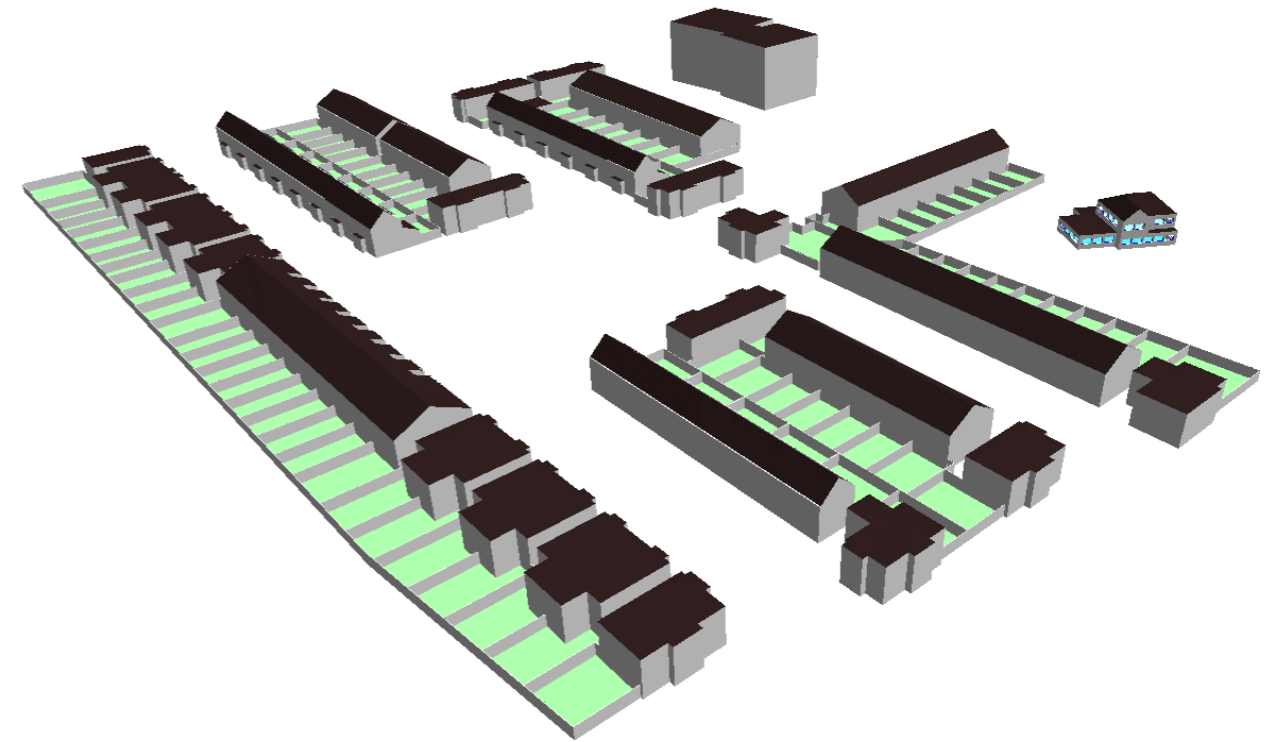


Dunshaughlin West / Phase 2 SHD



Daylight and Sunlight Analysis

IN2 Project No. D2008

05/10/2020

REV02

Revision History

Date	Revision	Description
14/08/2020	00	Initial issue for review
15/09/2020	01	Report updated for scheme development
05/10/2020	02	Report cover page updated

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1.0 Executive Summary

This report compiles the results of Daylight and Sunlight analysis for Dunshaughlin West / Phase 2 SHD, as per Architectural information as received from OMP Architects.

Section 2.0 details the Internal Daylight Analysis for a number of sample Living Areas and Bedrooms throughout both Apartments and Housing Units. The internal daylight was assessed to demonstrate how the arrangement and layout of the proposed development would ensure quality of natural light availability of internal living spaces. All spaces were confirmed to comfortably exceed minimum daylight requirements as prescribed in National Planning.

Section 3.0 outlines results from the analysis as undertaken based on the BRE best practice for Sunlight availability to Amenity Spaces. The analysis determined that all of the public and communal areas were found to be entirely compliant with these criteria, demonstrating their suitability as Amenity Spaces.

The potential impact of the proposed development with regards to daylight and sunlight with respect to an existing dwelling bounded by roads L2208 and R1205 was also undertaken as detailed in Section 4.0. This analysis determined that the proposed development, would have:

- Daylight: No noticeable impact due to the relatively low nature of the proposed housing units and distance from the existing dwelling.
- Sunlight: No impact – due to the proposed development being located North/ North West of the existing dwelling.

Finally, detailed results for Impact on Daylight/ Sunlight are included as Appendices.



Fig 1.1 - Site Layout Plan

2.0 Internal Daylight Analysis

2.1 Methodology

Daylighting analysis was undertaken using Tas Dynamic Simulation Modelling (DSM) to determine Average Daylight Factors (ADF's) for each individual room in accordance with BS.8206-2:2008 Code of Practice for Daylighting.

ADF's were determined for a CIE Overcast Sky equivalent to providing an external, unobstructed illumination level of 10,000 Lux. CIE Overcast skies are theoretical sky models, with brightness highest at the zenith and reducing to the horizon, but also unidirectional (as illustrated in Figure 2.1.1), therefore ADF's do not differ for façade orientation, with North facing rooms achieving identical metric performance to South facing, all else being equal, with results accounting for diffuse natural light excluding any direct sunlight effects.

The daylight analysis accounted for all aspects that can potentially restrict natural light availability including adjacent buildings, along with explicitly modelling Building Details as indicated in Figure 2.1.2 such as balcony structures, window frames, reveal and cill depth etc. in accordance with the architectural design drawings.

The daylighting models were calculated based on the following assumptions regarding transmittance and reflectance (based on measured manufacturer's test data):

- Glazing Transmission = 70%
- Ceilings: 82% reflectance (BS 00E55 White)
- Walls: 62% reflectance (BS 10C31 Ivory)
- Floors: 36% reflectance (BS 00A05 Platinum Grey)

Daylight Factors for each space were then calculated for a working plane height of 0.85m on a 0.1 x 0.1m grid basis to enable a detailed calculation within each room, the average of which was then determined to calculate ADF.

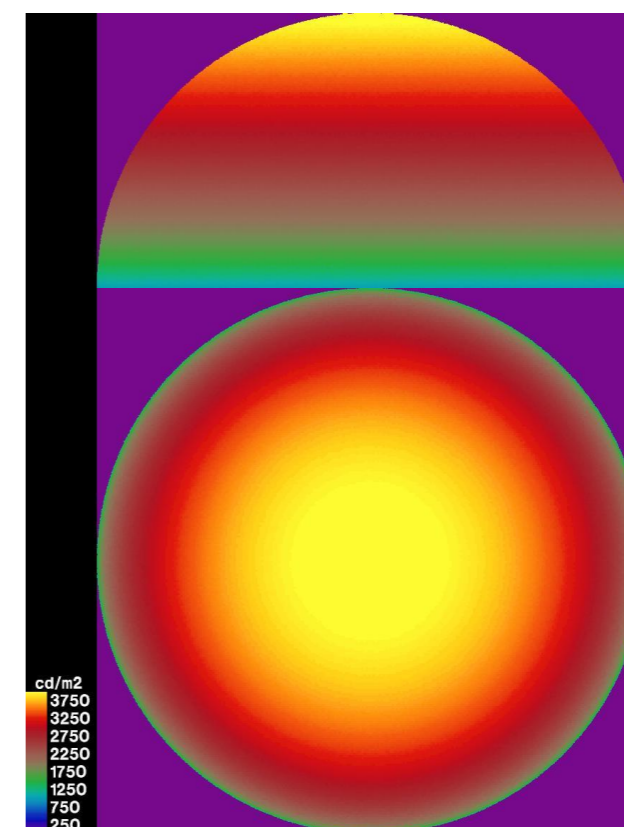


Fig 2.1.1 - CIE Overcast sky as viewed in elevation and from below

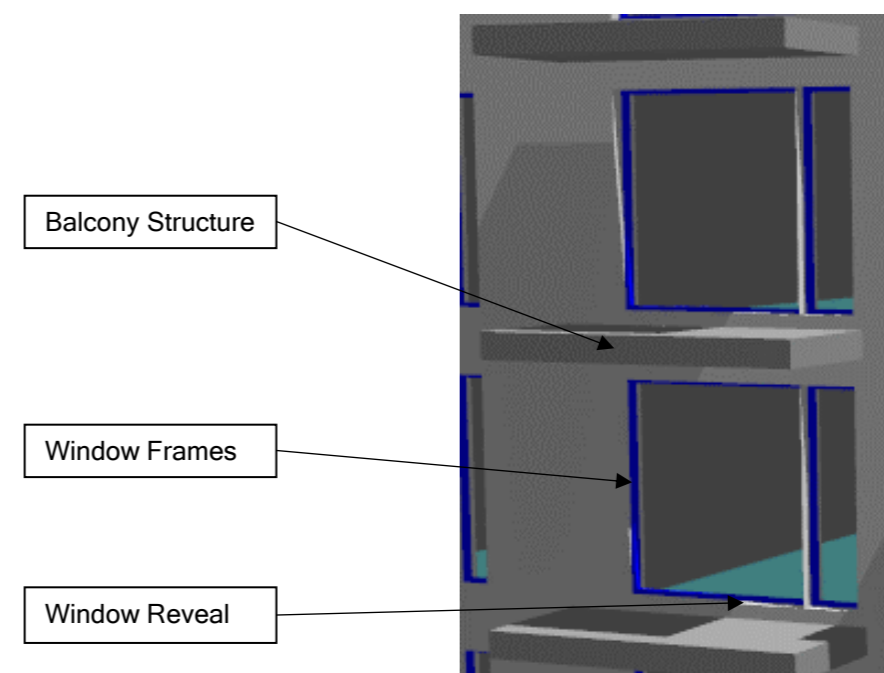


Fig 2.1.2 - Building Details included within Daylight Analysis

2.0 Internal Daylight Analysis

2.1 Methodology (Cont.)

ADF Compliance was then determined as below, in accordance with BS.8206-2:

- > 2% for Kitchens
- > 1.5% for Living/ Dining Areas
- > 1.0% for Bedrooms

It may be noted that for the purpose of analysis, Kitchenettes to Apartments have been excluded. This is because the associated requirement within BS.8206-2 for “Kitchens” (ADF>2.0%) was developed for residential housing where the kitchen would be an identifiable separate room with seating and where occupants would be expected to eat and spend time as well as being generally present throughout the day.

