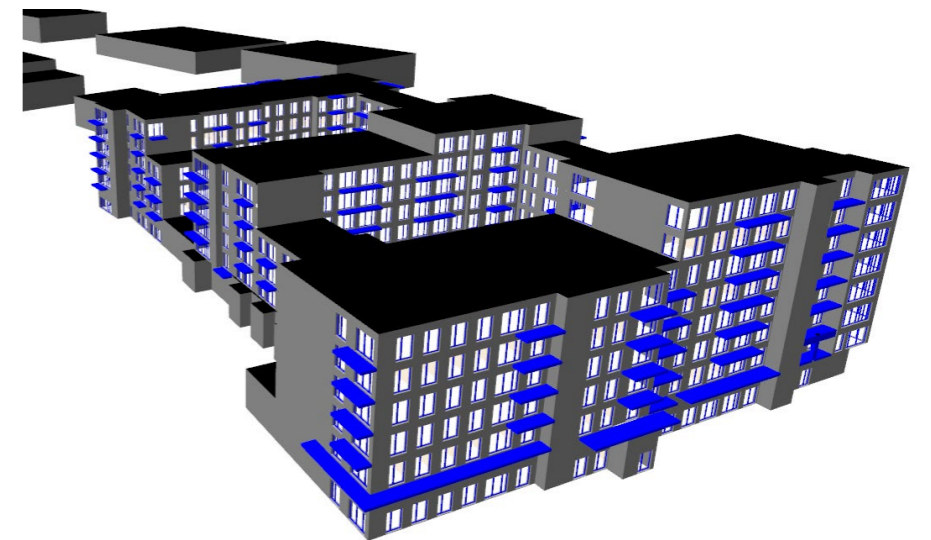


Greenleaf Homes Limited



Proposed Residential Development
The Former Gallaher Site,
Airton Road,
Tallaght,
Dublin 24



DAYLIGHT & SUNLIGHT ANALYSIS

IN2 Project. No. D1919

Rev.07

12th February 2020

INDEX

- 1.0 EXECUTIVE SUMMARY
- 2.0 SITE SUNLIGHTING AND SHADING
- 3.0 INTERNAL DAYLIGHT ANALYSIS

1.0 EXECUTIVE SUMMARY

This report assesses the predicted daylight availability for the development as described in the planning report. Analysis was based on drawings and 3D Model received from Ferreira Architects on 18th December 2019.

Sunlight availability to the Amenity spaces was assessed against the BRE guideline criteria target of 50% achieving 2-hours sunlight on March 21st, detailed in Section 2.0. The amenity spaces exceed this requirement achieving in excess of 97% sunlight availability. Shadow analysis illustrates no significant impact onto adjoining buildings as a result of the proposed scheme.

The internal daylight was assessed to determine how the arrangement and layout of the proposed development effected the quality of the internal living spaces. All spaces were assessed against the minimum daylight requirements as prescribed by the BRE.

The analysis determines that 98% of rooms within the apartment blocks exceeded the minimum BRE requirements (1307 of 1340 rooms), with the remaining living spaces all achieving in excess of 1.0% average daylight factor ensuring no sub quality spaces throughout the development.

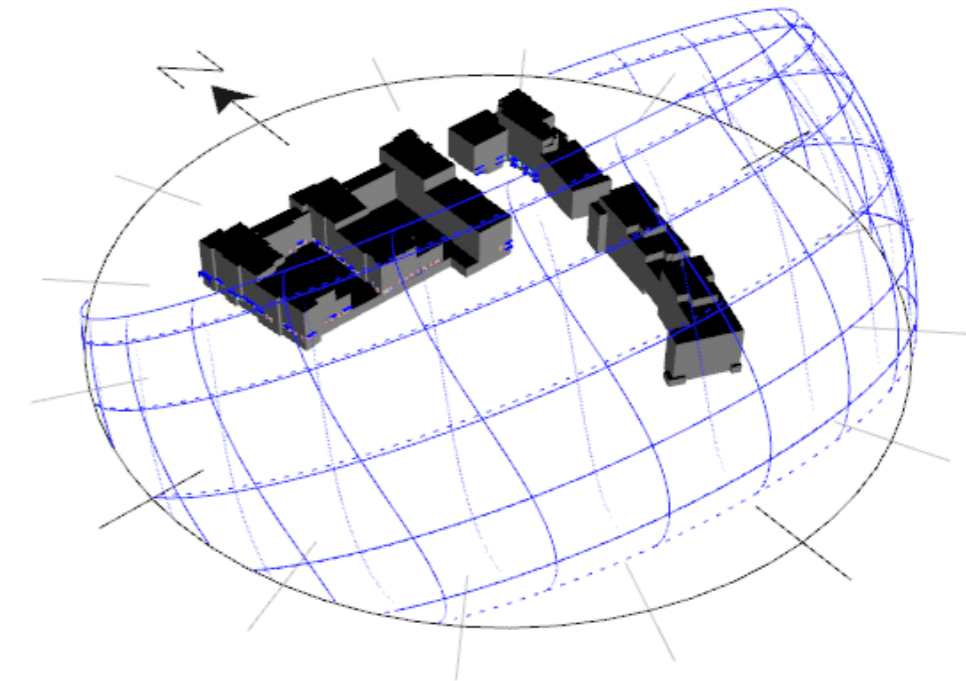


Fig 1.1 Proposed Scheme

2.0 SITE SUNLIGHTING AND SHADING

2.1 Methodology

The BRE *Site Layout Planning for Daylight and Sunlight* Design Guide provides guidance with regards to sunlighting and shading to proposed developments and external Amenity spaces.

The guidance in relation to amenity spaces recommends “that for it to appear adequately sunlit throughout the year, at least half (50%) of a garden or amenity area should receive at least two hours of sunlight on 21st March”. The analysis determines any areas that do not achieve this requirement as **dark green** (see sample image in Fig 2.1).

2.2 Results

Fig 2.2 confirms, due to block orientation and massing, the amenity spaces to the development will all be compliant with this criterion by achieving upwards of **97%** daylight availability.

2.3 Shadow Analysis

Additionally, imagery of the predicted sunlighting and shadowing for the proposed development, with results illustrated for the Equinox (March 21st) and the Summer Solstices (June 21st) has been carried out.

The images overleaf illustrate the collated results undertaken for sunlight and shadowing analysis based on site location’s latitude and longitude (53.3° N/ 6.4° W) at Tallaght.

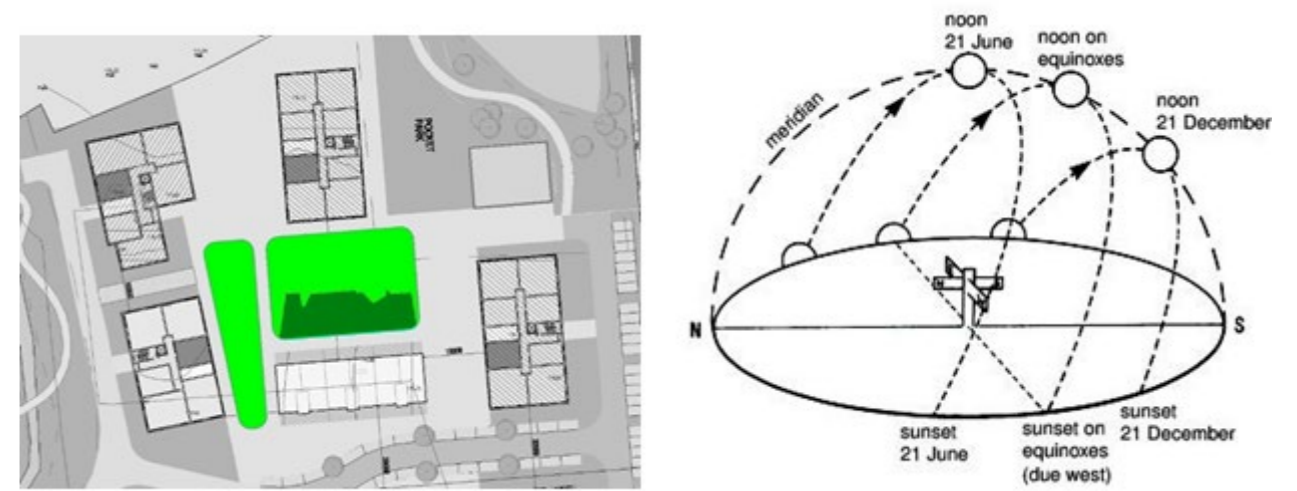


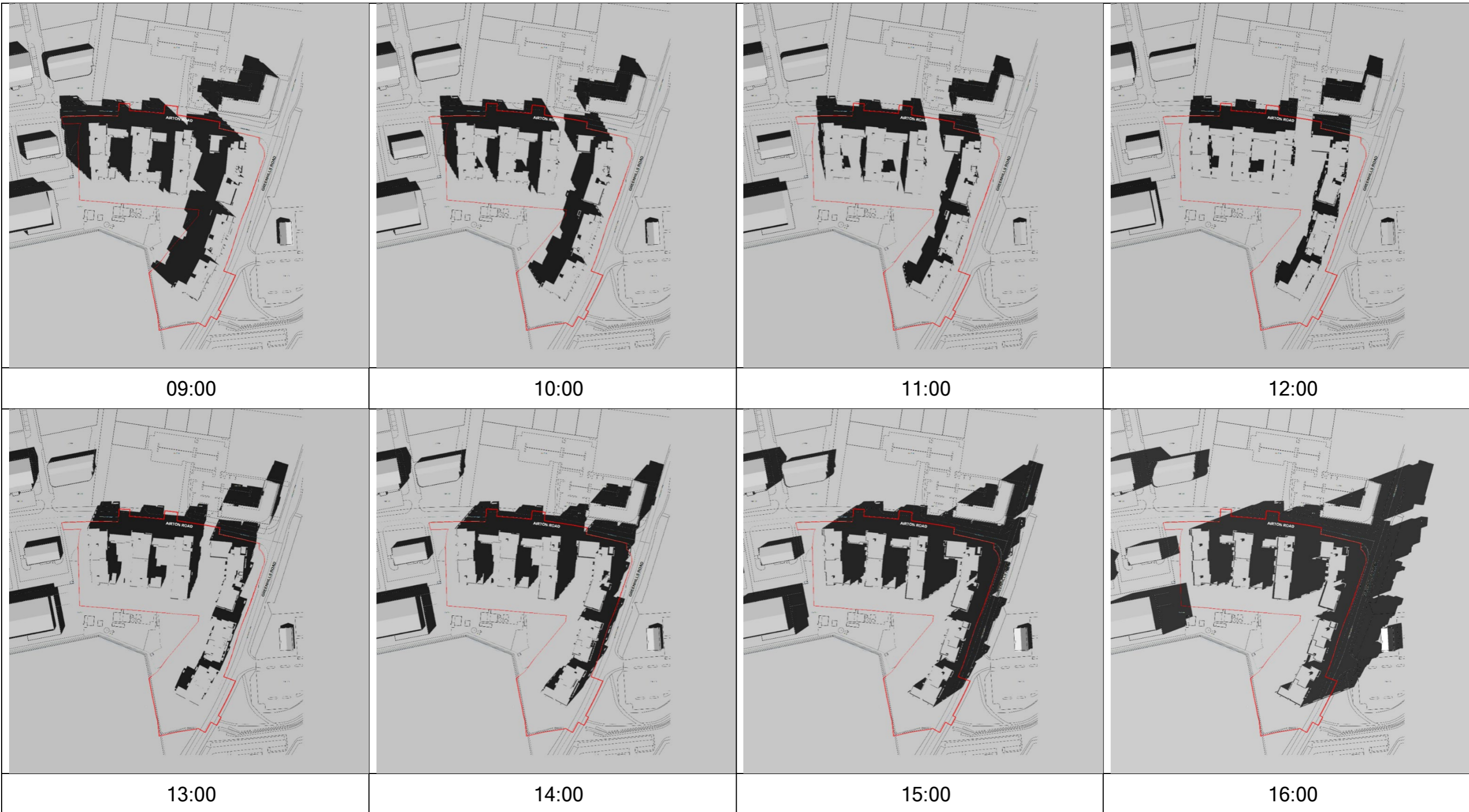
Fig 2.1 -Sample Sunlight Image & Sun Path Diagram



