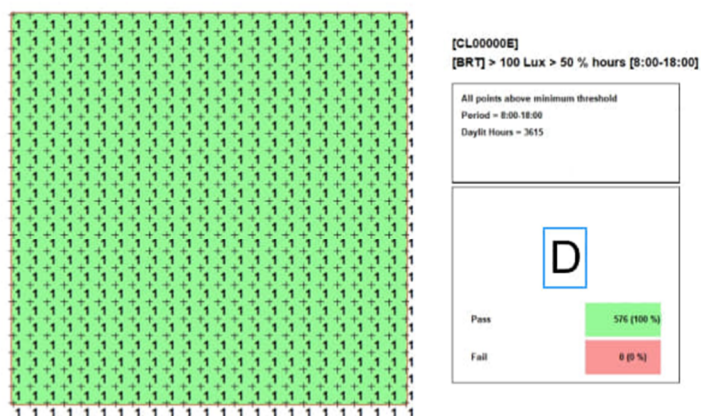


Fig 8J – Living/Kitchen - Target illuminance E_{TM} (100lx) for 95% of assessment grid

7.0. CONCLUSION

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, 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 Guideline:

“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 difficulty in achieving the result set out by the BRE guidance in a city center location is also recognized within planning guidance which has been published by the Irish Government. On page 43 of the Urban Design Manual 2009 the following advice is provided:

“Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths.”

7.1. Daylight

Daylight factors (D_T)

The analysis confirms that across the entire development recommended levels of internal daylight are achieved. A **100%** compliance rate was achieved across the selected apartments throughout the entire development.

Daylight illuminance (E_T)

The analysis confirms that across the entire development recommended levels of Daylight illuminance are achieved. A **100%** compliance rate was achieved across the selected apartments throughout the entire development.

7.2. Sunlight Exposure

The results tables below confirm how a high level of compliance for Exposure to Sunlight. 95% of the units assessed were determined to be compliant as 103 out of 108 apartments or duplexes were compliant.

Overall	Pass	Fail	Total
Block-A1	23	0	23
Block-A2	23	0	23
Block-B	19	0	19
Block-C	16	5	21
Block-D	14	0	14
Block-E	8	0	8
Total	103	5	108
Percentage	95%	5%	