Apartments do not include a kitchen of this type; they instead include a kitchenette which would be expected to be used solely to prepare food with the residents spending most of their time in the Living area. We therefore assessed each Living/ Dining Area in its entirety, with Daylighting deemed compliant only where the combined space of these was found to achieve at least 1.5% ADF.

2.1.1 Apartment Block 01- Level 01

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

All spaces were found to be compliant.

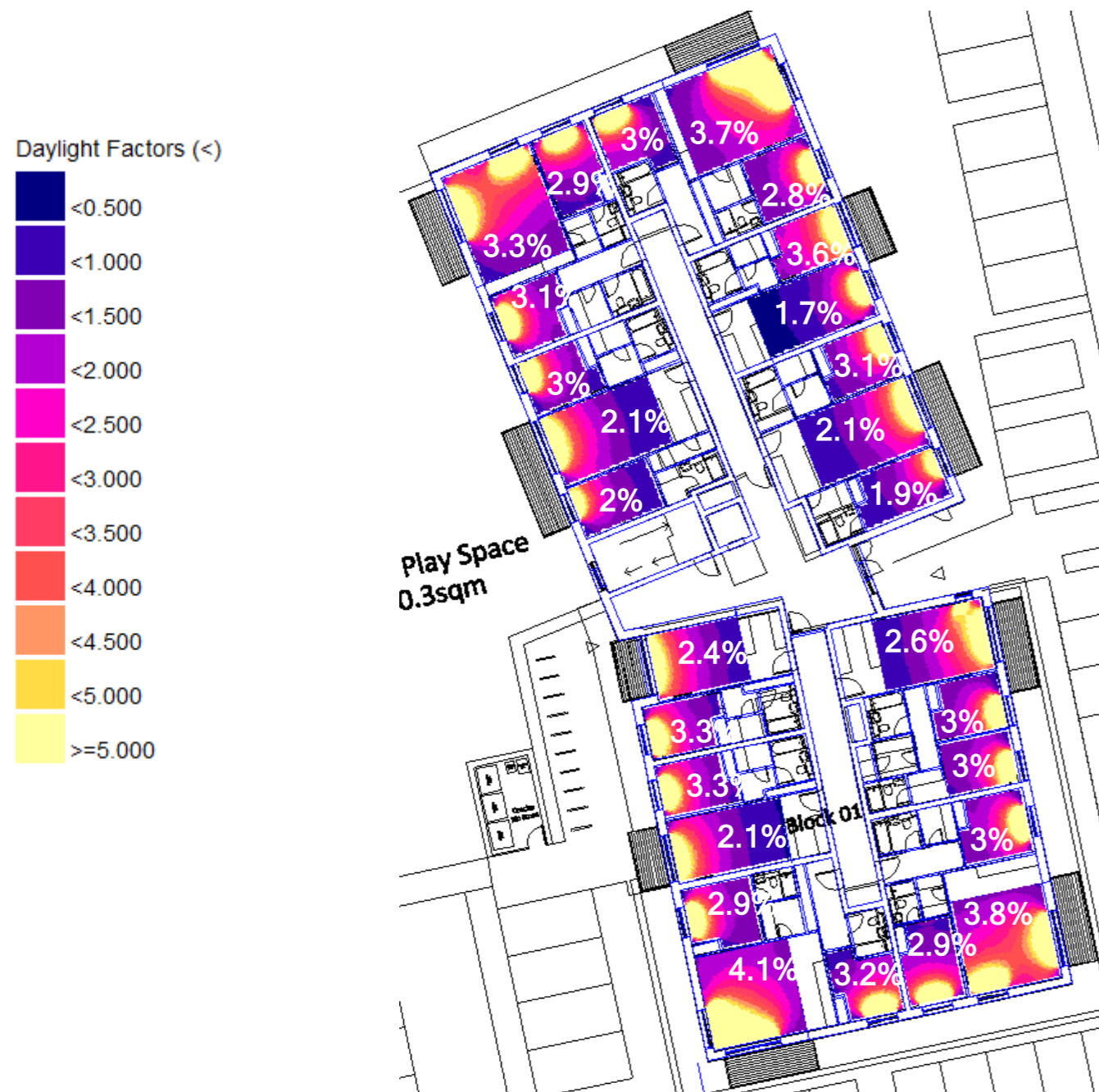


Fig 2.1.1.1 - Level 01 - Daylight Factor Results

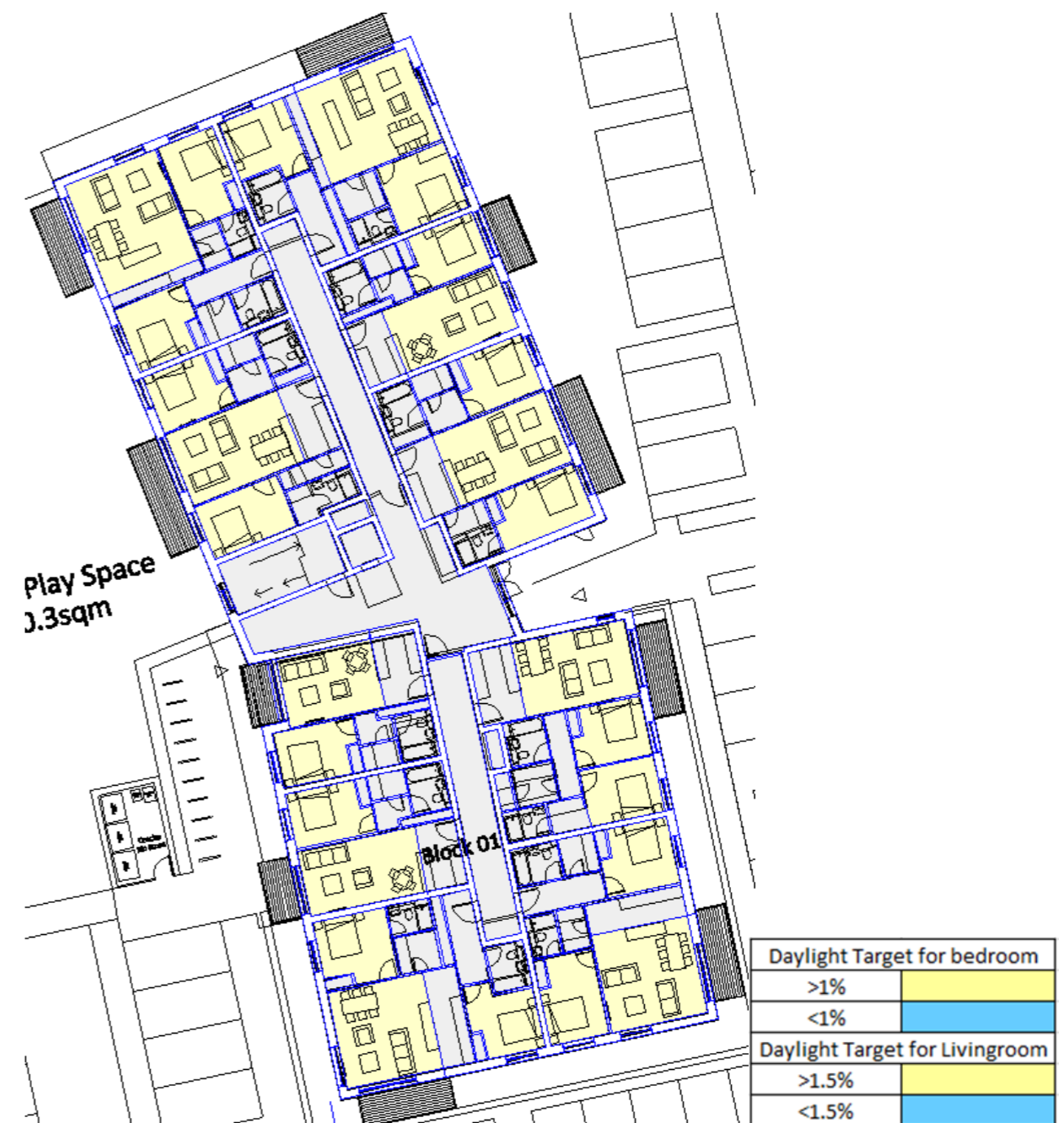


Fig 2.1.1.2 - Level 01 - Daylight Results - Pass/Fail

2.1.2 Apartment Block 02- Level 01

All spaces were found to be compliant.

Daylight Factors (<)