Fig 2.2 -Sunlight Availability to Amenity Spaces for Proposed Development

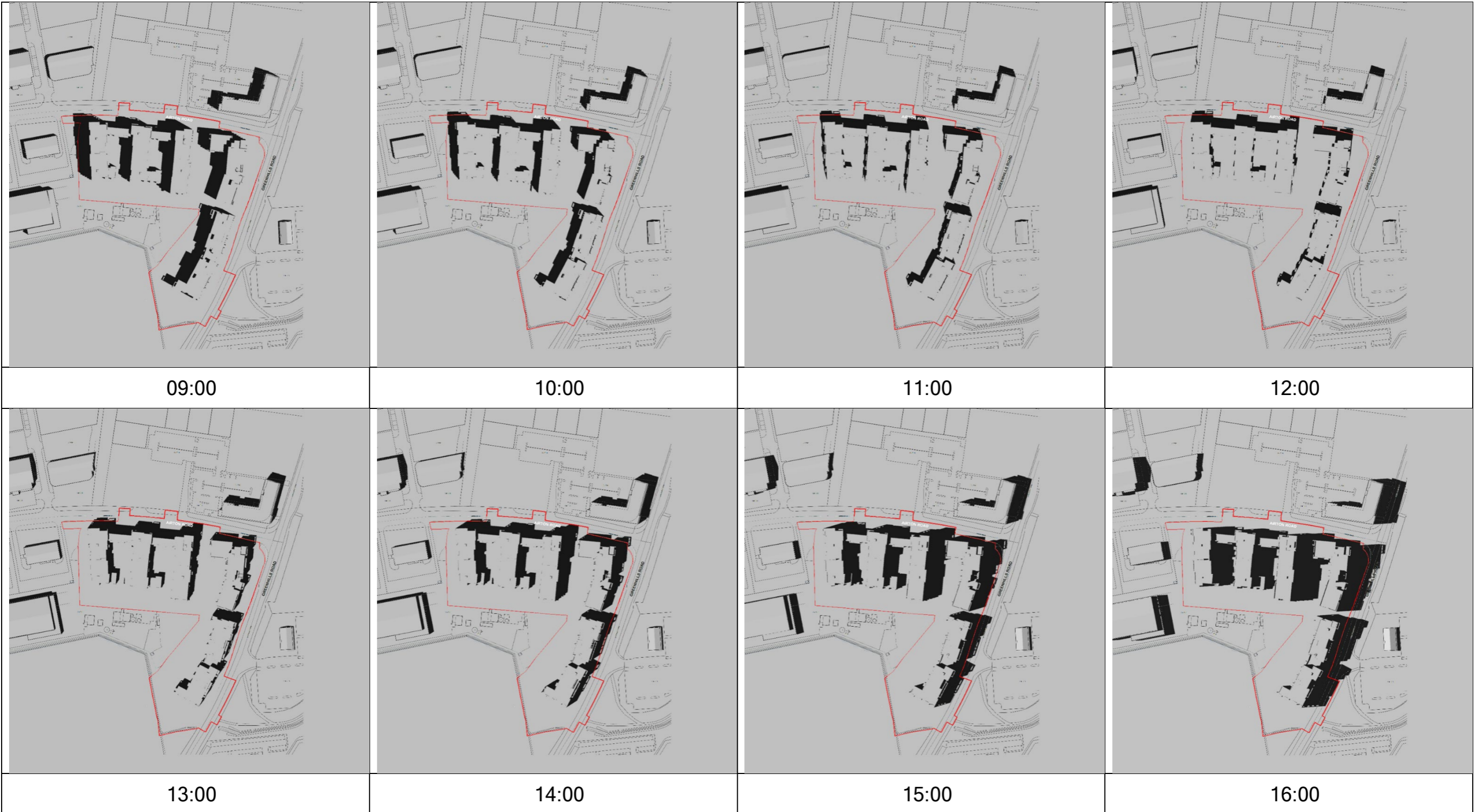
2.0 SITE SUNLIGHTING AND SHADING (cont'd)

2.3 Site Shading - Equinox (March 21st)



2.0 SITE SUNLIGHTING AND SHADING (cont'd)

2.3 Site Shading - Summer Solstices (June 21st)



3.0 INTERNAL DAYLIGHT ANALYSIS

3.1 Methodology

Daylighting analysis was undertaken using a dynamic simulation model (Tas Software). The daylight analysis accounts for building form, orientation, adjoining buildings along with detailed framing, cill depth and glazing properties in accordance with the architectural design drawings. Simulation results are displayed as colour images contour plots showing the achieved values for average daylight factors.

Internal daylighting for all internal spaces were assessed by undertaking lighting simulations, enabling both quantification and visualisation of predicted illumination levels (lux) and uniformity. This enabled Average Daylight Factor (ADF) values to be determined for each floor space.

Internal Lighting levels were determined for a CIE Overcast Sky of 10,000 Lux. This CIE sky is uni-directional, so façade orientation does not affect daylight factors.

Each habitable space was assessed for Daylighting against the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition), as relevant, which state;

"Daylight provision in new rooms may be checked using the average daylight factor (ADF). The ADF is a measure of the overall amount of daylight in a space. BS 8206-2 Code of practice for daylighting recommends an ADF of 5% for a well daylight space and 2% for a partly daylight space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 also gives minimum values of ADF of 2% for kitchen, 1.5% for living rooms and 1% for bedroom."

It can be seen from the above that there is a recognition within the Best Practice Guide and associated Standard that daylight requirements in non-domestic buildings are more critical than within dwellings. This is due to the expectation that dwellings would not typically be occupied during daytime. Therefore, living areas and bedrooms were provided with reduced targets of Average Daylight Factor (ADF).

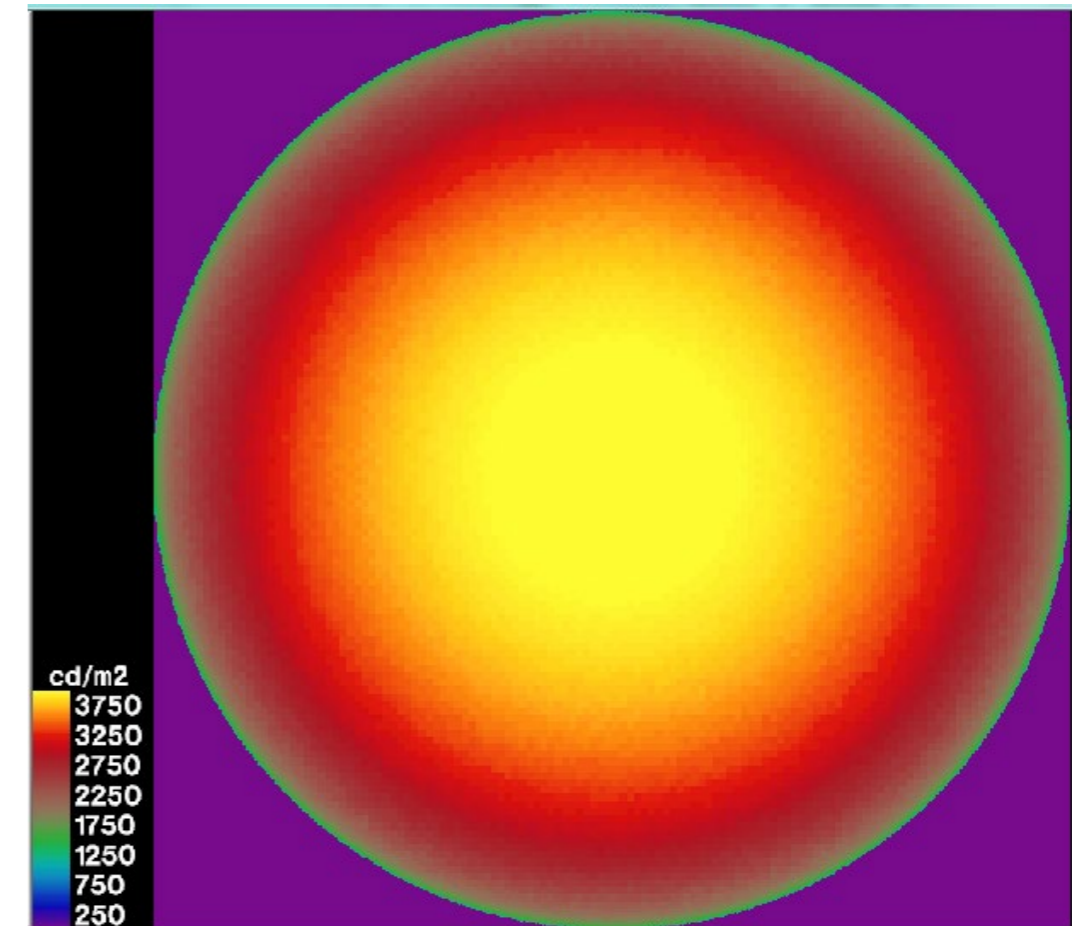


Fig 3.1 - CIE Overcast Sky

3.0 INTERNAL DAYLIGHT ANALYSIS

3.1 Methodology (Cont'd)

It may be noted that the sole residential space that had been set as a target equivalent to non-domestic buildings (2% minimum) were kitchens; however, this was done so on the premise that such a space within a traditional house would be continuously occupied throughout daytime.

Conversely, it would be envisaged that the kitchenettes within the apartments would be intermittently occupied, with the living area being the main area of occupation through daytime (if occupants are present). Therefore, the analysis has been undertaken based on assessing the main Living/ Dining Areas as being an appropriate area to achieve good daylighting, with an associated target ADF of 1.5%.

The following daylight factors were targeted:

- > 1.5% for Living Areas
- >1% for Bedrooms

The daylighting models were calculated based on the following assumptions:

- Glazing Transmission = 70% for building line glazing, = 80% for winter garden glazing.
- Ceilings: 82% reflectance (BS 00E55 White)
- Walls: 62% reflectance (BS 10C31 Ivory)
- Floors: 36% reflectance (BS 00A05 Platinum Grey)

The visual results overleaf illustrate the daylight contours assessed for each applicable space.

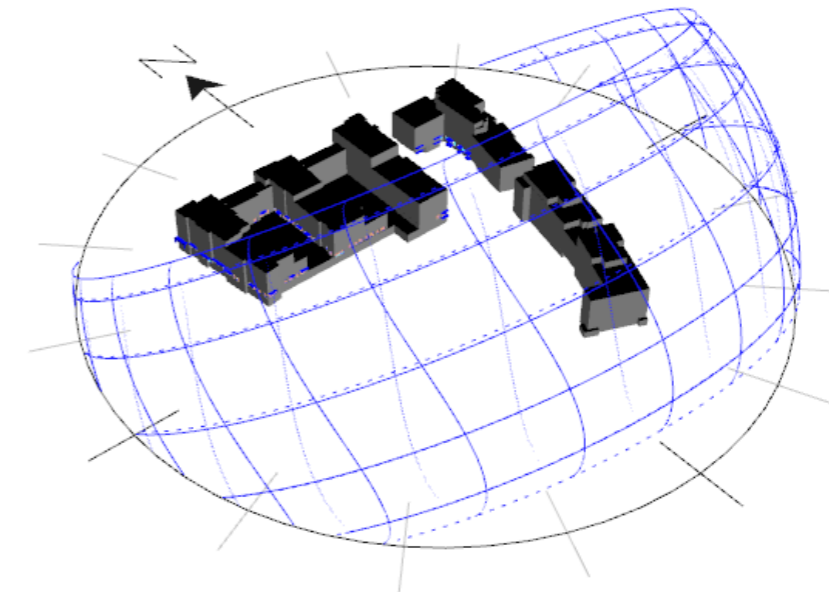


Fig 4.2 -TAS 3D Model

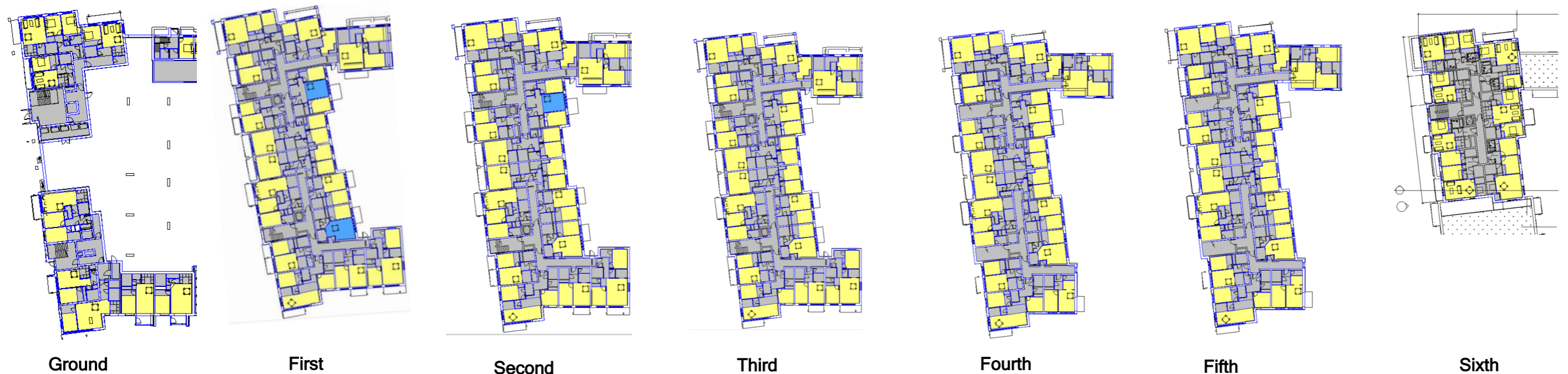
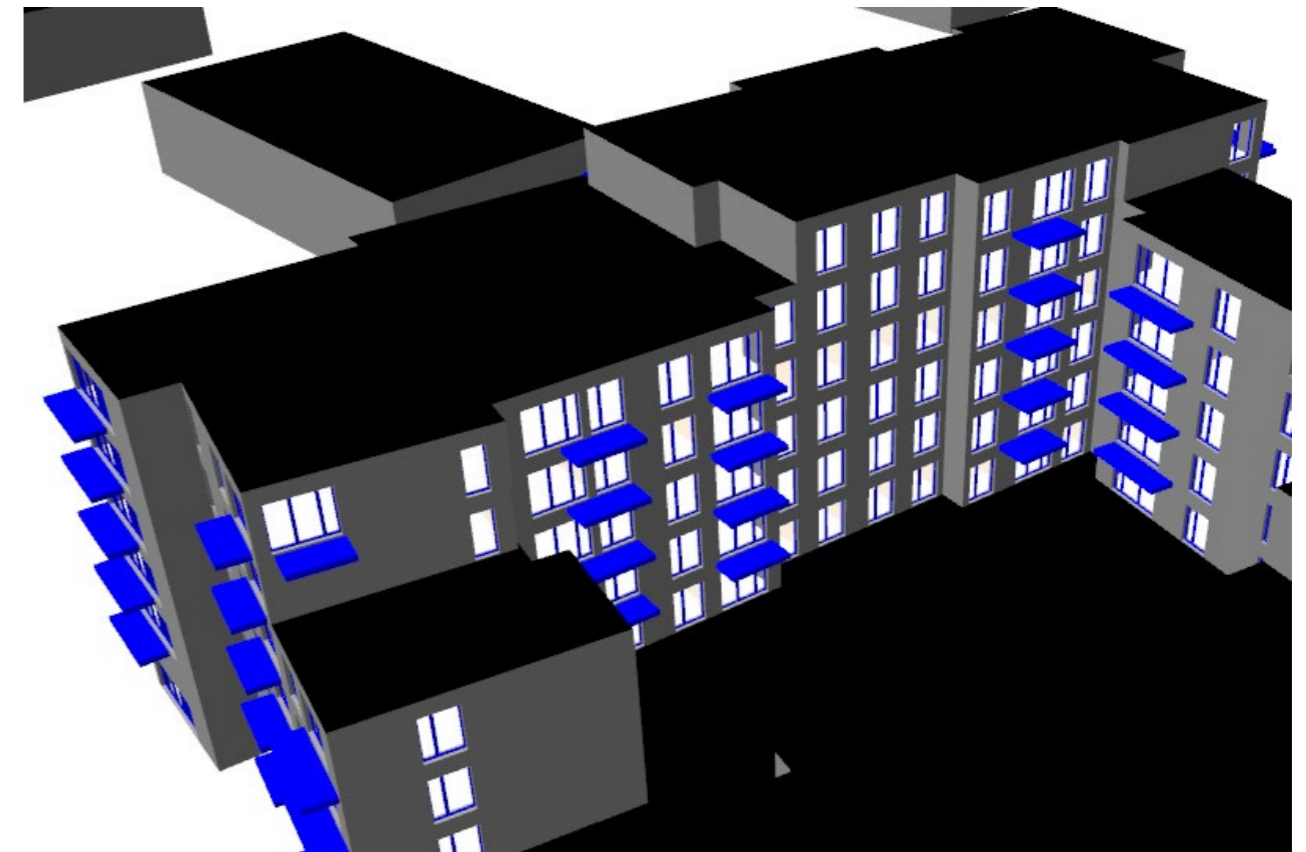
| Room Breakdown | Block A | Block B | Block C | Block D | Block E | Block F | Total |
|----------------|---------|---------|---------|---------|---------|---------|-------|
| Above Target | 223 | 232 | 220 | 294 | 166 | 174 | 98% |
| Below Target | 3 | 3 | 10 | 6 | 7 | 3 | 2% |

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results

98.7% of the rooms in Block A were found to meet the minimum BRE guidelines.

| D1919 Airton Road - Block A | | | | |
|-----------------------------|------------|----------|--------------|-------------|
| Floor | Pass | Fail | % Pass | % Fail |
| Ground | 18 | 0 | 100% | 0% |
| 1st | 37 | 2 | 95% | 5% |
| 2nd | 38 | 1 | 97% | 3% |
| 3rd | 39 | 0 | 100% | 0% |
| 4th | 36 | 0 | 100% | 0% |
| 5th | 36 | 0 | 100% | 0% |
| 6th | 19 | 0 | 100% | 0% |
| Total | 223 | 3 | 98.7% | 1.3% |

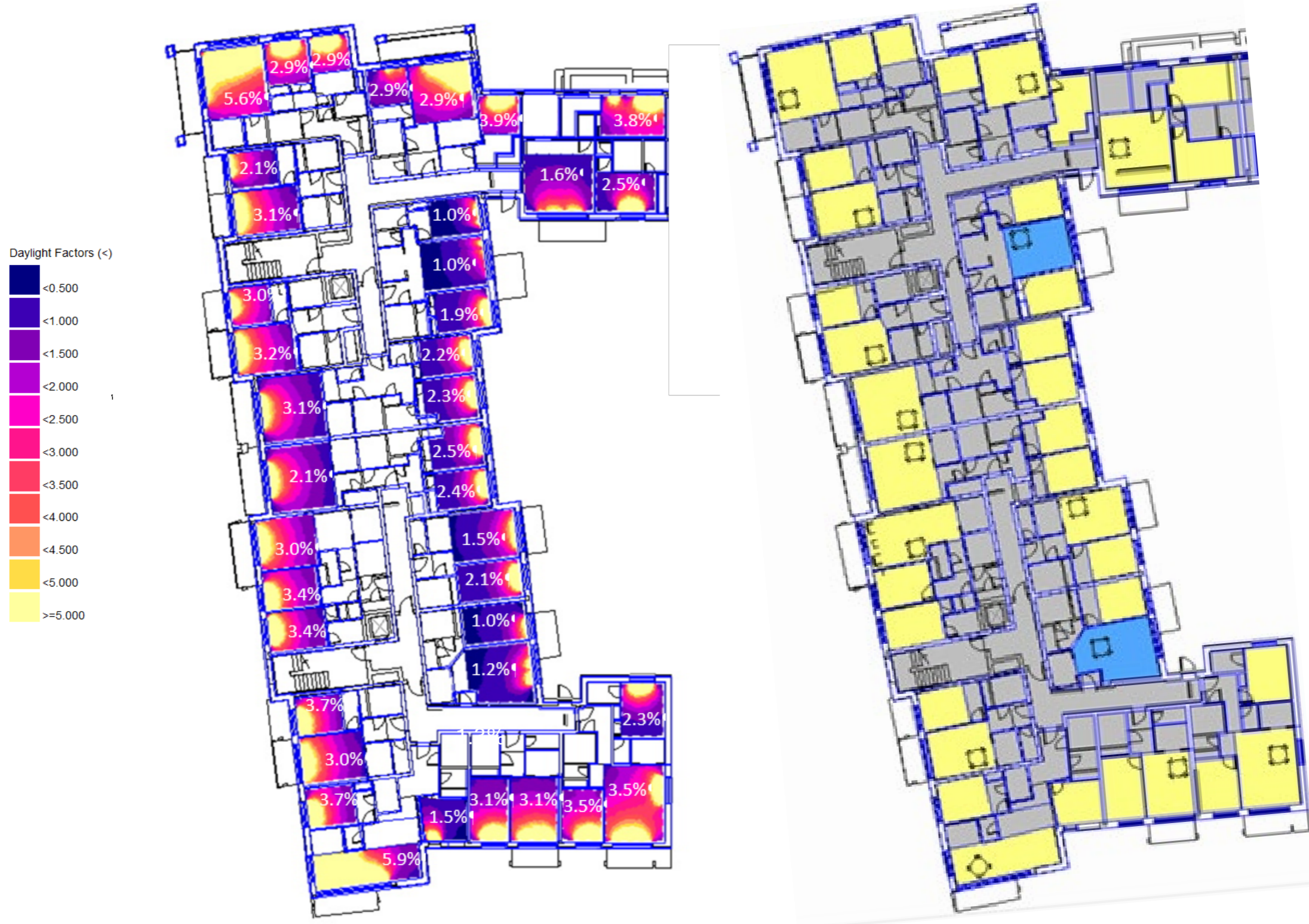


3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results: Block A - Results for First Floor

| Daylight Target Bedroom | |
|-------------------------|--|
| >1% | |
| < 1% | |

| Daylight Target Living | |
|------------------------|--|
| >1.5% | |
| < 1.5% | |