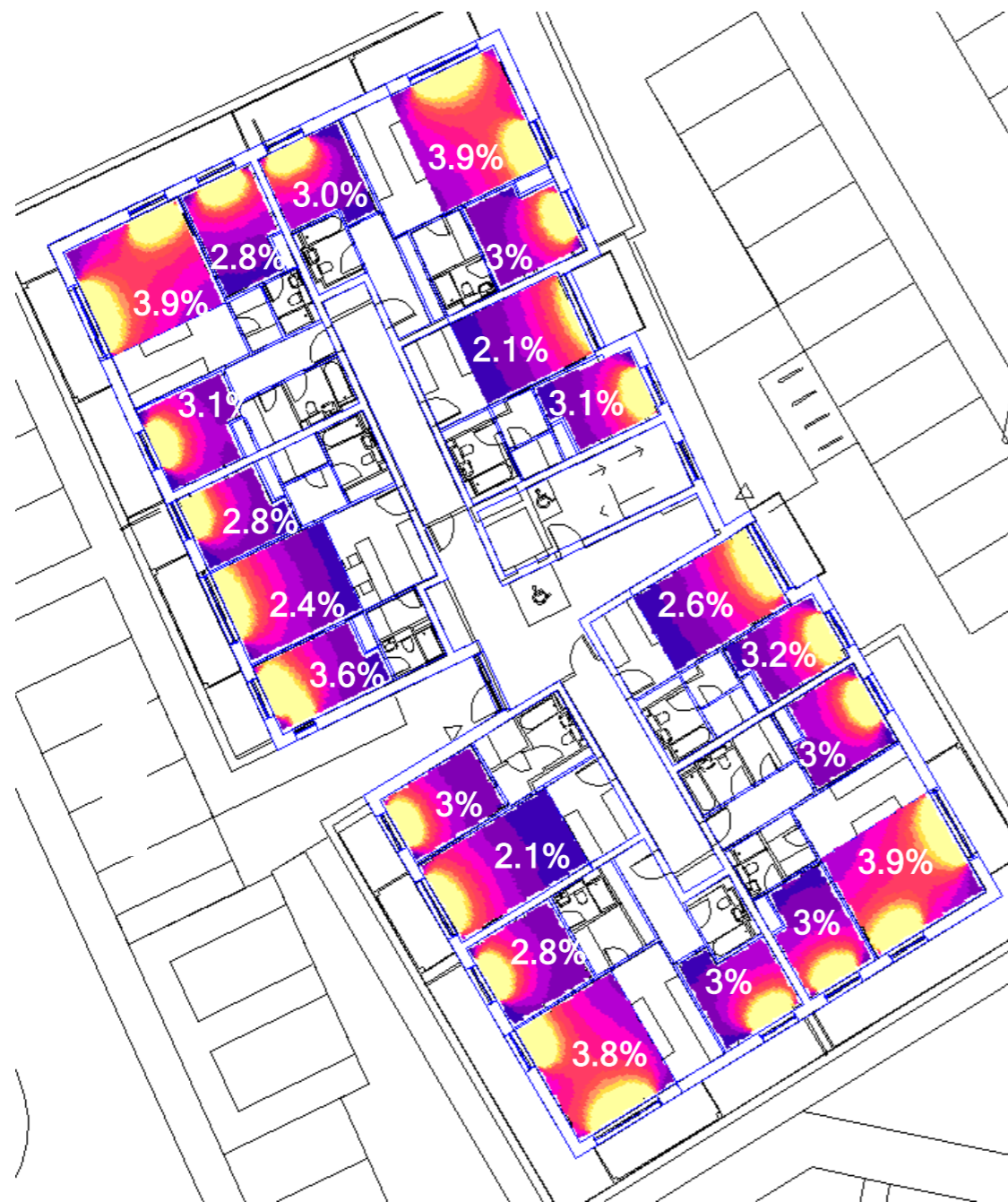


Fig 2.1.2.1 - Level 01 - Daylight Factor Results



Daylight Target for bedroom	
>1%	Pass (Yellow)
<1%	Fail (Blue)
Daylight Target for Livingroom	
>1.5%	Pass (Yellow)
<1.5%	Fail (Blue)

Fig 2.1.2.2 - Level 01 - Daylight Results - Pass/Fail

2.1.3 Apartment Block 03- Level 01

All spaces were found to be compliant.

Daylight Factors (<)

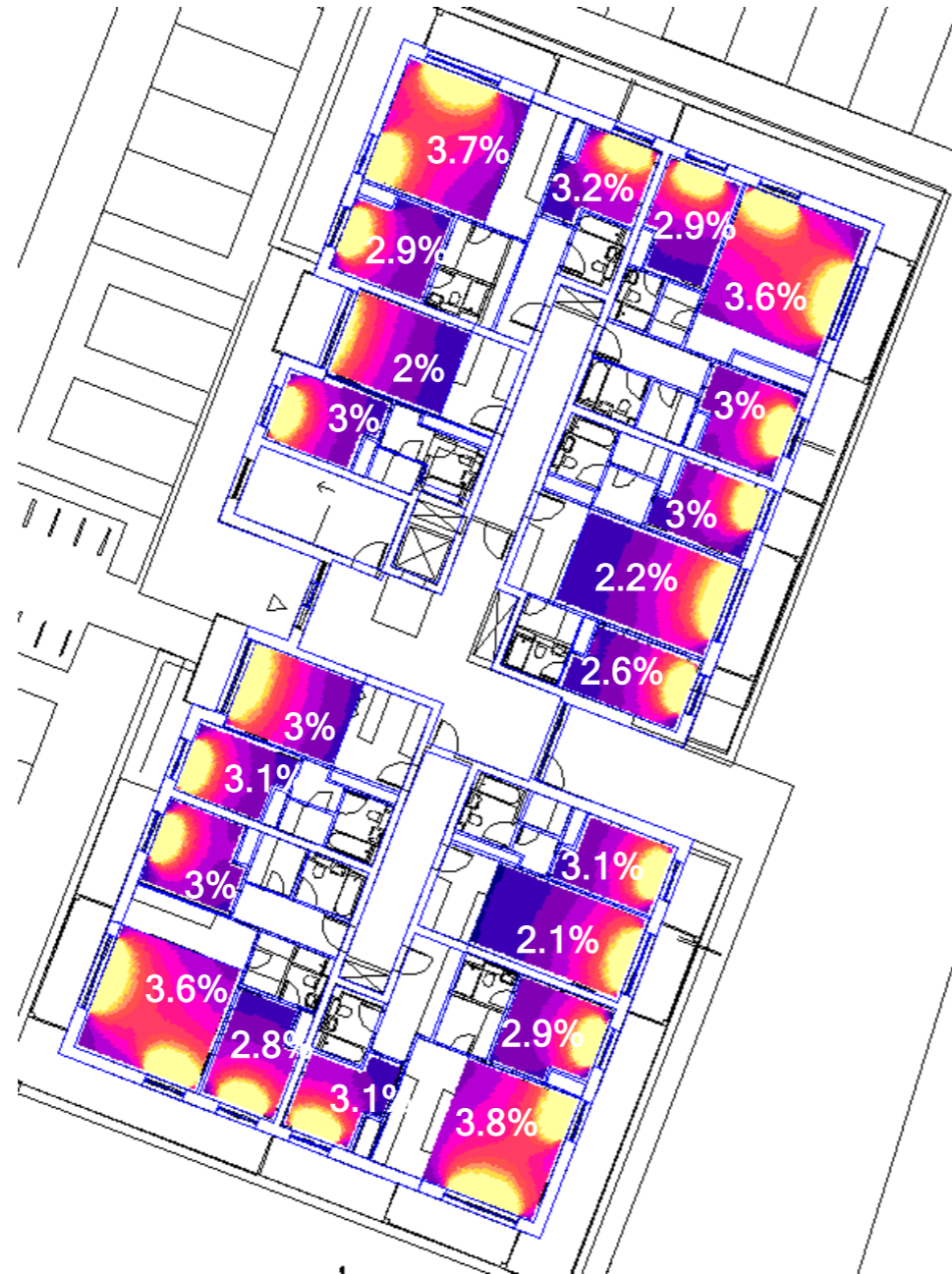


Fig 2.1.3.1 - Level 01 - Daylight Factor Results



Fig 2.1.3.2 - Level 01 - Daylight Results - Pass/Fail

Daylight Target for bedroom	
>1%	Yellow
<1%	Blue
Daylight Target for Livingroom	
>1.5%	Yellow
<1.5%	Blue

2.1.4 Duplex Type 1

All spaces were found to be compliant.

Daylight Factors (<)