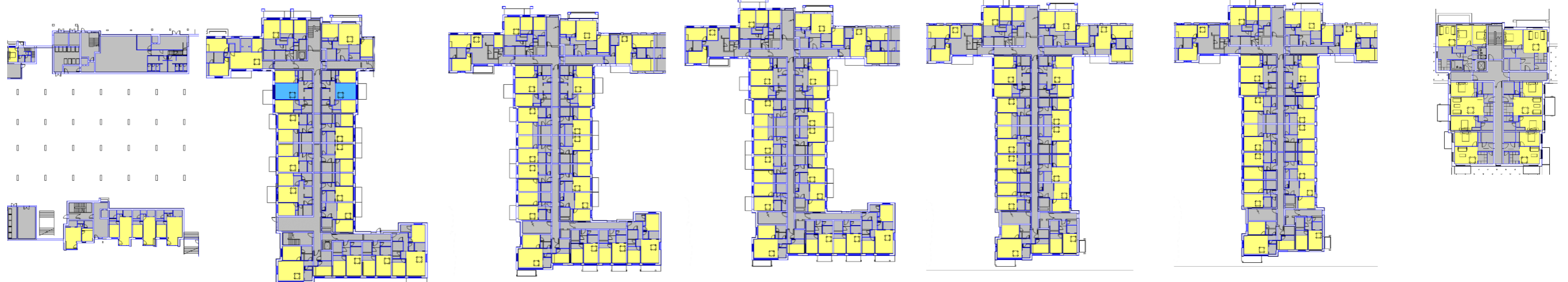
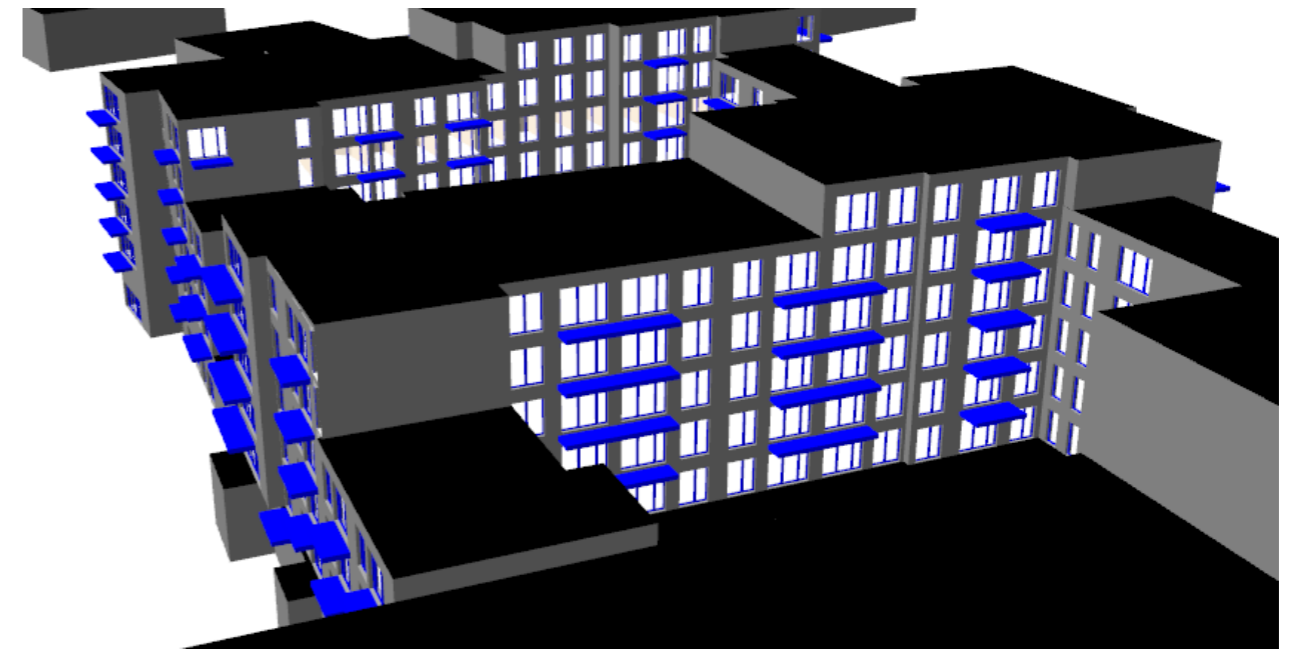
| Block A - First Floor | | |
|-----------------------|----|-----|
| Room Breakdown | | |
| Above Target | 37 | 95% |
| Below Target | 2 | 5% |

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results

98.7% of the rooms in Block B were found to meet the minimum BRE guidelines.

| D1919 Airton Road - Block B | | | | |
|-----------------------------|------------|----------|--------------|-------------|
| Floor | Pass | Fail | % Pass | % Fail |
| Ground | 9 | 0 | 100% | 0% |
| 1st | 38 | 3 | 93% | 7% |
| 2nd | 45 | 0 | 100% | 0% |
| 3rd | 45 | 0 | 100% | 0% |
| 4th | 40 | 0 | 100% | 0% |
| 5th | 40 | 0 | 100% | 0% |
| 6th | 15 | 0 | 100% | 0% |
| Total | 232 | 3 | 98.7% | 1.3% |



Ground

First

Second

Third

Fourth

Fifth

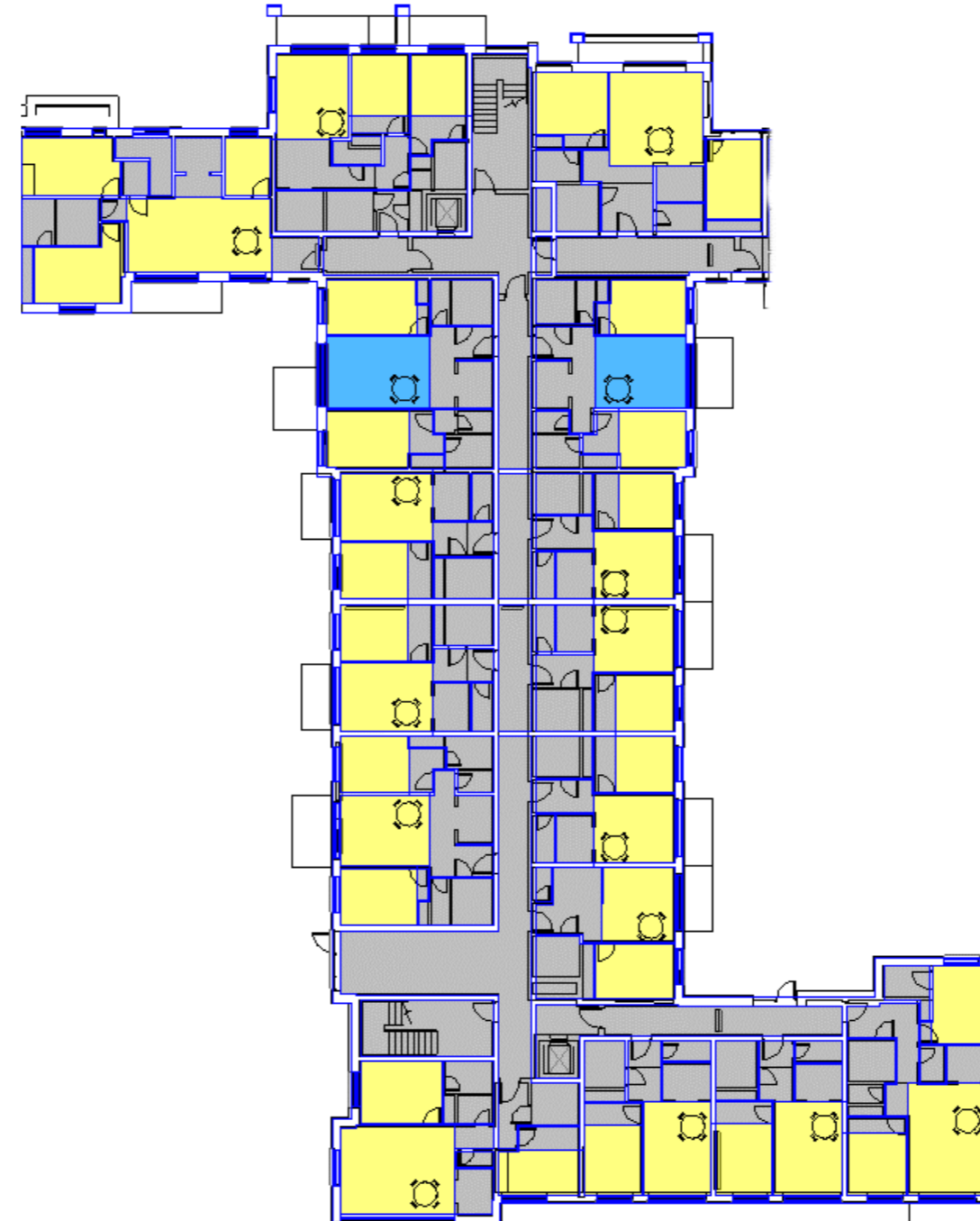
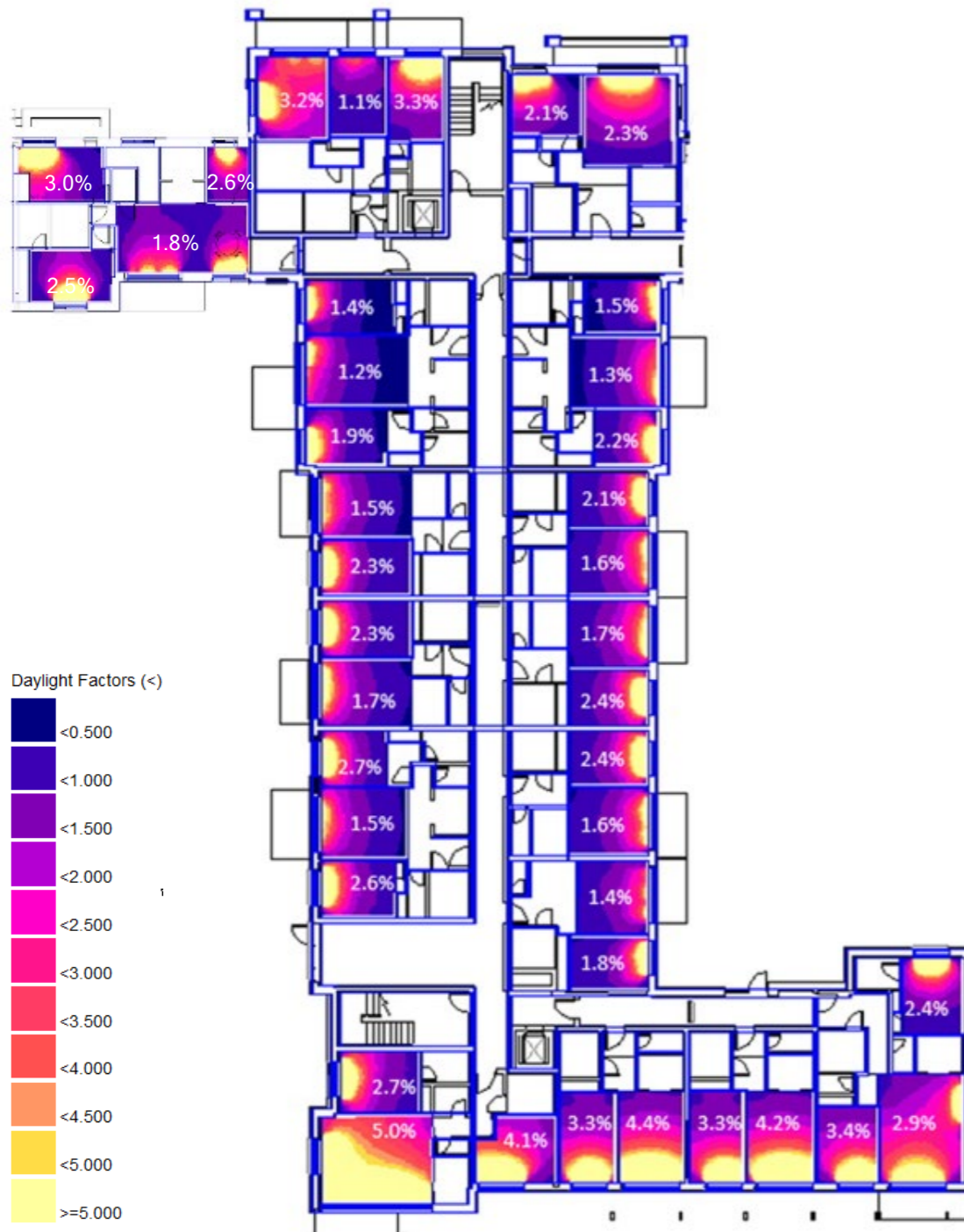
Sixth