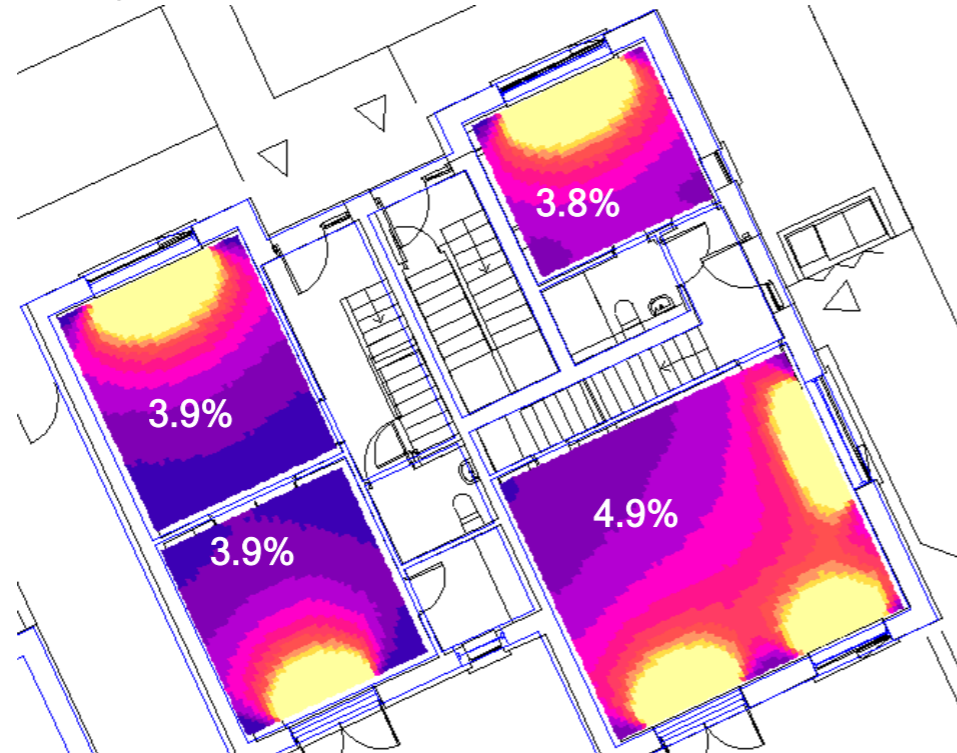


Fig 2.1.4.1 - H03 Ground Floor - Daylight Factor Results

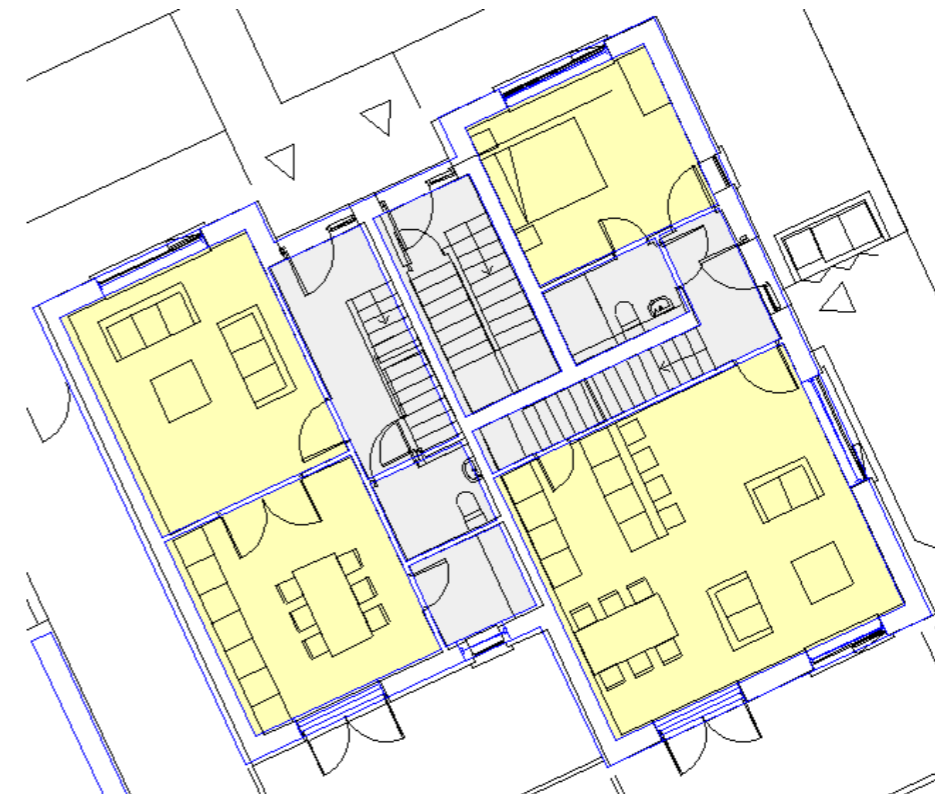


Fig 2.1.4.2 - H03 Ground Floor Daylight Results - Pass/Fail

Daylight Target for bedroom	
>1%	Pass
<1%	Fail
Daylight Target for Livingroom	
>1.5%	Pass
<1.5%	Fail
Daylight Target for Kitchen	
>2%	Pass
<2%	Fail

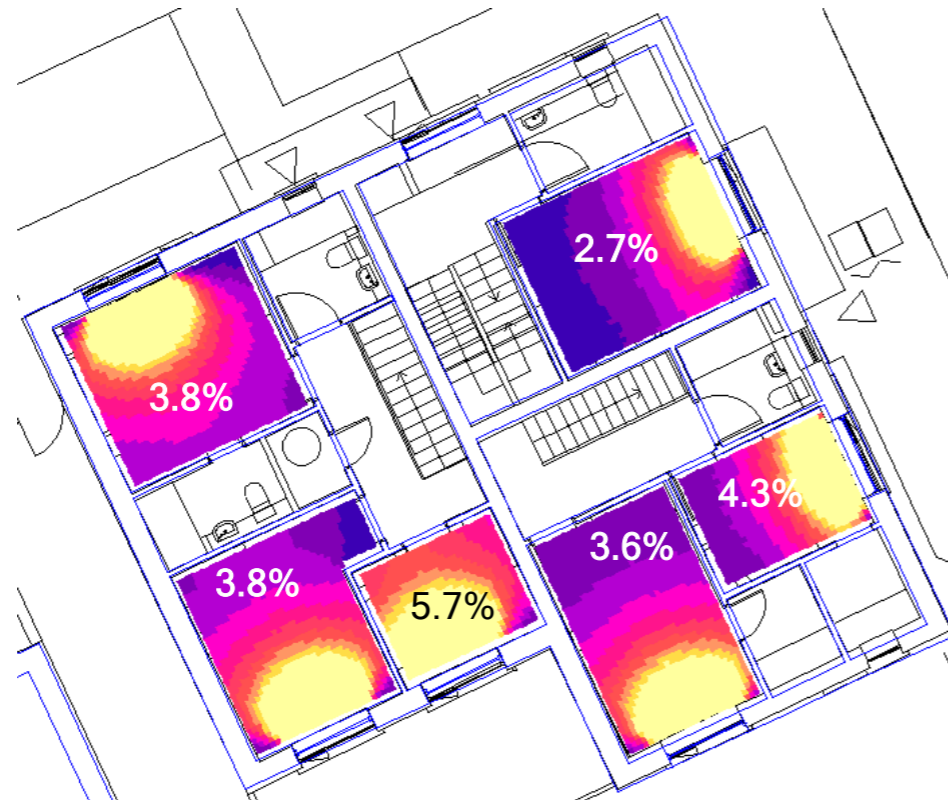


Fig 2.1.4.3 - H03 First Floor - Daylight Factor Results

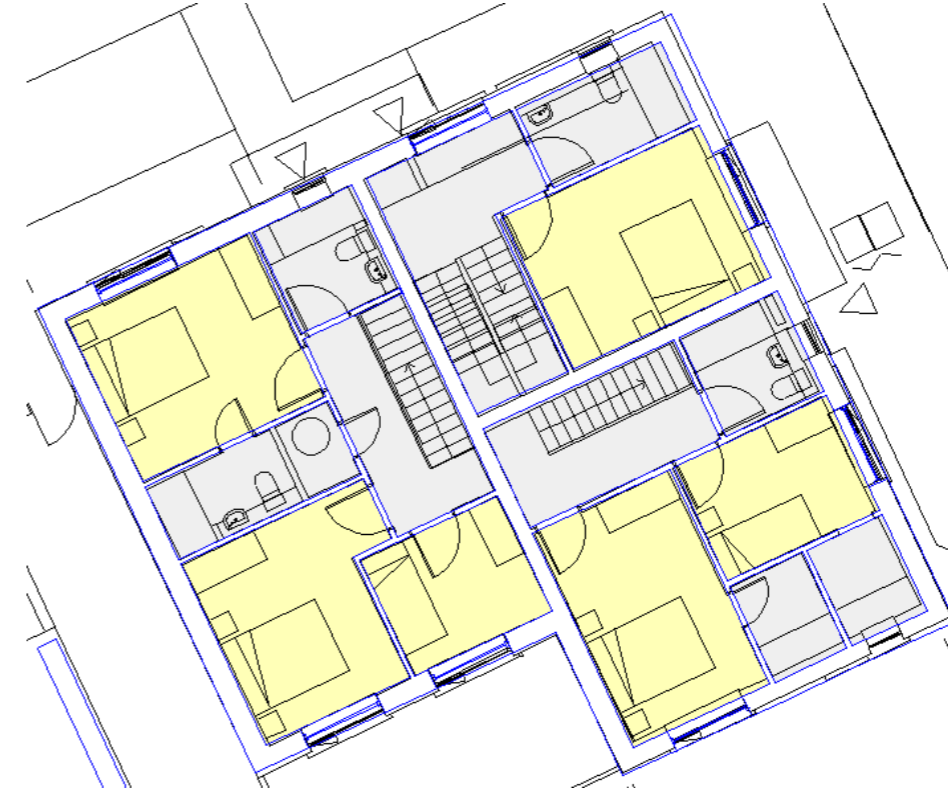


Fig 2.1.4.4 - H03 First Floor Daylight Results - Pass/Fail

2.1.5 Duplex Type 2

All spaces were found to be compliant.

Daylight Factors (<)