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results Block B - Results for First Floor

| Daylight Target Bedroom | |
|-------------------------|--------|
| >1% | Yellow |
| < 1% | Blue |

| Daylight Target Living | |
|------------------------|--------|
| >1.5% | Yellow |
| < 1.5% | Blue |



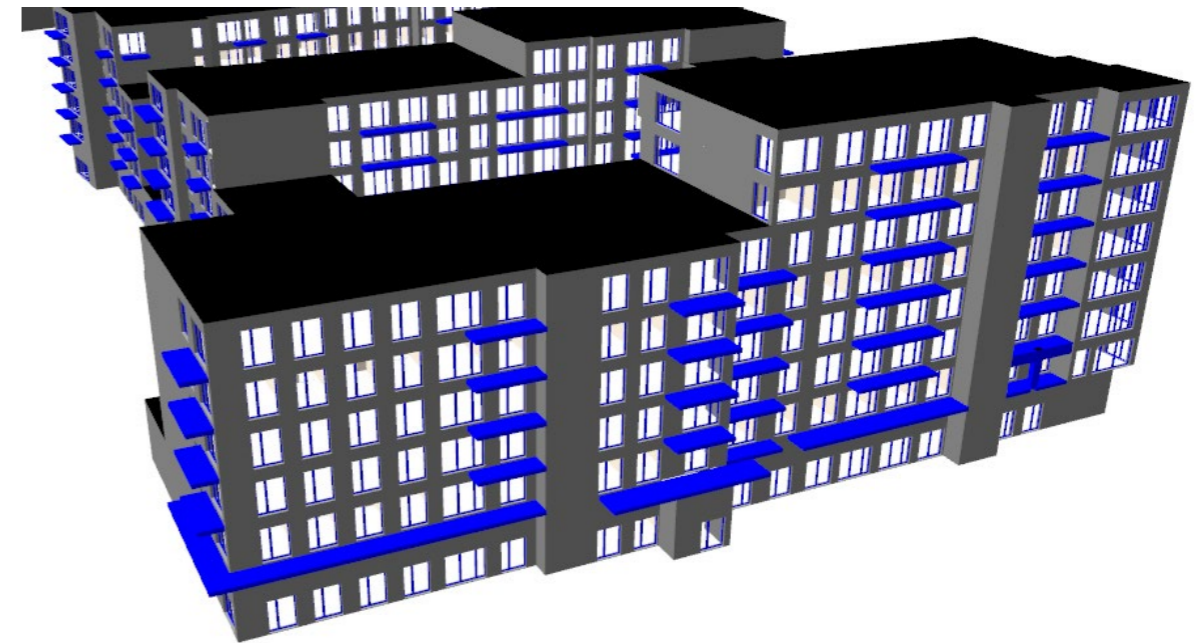
| Block B - First Floor | | |
|-----------------------|----|-----|
| Room Breakdown | | |
| Above Target | 38 | 93% |
| Below Target | 3 | 7% |

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results

95.7% of the rooms in Block C were found to meet the minimum BRE guidelines.

| D1919 Airton Road - Block C | | | | |
|-----------------------------|------------|-----------|--------------|-------------|
| Floor | Pass | Fail | % Pass | % Fail |
| Ground | 6 | 0 | 100% | 0% |
| 1st | 30 | 8 | 79% | 21% |
| 2nd | 37 | 1 | 97% | 3% |
| 3rd | 37 | 1 | 97% | 3% |
| 4th | 38 | 0 | 100% | 0% |
| 5th | 38 | 0 | 100% | 0% |
| 6th | 17 | 0 | 100% | 0% |
| 7th | 17 | 0 | 100% | 0% |
| Total | 220 | 10 | 95.7% | 4.3% |

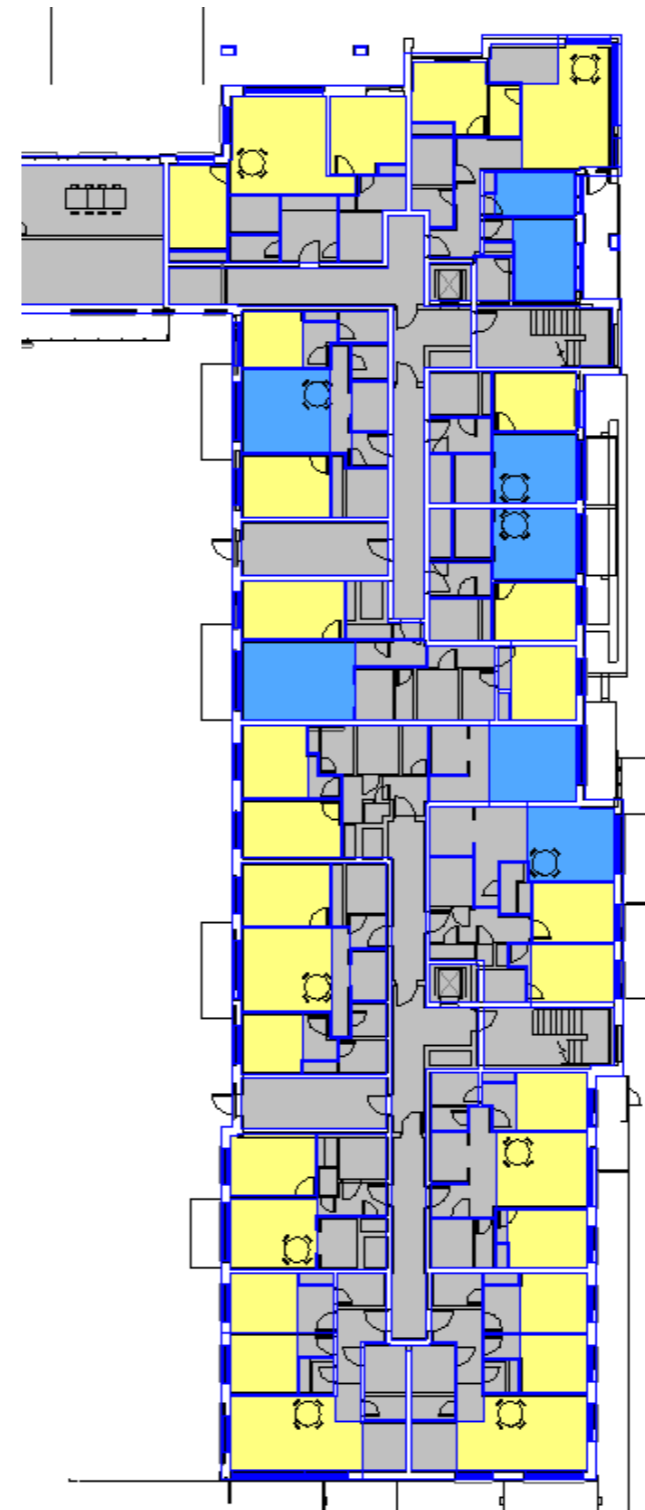
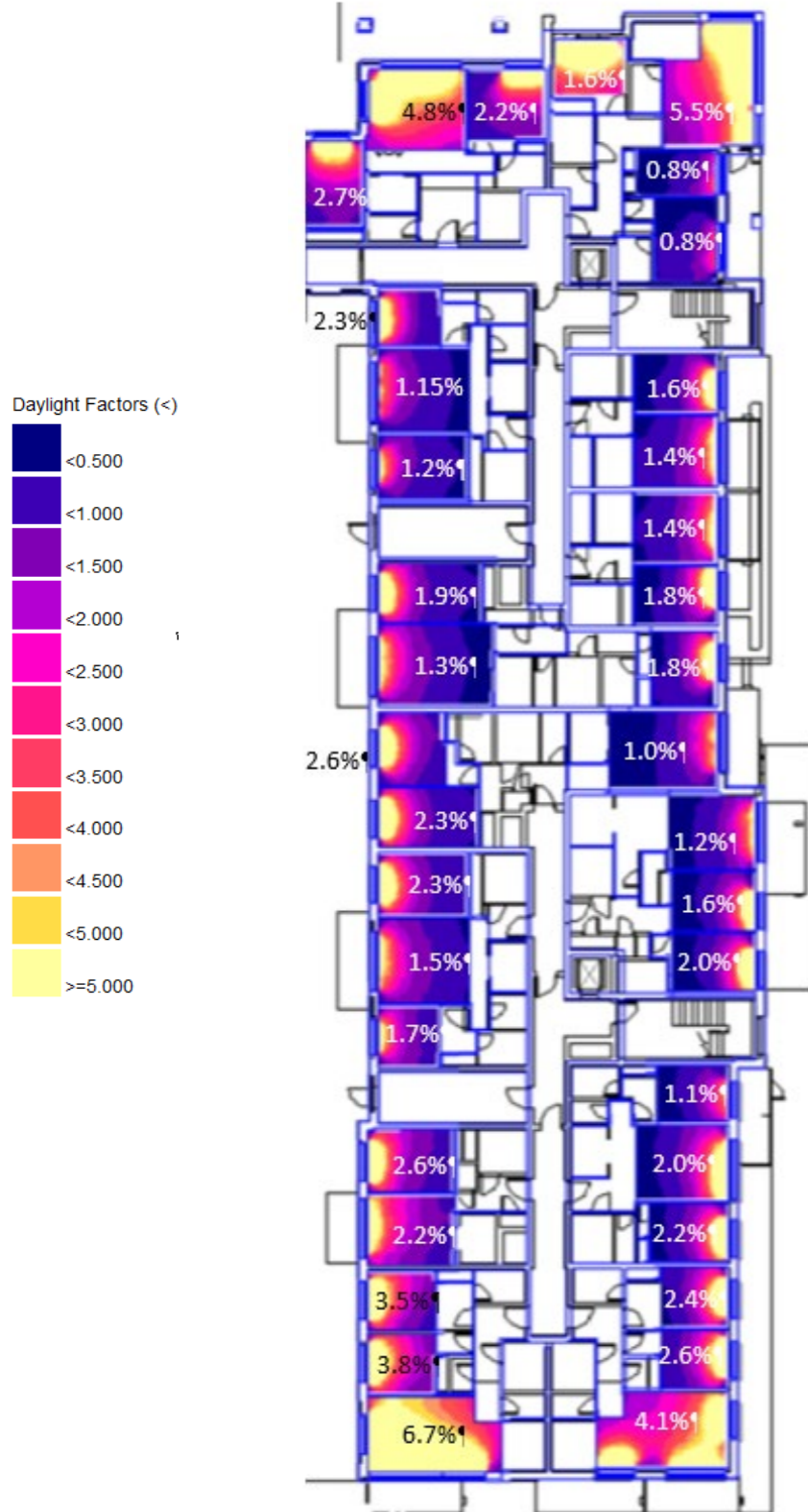