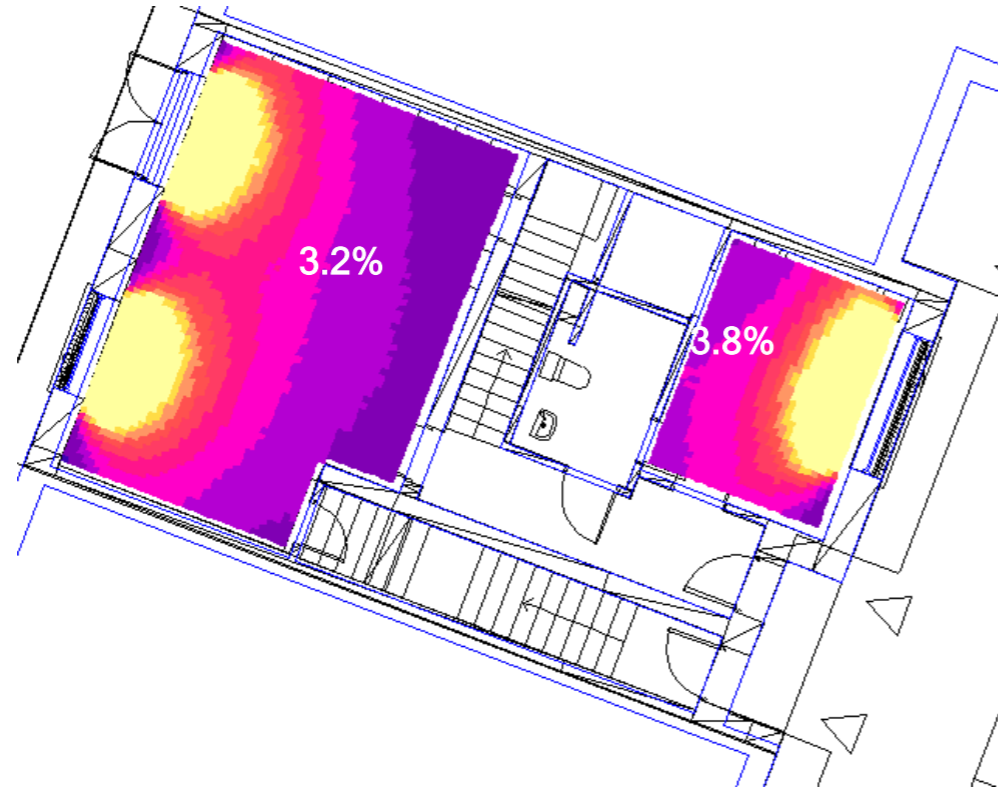


Fig 2.1.5.1 - H03 First Floor - Daylight Factor Results

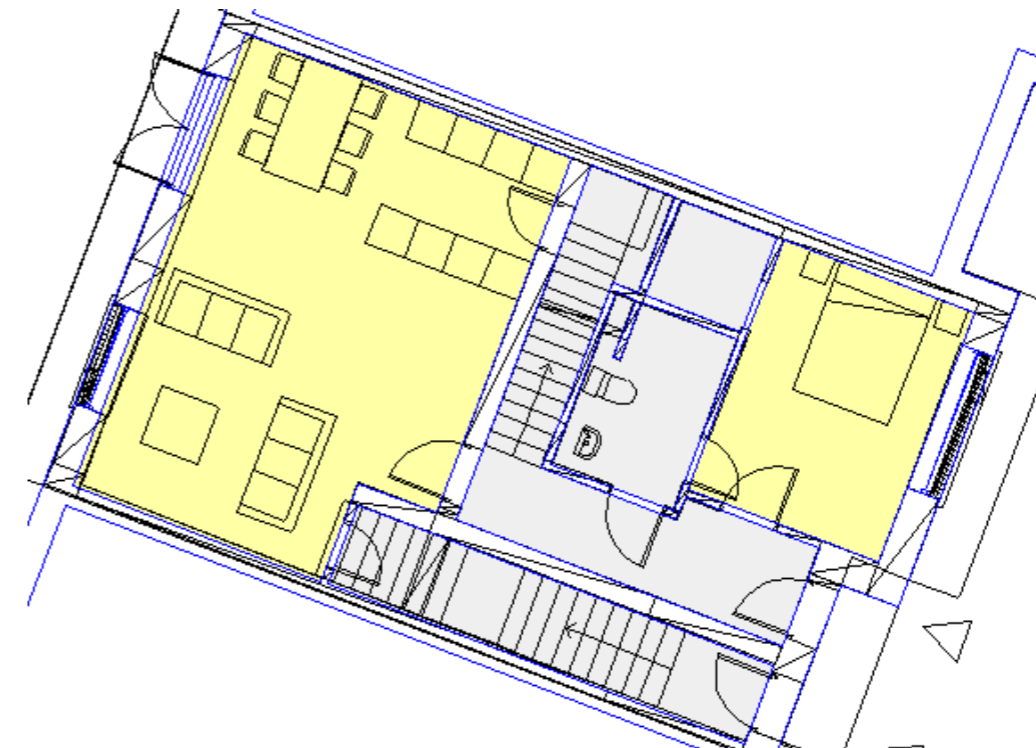


Fig 2.1.5.2 - H03 First Floor Daylight Results - Pass/Fail

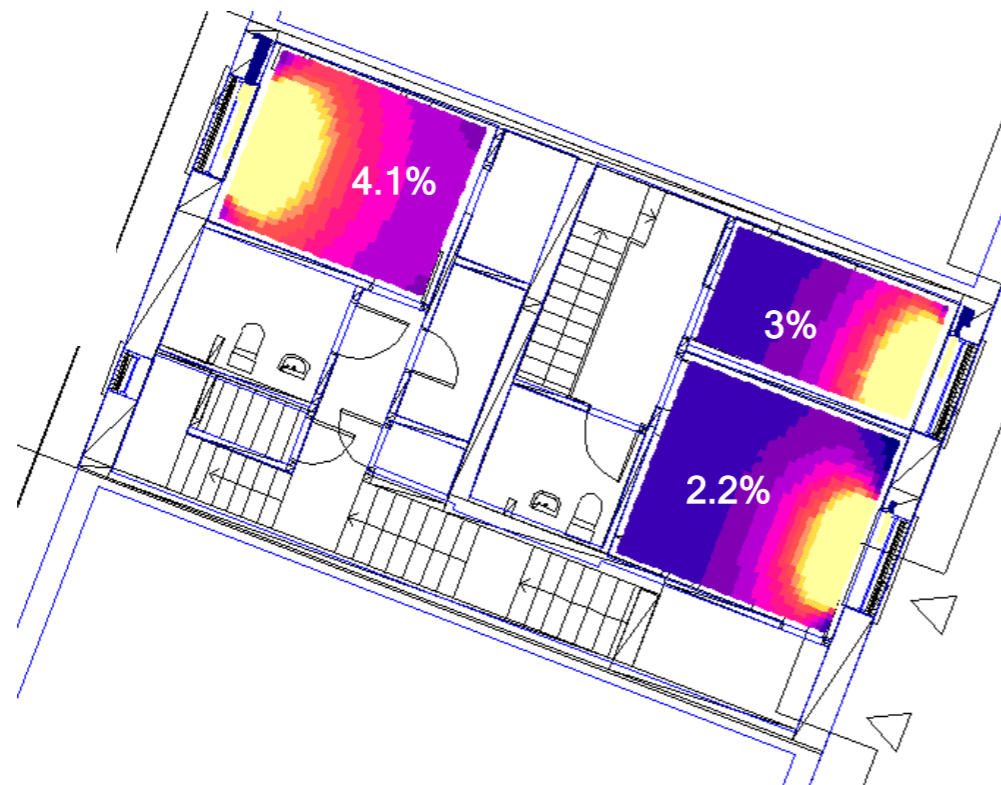


Fig 2.1.5.3 - H03 First Floor - Daylight Factor Results

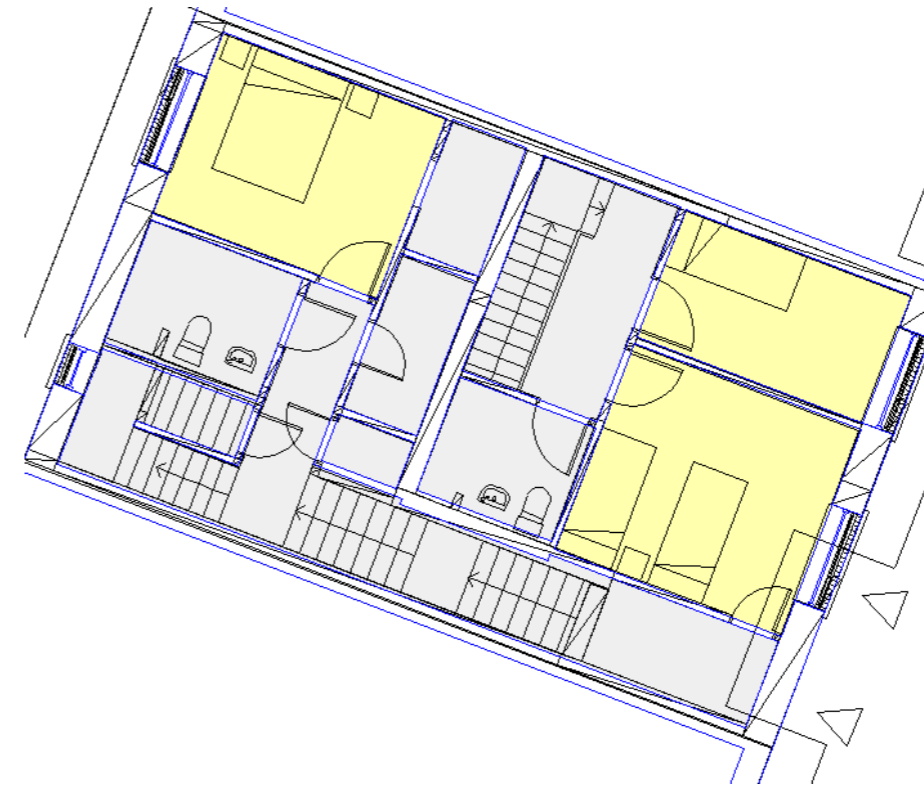


Fig 2.1.5.4 - H03 First Floor Daylight Results - Pass/Fail

Daylight Target for bedroom	
>1%	Yellow
<1%	Light Blue
Daylight Target for Livingroom	
>1.5%	Yellow
<1.5%	Light Blue
Daylight Target for Kitchen	
>2%	Yellow
<2%	Light Blue

2.1.6 House Type 3-Ground Floor

All spaces were found to be compliant.

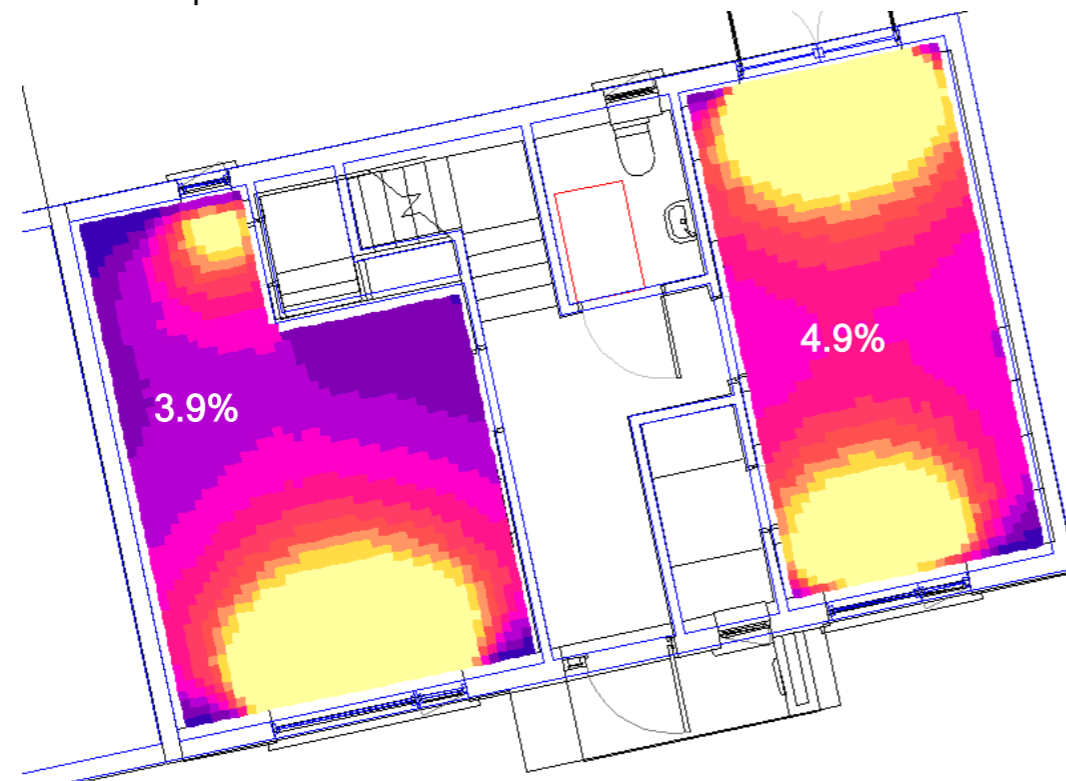
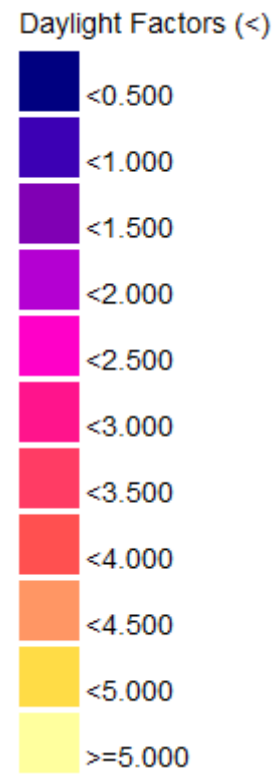


Fig 2.1.6.1 - H03 Ground Floor - Daylight Factor Results

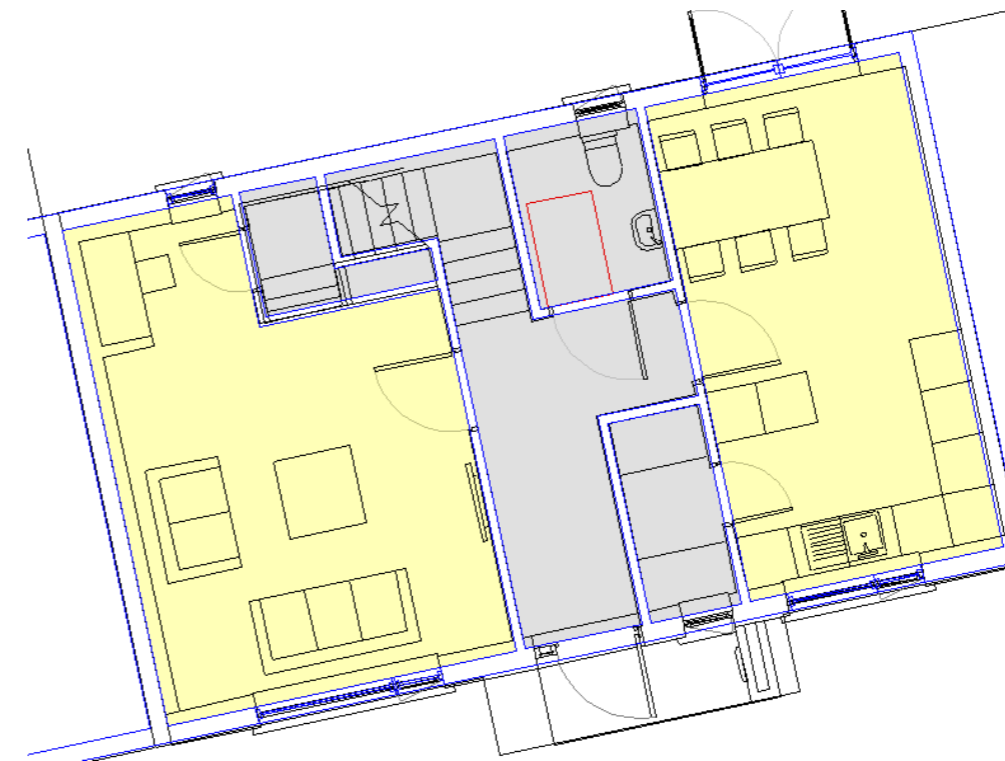


Fig 2.1.6.2 - H03 Ground Floor Daylight Results - Pass/Fail

Daylight Target for bedroom	
>1%	Pass
<1%	Fail
Daylight Target for Livingroom	
>1.5%	Pass
<1.5%	Fail
Daylight Target for Kitchen	
>2%	Pass
<2%	Fail

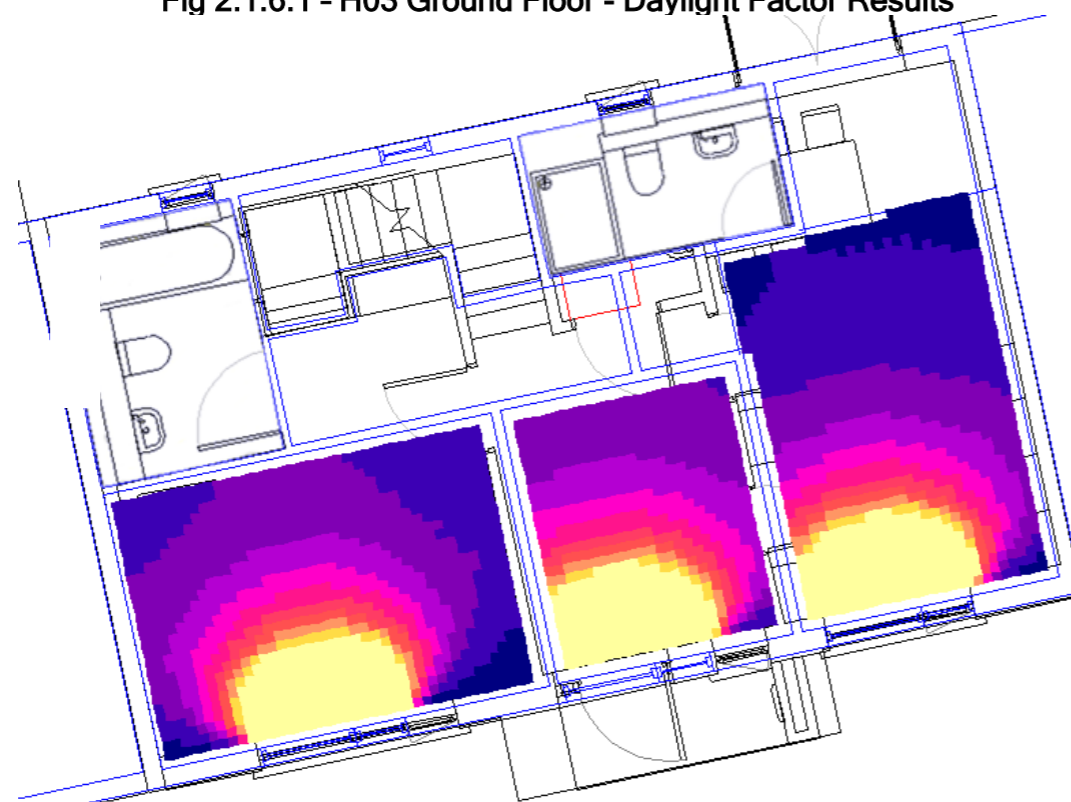


Fig 2.1.6.3 - H03 First Floor - Daylight Factor Results

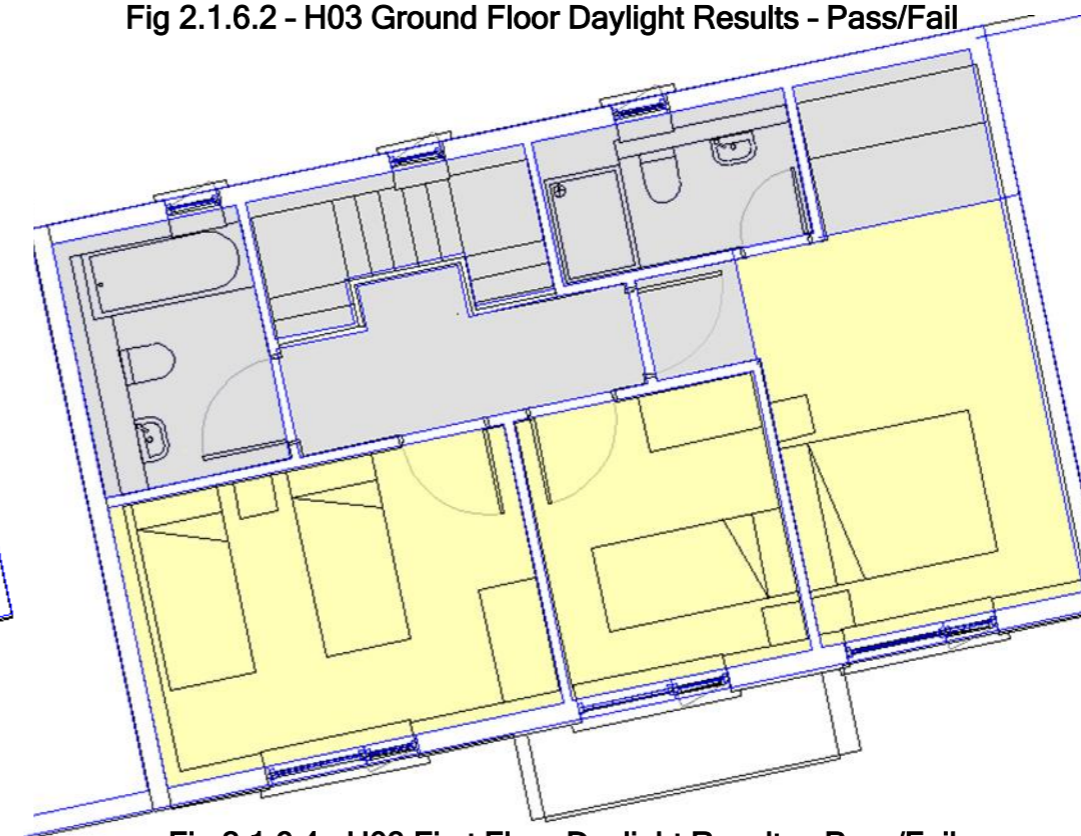


Fig 2.1.6.4 - H03 First Floor Daylight Results - Pass/Fail

3.0 Site Sunlighting

3.1 Methodology

The BRE Site Layout Planning for Daylight and Sunlight Design Guide 209 provides guidance with regards to sunlighting and shading to external Amenity spaces within proposed developments.

The guidance recommends “that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March”.

The methodology assesses sunlight performance at the Equinox, as this is the mid solar position throughout the year (as illustrated in Fig.3.1.1), with compliance indicative of spaces that will receive adequate sunlight and appealing useful spaces, including that the following attributes will be achieved as identified in BRE.209:

- Provide attractive sunlit views (all year)
- Make Outdoor Activities like sitting out and children’s play more pleasant (mainly warmer months).
- Encourage plant growth (mainly spring and summer).
- Dry out the ground, reducing moss and slime (mainly in colder months).