Ground First Second Third Fourth Fifth Sixth Seventh

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results Block C - Results for First Floor

| Daylight Target Bedroom | | Daylight Target Living | |
|-------------------------|--|------------------------|--|
| >1% | | >1.5% | |
| <1% | | <1.5% | |



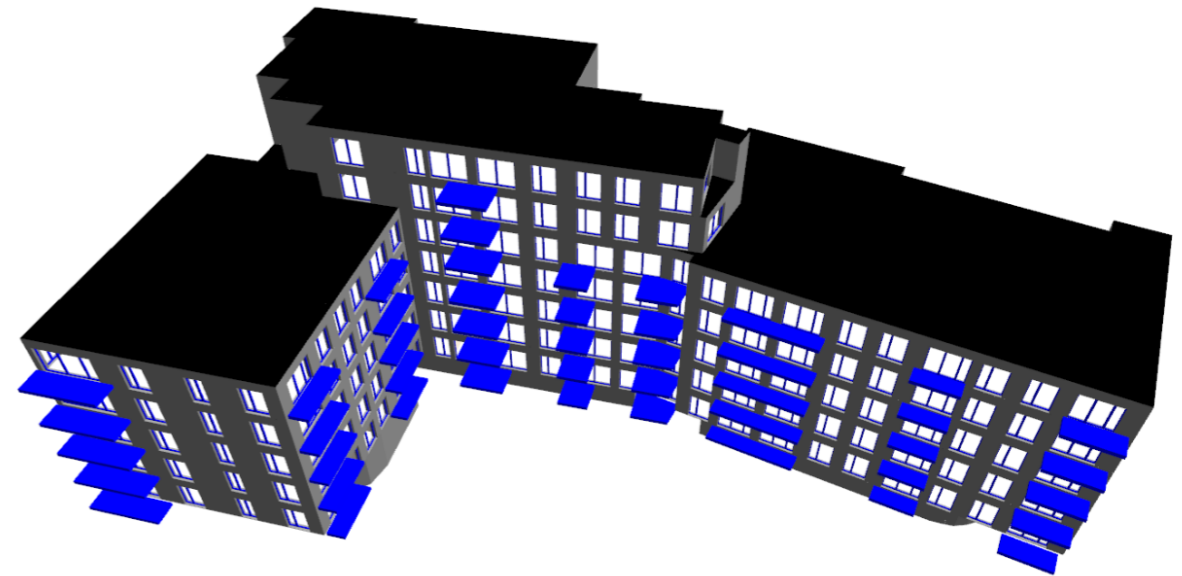
| Block C - First Floor | | |
|-----------------------|----|-----|
| Room Breakdown | | |
| Above Target | 30 | 79% |
| Below Target | 8 | 21% |

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results

98% of the rooms in Block D were found to meet the minimum BRE guidelines.

| Floor | Pass | Fail | % Pass | % Fail |
|--------------|------------|----------|--------------|-------------|
| Ground | 15 | 3 | 83% | 17% |
| 1st | 47 | 3 | 94% | 6% |
| 2nd | 50 | 0 | 100% | 0% |
| 3rd | 50 | 0 | 100% | 0% |
| 4th | 50 | 0 | 100% | 0% |
| 5th | 50 | 0 | 100% | 0% |
| 6th | 16 | 0 | 100% | 0% |
| 7th | 16 | 0 | 100% | 0% |
| Total | 294 | 6 | 98.0% | 2.0% |



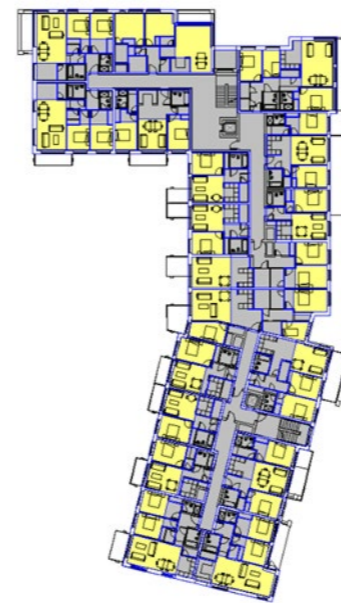
Ground



First



Second



Third



Fourth & Fifth



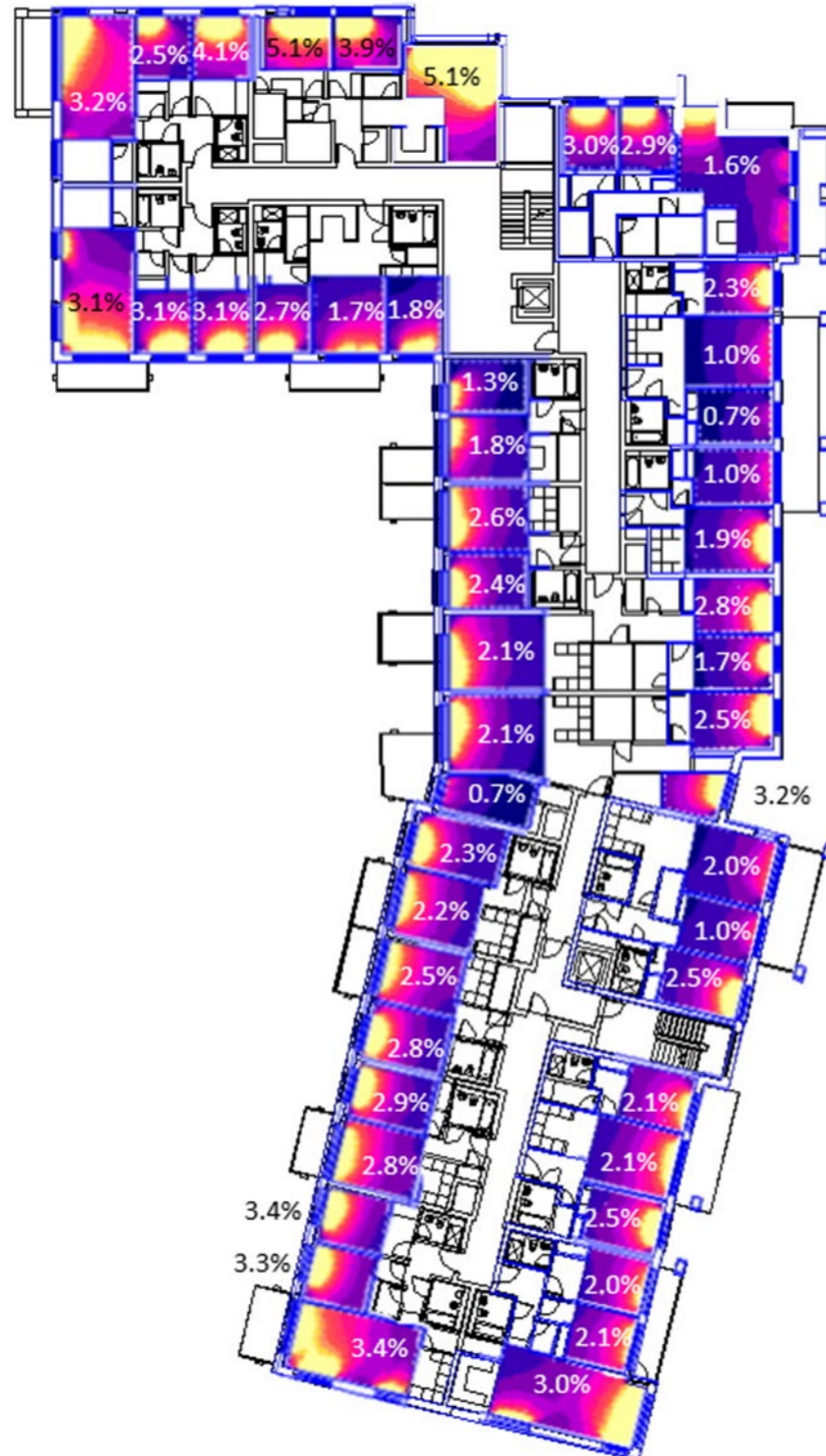
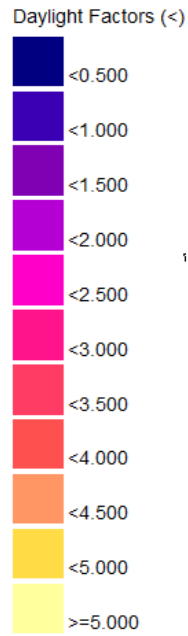
Sixth & Seventh

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results Block D - Results for First Floor

| Daylight Target Bedroom | |
|-------------------------|--|
| >1% | |
| < 1% | |

| Daylight Target Living | |
|------------------------|--|
| >1.5% | |
| < 1.5% | |