An example analysis of Amenity Spaces is indicated in Figure 3.1.2. In this development, the main amenity space (to right hand side) is located to the North of a building block which provides some degree of overshadowing (dark green contours).

However, as the majority of the Amenity Space was determined to be able to receive at least 2 hours of sunlight at the Equinox (light green contours), this would be deemed to be compliant.

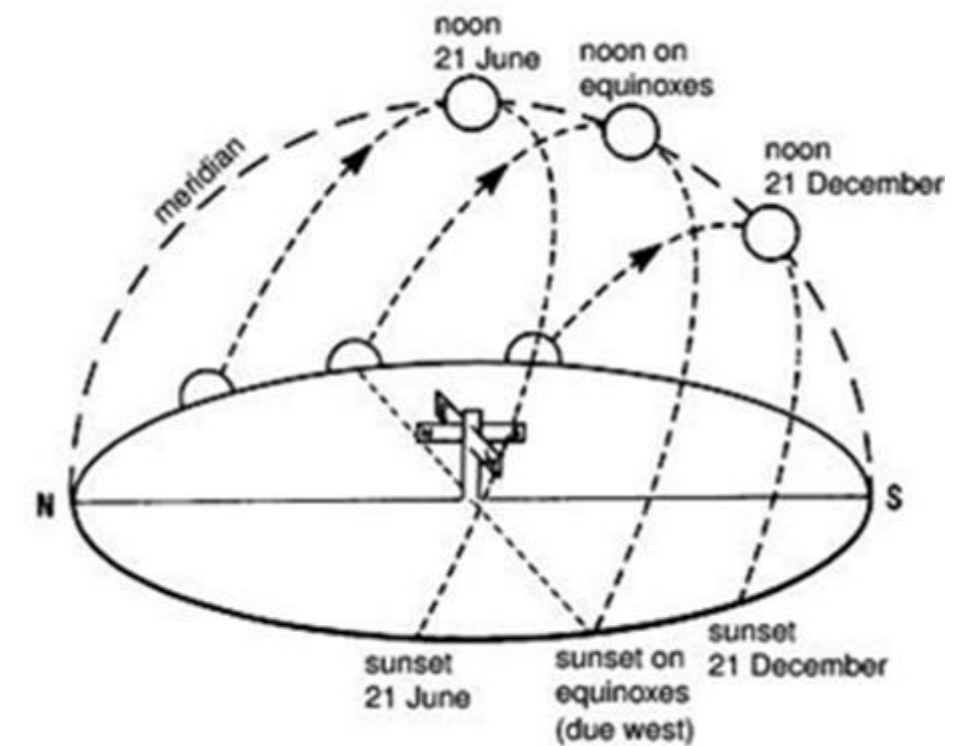


Fig 3.1.1 - Annual Solar Position



Fig 3.1.2 - Example Amenity Spaces

3.2 Analysis

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 3.1. All amenity spaces were found to be compliant with the Communal Open Spaces exceed this requirement achieving in excess of 98% sunlight availability, the Public Open Areas all reaching 100%, and the Creche Play Space also reaching 100% sunlight availability.

Amenity Ref	Amenity Area (m ²)	Lit Area (m ²)	Percentage %
Creche play space 1	436.94	435.53	100%
Communal Open Space 1 (C 1)	175.61	175.61	100%
Communal Open Space 2 (C 2)	119.10	119.10	100%
Communal Open Space 3 (C 3)	100.15	82.46	82%
Communal Open Space 4 (C 4)	597.01	597.01	100%
Communal Open Space 5 (C 5)	133.74	133.74	100%
Communal Open Space 6 (C 6)	62.47	62.47	100%
Communal Open Space 7 (C 7)	143.17	143.17	100%
Communal Open Space 8 (C 8)	216.41	216.41	100%
Communal Open Space 9 (C 9)	309.61	309.61	100%
Communal Open Space 10 (C 10)	391.14	391.14	100%
Public Open Area 1 (P 1)	2,481.06	2,481.06	100%
Public Open Area 2 (P 2)	2,084.17	2,084.17	100%
Public Open Area 3 (P 3)	577.59	577.59	100%
Public Open Area 4 (P 4)	732.19	732.19	100%
Public Open Area 5 (P 5)	970.99	968.92	100%
Public Open Area 6 (P 6)	10,443.47	10,443.47	100%
Public Open Area 7 (P 7)	13,591.49	13,591.49	100%
Public Open Area 8 (P 8)	8,589.13	8,589.13	100%
Public Open Area 9 (P 9)	761.90	761.90	100%

Fig 3.2.1 - Amenity Spaces Table of Results
Each Amenity Space is analysed in detail below, with referenced key plan locations

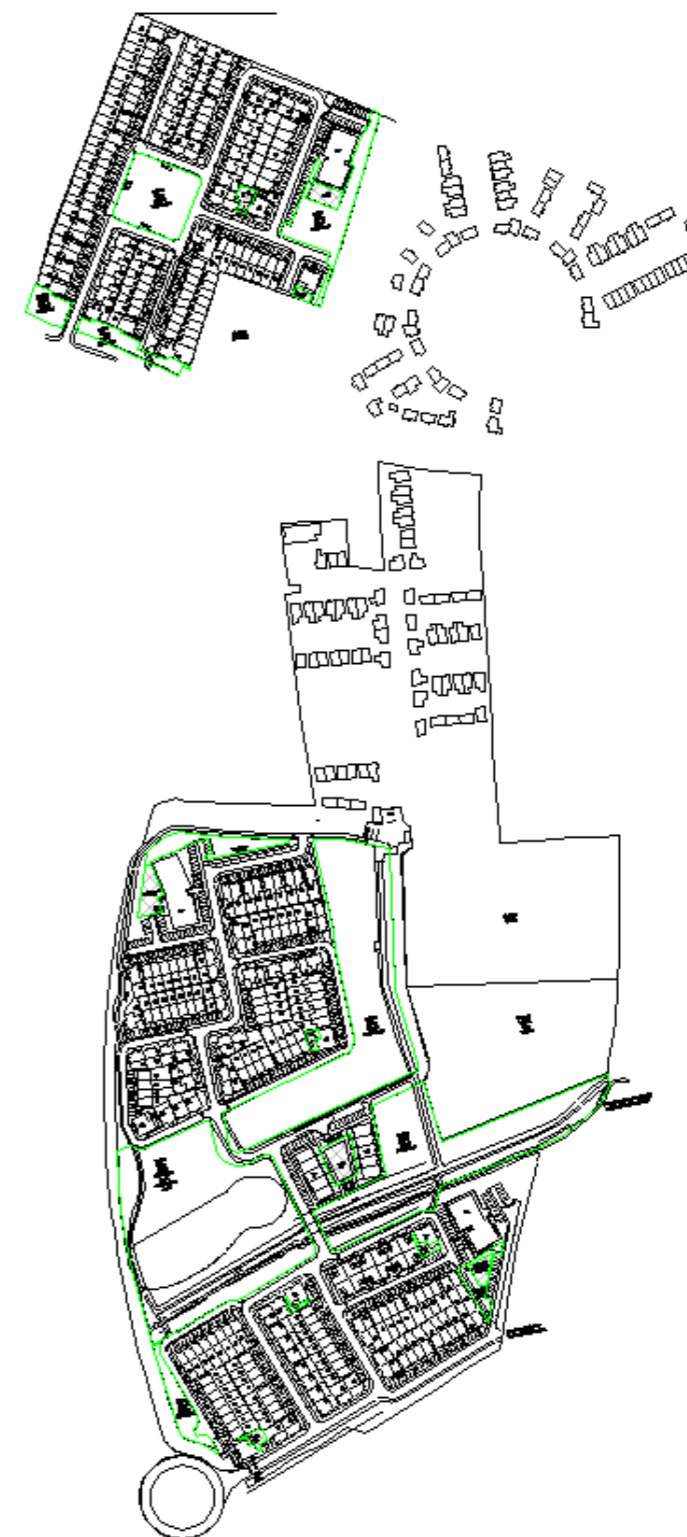


Fig 3.2.2 - Site Plan

3.3 Results

Each amenity space achieves compliance with the BRE guidelines.



4.0 Impact On Neighbouring Dwelling

4.1 Daylight Vertical Sky Component (VSC)

The DHPLG advocates the use of the industry best practice guideline for daylight and sunlight is the BRE publication “Site Layout Planning for Daylight and Sunlight – A guide to good Practice (Second Edition): BRE209”. Whilst it may be noted that it is a guidance document and not a legislative requirement or standard, it has been utilised as a robust means of assessing the impact of the proposed development with regards to the existing dwelling.

With respect to Daylight, BRE Guidelines state:

Light from the Sky

“If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if either:

- *The VSC (Vertical Sky Component) measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value.”*

Allowing that a detailed survey of the existing dwelling was unavailable at the time of analysis, and thus in order to ensure a “worst case” conservative assessment be undertaken, a continuous series of notional “windows” was modelled to each of its elevations, enabling VSC values to be calculated for points at 2m separation (with height of 1.6m above ground in accordance with BRE guidance). This approach ensured a comprehensive analysis of daylight impact across each façade, as all potential around floor window locations were essentially tested, with detailed VSC results included within Appendix A.

From these detailed point calculations, the worst-case values determined for each elevation are illustrated in Figure 4.1.2.

It can be seen that for the existing dwelling with the exception of the NE façade (which has some sky view restriction due to building return protrusion), all elevations were determined to be currently receiving full natural light availability (VSC = 39%) – It may be noted that all existing trees and foliage were excluded from the analysis to allow conservative estimate of impact.

The proposed development was then determined to result in the following VSC values determined to each elevation of the existing dwelling.