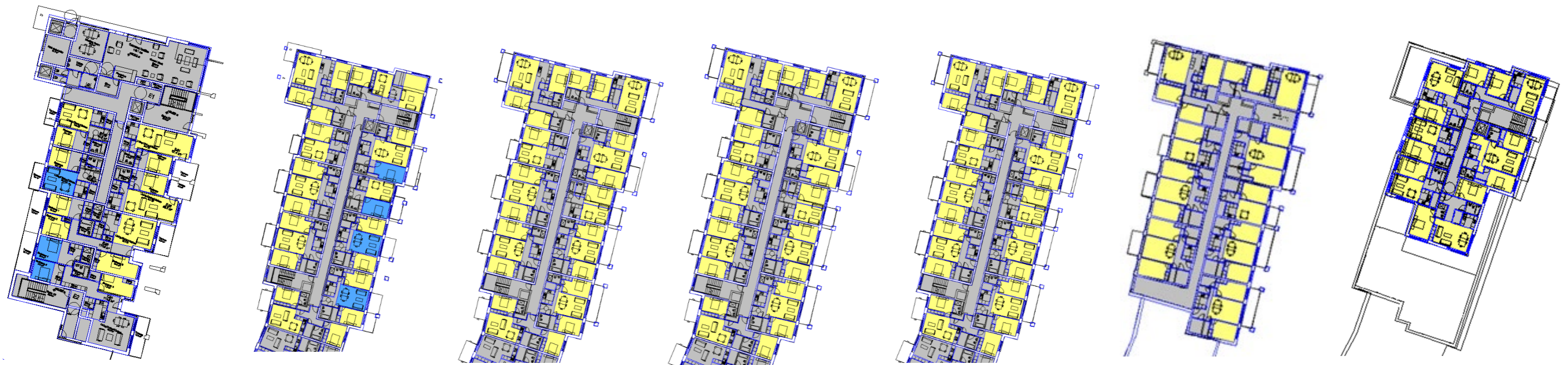
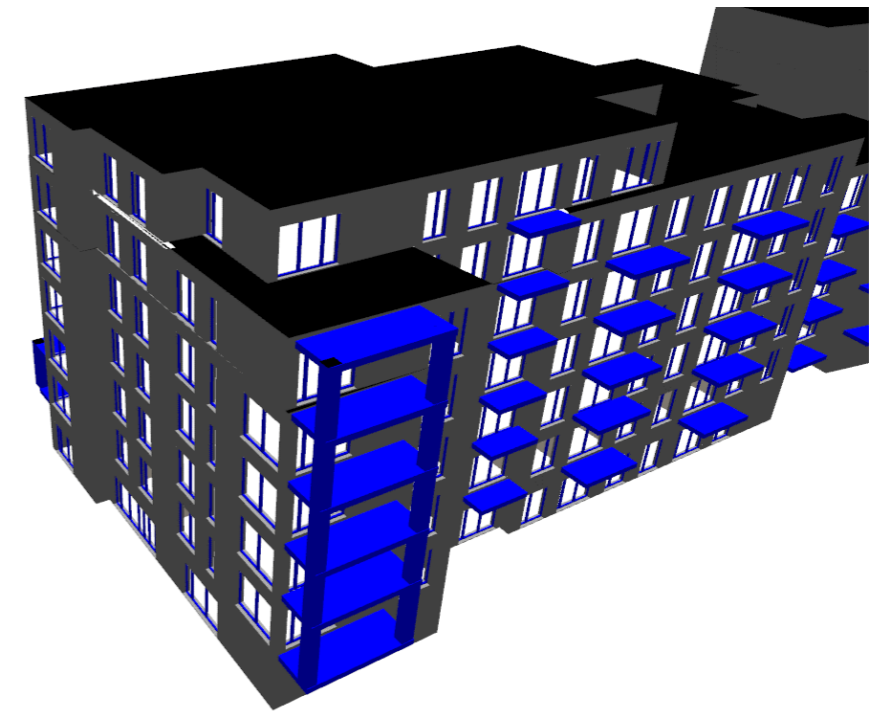
| Block D - First Floor | | |
|-----------------------|----|-----|
| Room Breakdown | | |
| Above Target | 47 | 94% |
| Below Target | 3 | 6% |

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results

95.4% of the rooms in Block E were found to meet the minimum BRE guidelines.

| D1919 Airton Road - Block E | | | | |
|-----------------------------|------------|----------|--------------|-------------|
| Floor | Pass | Fail | % Pass | % Fail |
| Ground | 13 | 3 | 81% | 19% |
| 1st | 25 | 4 | 86% | 14% |
| 2nd | 29 | 0 | 100% | 0% |
| 3rd | 29 | 0 | 100% | 0% |
| 4th | 29 | 0 | 100% | 0% |
| 5th | 26 | 0 | 100% | 0% |
| 6th | 15 | 0 | 100% | 0% |
| Total | 166 | 7 | 96.0% | 4.0% |



Ground

First

Second

Third

Fourth

Fifth

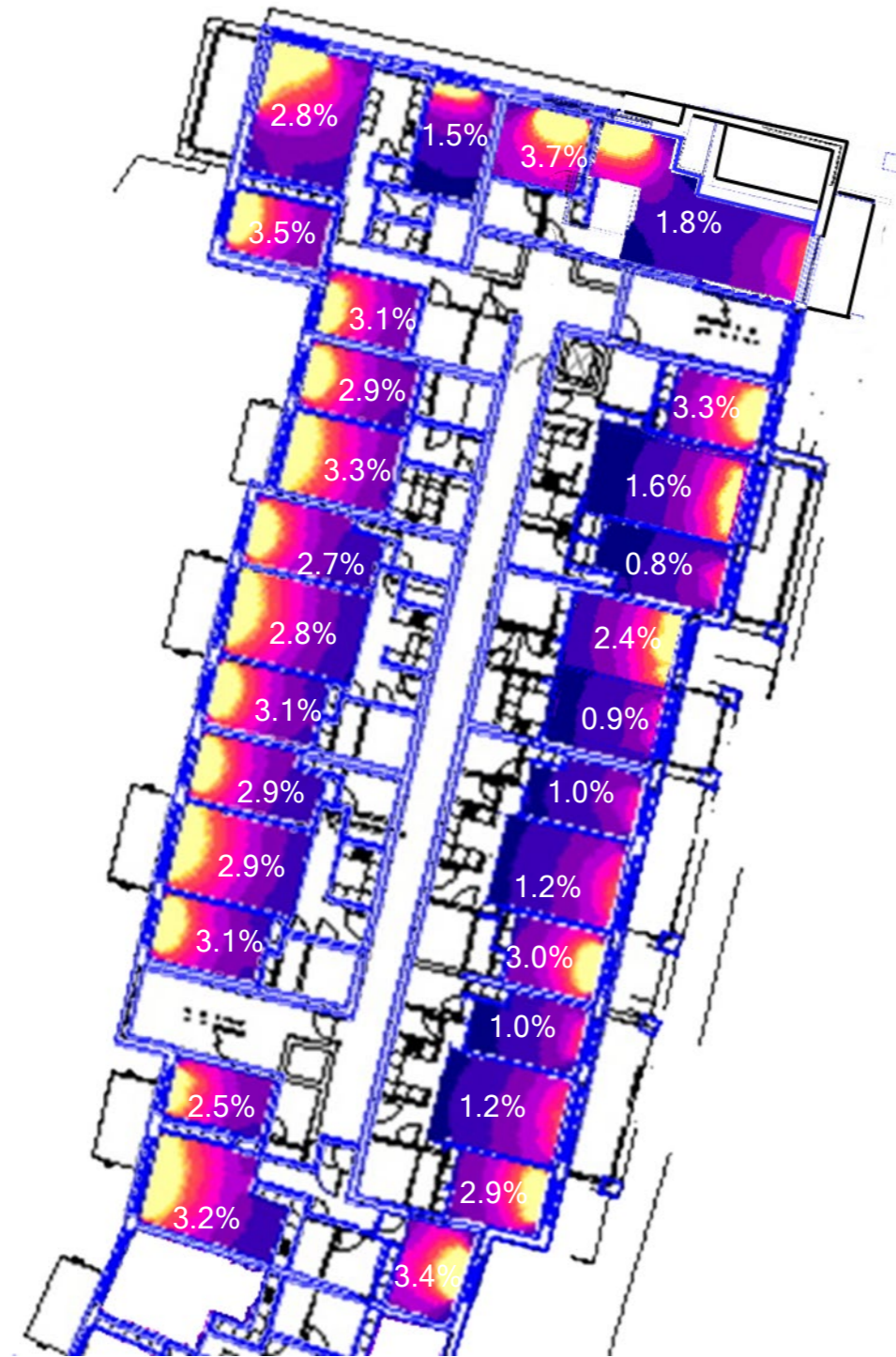
Sixth

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results Block E - Results for First Floor

| Daylight Target Bedroom | |
|-------------------------|--|
| >1% | |
| < 1% | |

| Daylight Target Living | |
|------------------------|--|
| >1.5% | |
| < 1.5% | |



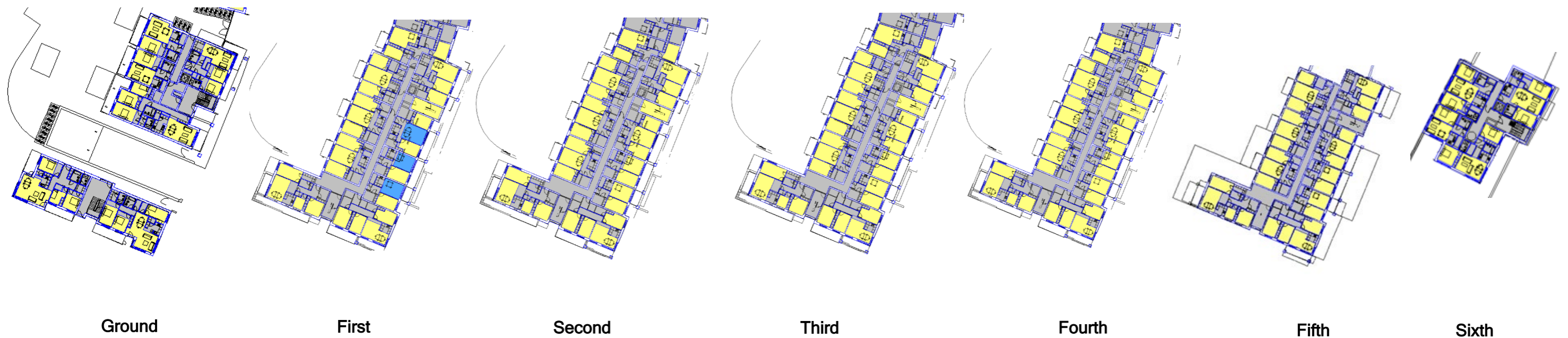
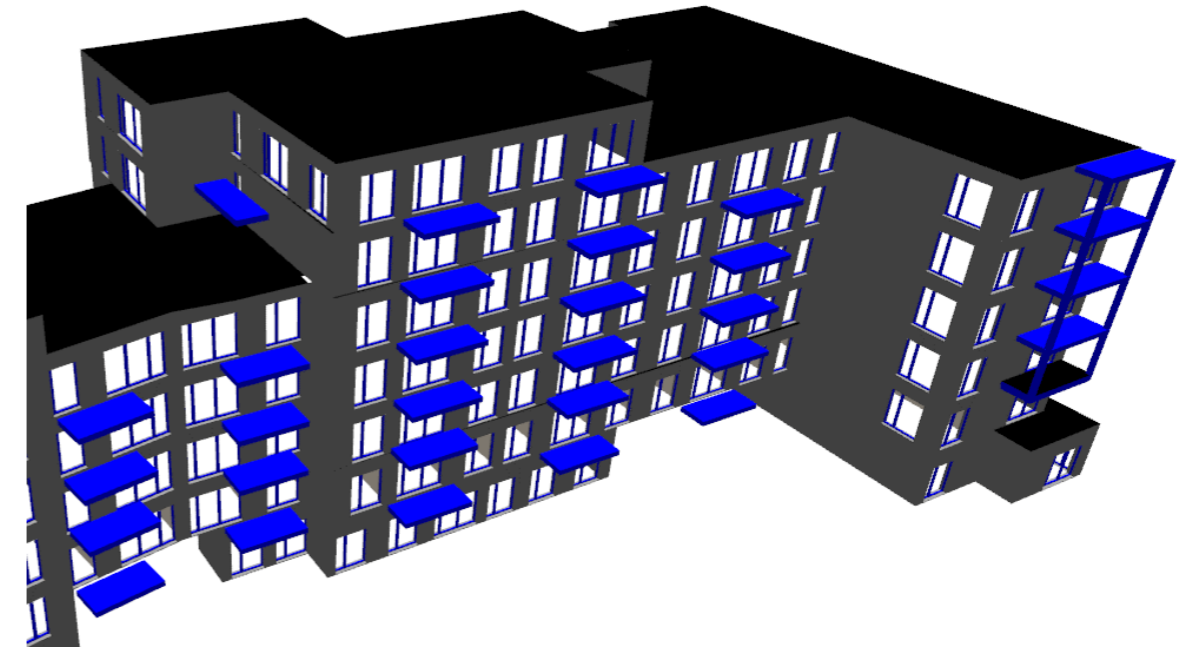
| Block E - First Floor | | |
|-----------------------|----|-----|
| Room Breakdown | | |
| Above Target | 25 | 86% |
| Below Target | 4 | 14% |

3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results

98.3% of the rooms in Block F were found to meet the minimum BRE guidelines.

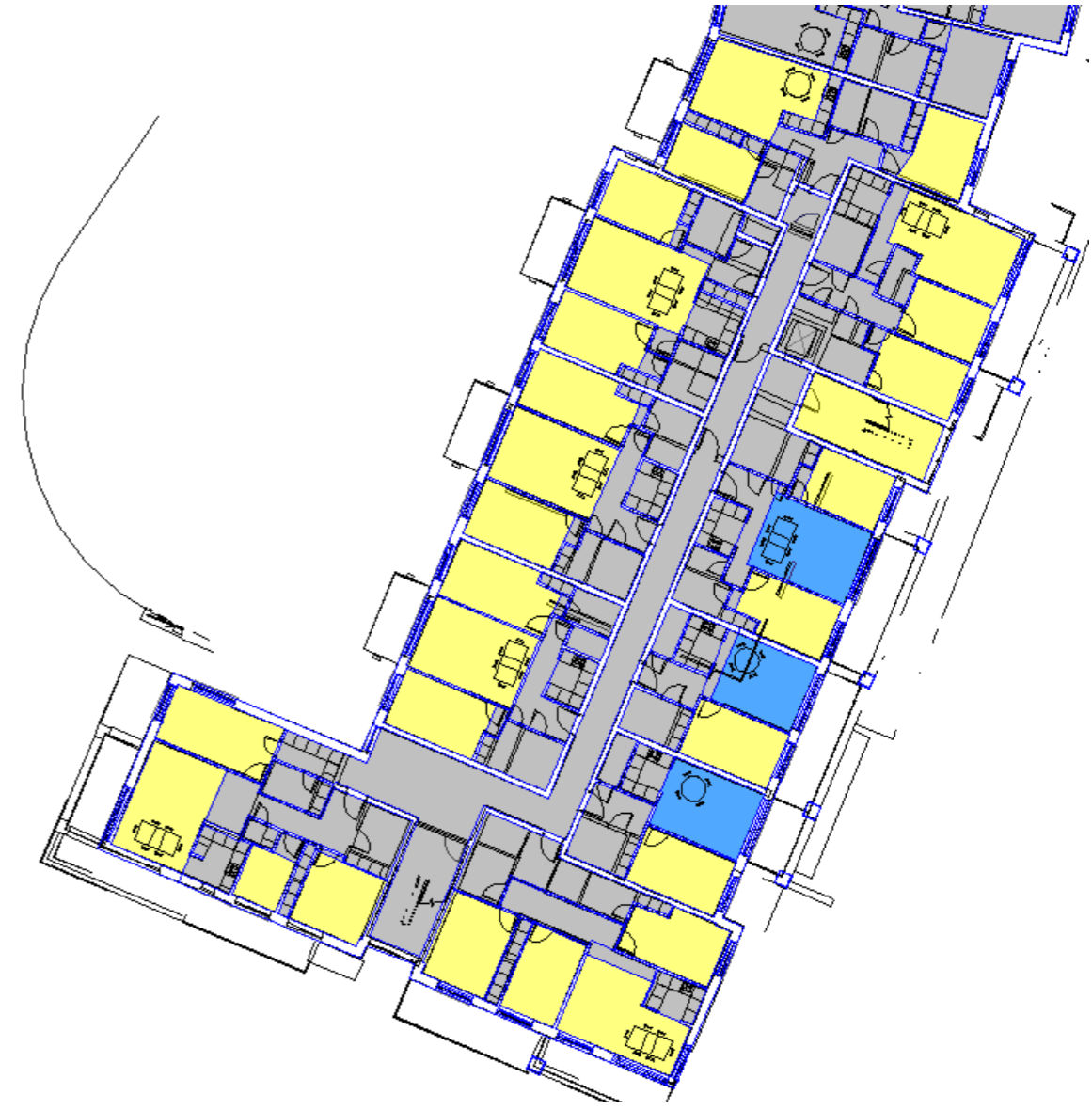
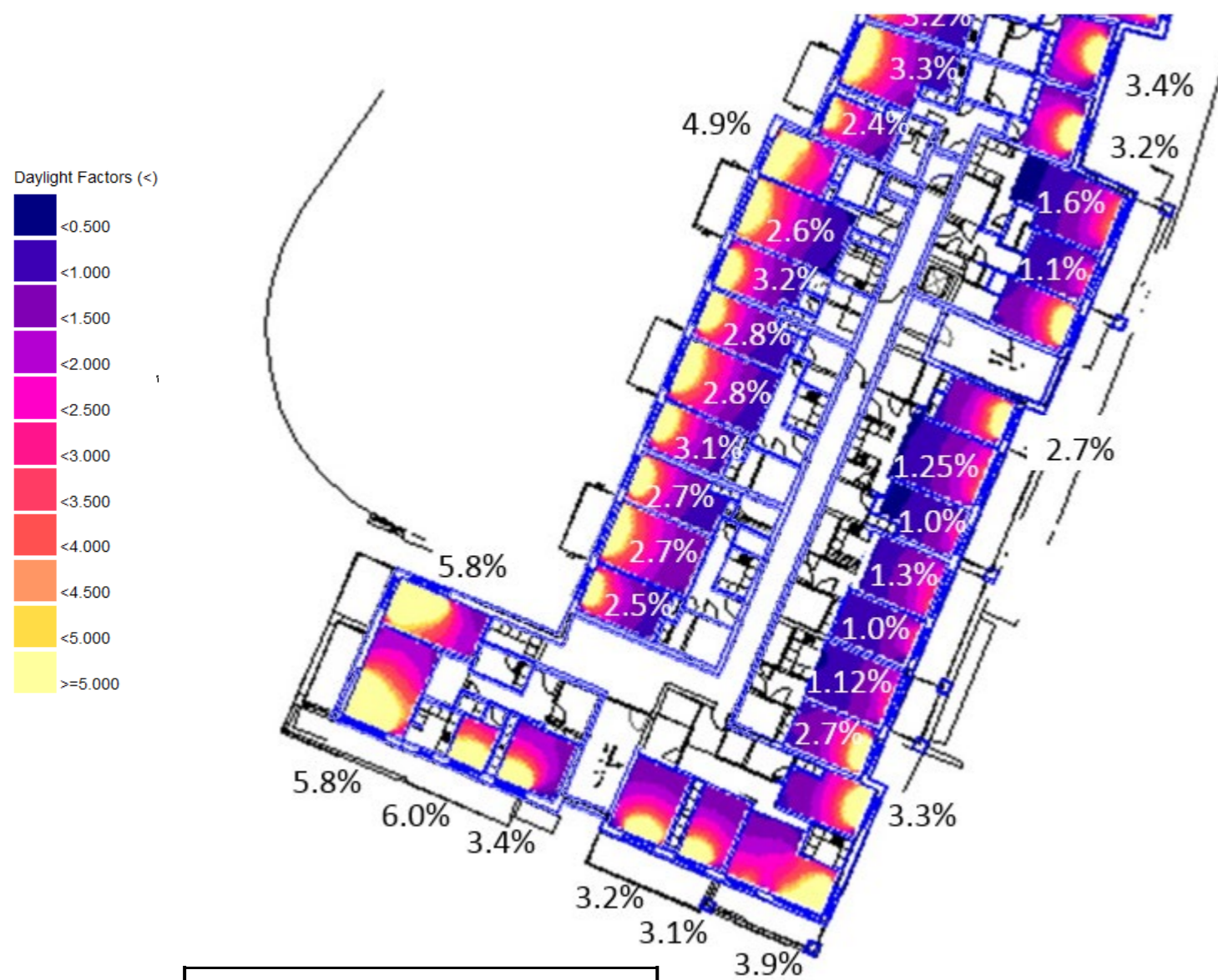
| D1919 Airton Road - Block F | | | | |
|-----------------------------|------------|----------|--------------|-------------|
| Floor | Pass | Fail | % Pass | % Fail |
| Ground | 19 | 0 | 100% | 0% |
| 1st | 27 | 3 | 90% | 10% |
| 2nd | 30 | 0 | 100% | 0% |
| 3rd | 30 | 0 | 100% | 0% |
| 4th | 30 | 0 | 100% | 0% |
| 5th | 27 | 0 | 100% | 0% |
| 6th | 11 | 0 | 100% | 0% |
| Total | 174 | 3 | 98.3% | 1.7% |



3.0 INTERNAL DAYLIGHT ANALYSIS

3.2 Results Block F - Results for First Floor

| Daylight Target Bedroom | | Daylight Target Living | |
|-------------------------|--|------------------------|--|
| >1% | | >1.5% | |
| < 1% | | < 1.5% | |



| Block F - First Floor | | |
|-----------------------|----|-----|
| Room Breakdown | | |
| Above Target | 27 | 90% |
| Below Target | 3 | 10% |