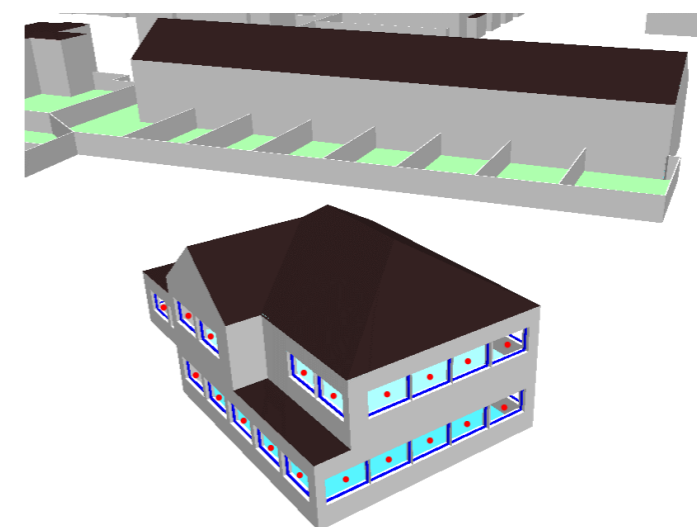


Fig 4.1.1 - Daylight (VSC) Indicating Calculation Points on Existing Dwelling

As each space was found to receive a VSC of above 27% (see appendix A for full results), and therefore were all in compliance with the BRE criteria and no windows will be adversely affected.

Façade	VSC Existing (%)	VSC Proposed (%)	Proposed/Existing (%)
NW	38.9	36.3	93
NE	30.3	28.3	93
SE	38.9	38.9	100
SW	38.9	38.2	98

Fig 4.1.2 - Vertical Sky Component (VSC) Results

4.2 Sunlighting Annual Probable Sunlight Hours

BRE Guidelines state:

Sunlighting

If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:

- receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and
- receives less than 0.8 times its former sunlight hours during either period and
- has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

The potential impact of the proposed development was also assessed for the BRE APSH methodology outlined above and for façade point locations as utilised for VSC analysis detailed in Section 4.1.

The analysis assesses main windows, main living rooms and conservatories, for annual sunlight hours and winter sunlit hours for all windows within 90° of south.

However, as confirmed through the tabulated summary below in Figure 4.2.2 and detailed within the Appendix B, no sampled points were found to have any impact with regards to sunlight availability (either on annual or winter basis) – primarily due to the proposed development being located to the North/ North West of the existing dwelling.

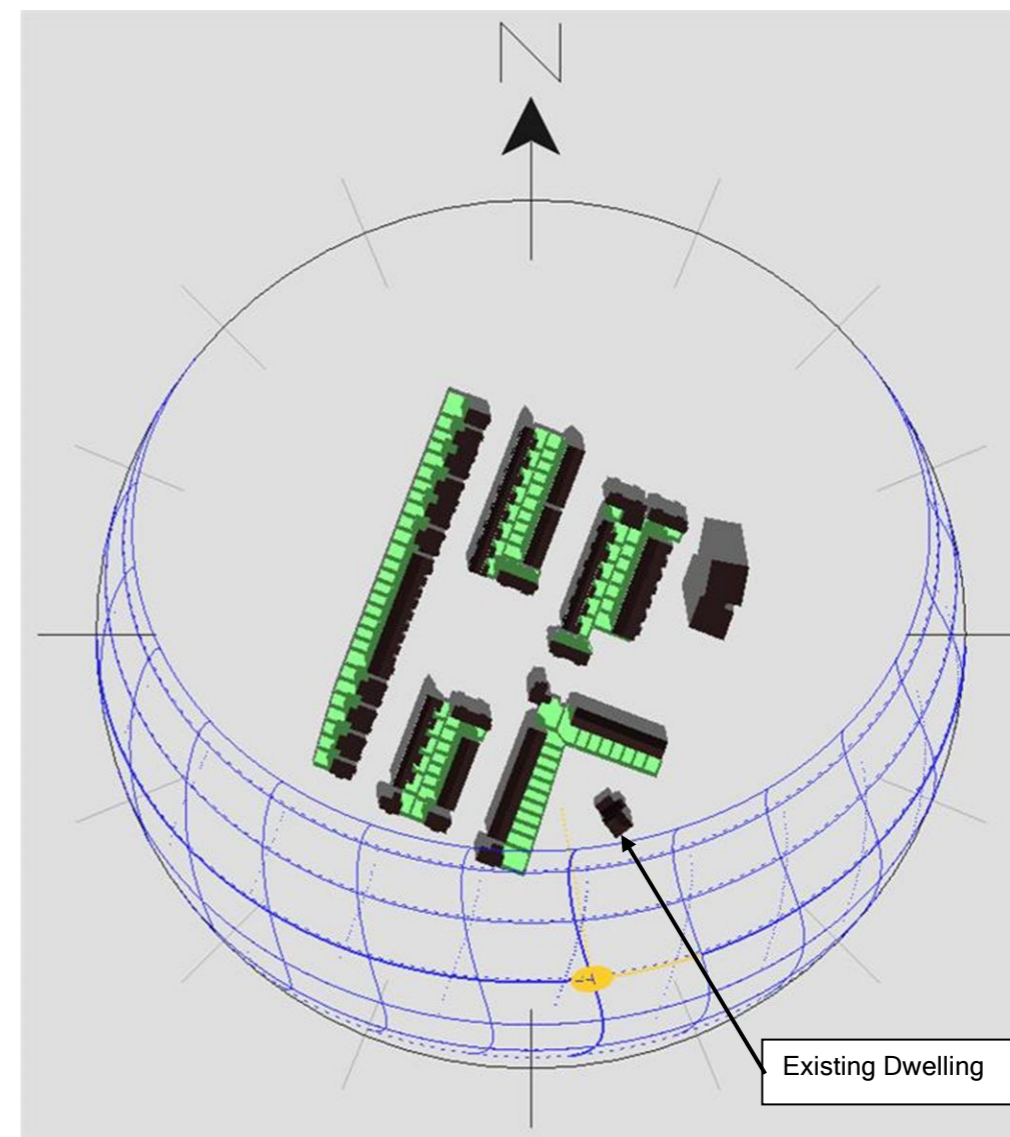


Fig 4.2.1 - Proposed and Existing Development, with Sunpath Diagram indicated

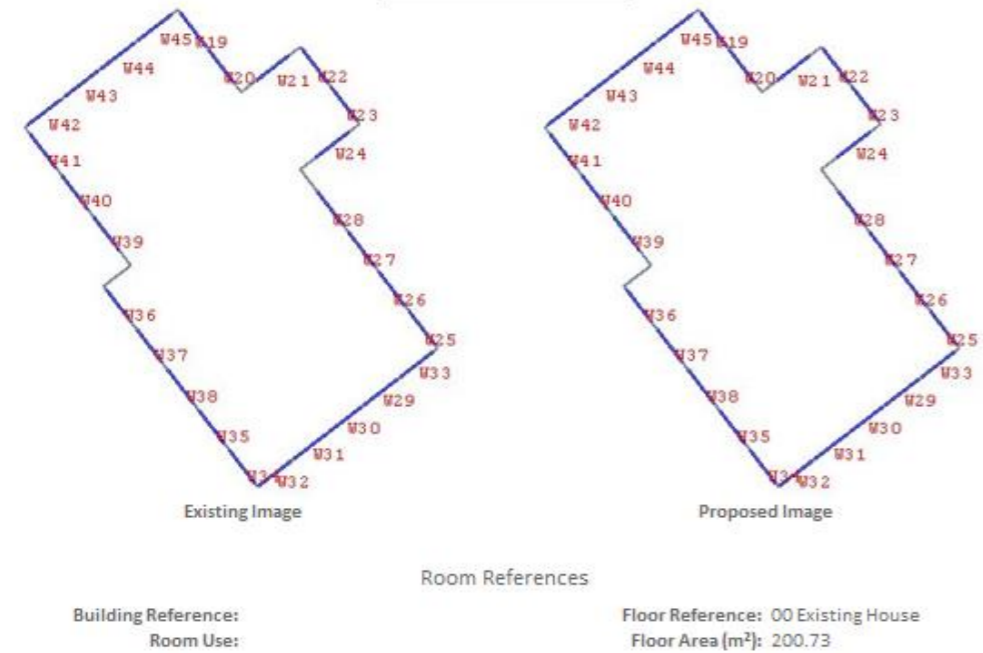
Façade	Annual Ex (%)	Annual Pr (%)	Proposed/Existing (%)	Winter Existing (%)	Winter Proposed (%)	Winter Proposed/Existing (%)
SE	81.8	81.8	100	31.0	31.0	100
SW	69.0	69.0	100	24.6	24.6	100

Fig 4.2.2 - Annual Probable Sunlight Hours (APSH) Results

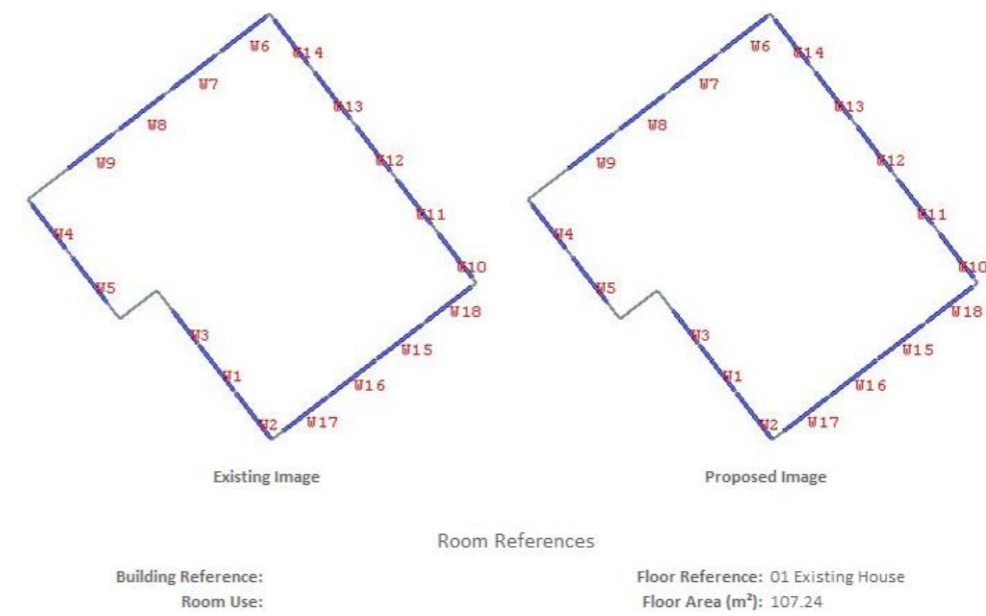
Appendix A – Daylight: Vertical Sky Component

Vertical Sky Component

Existing Building Grd



Existing Building 1st



Window Results

Window Ref Ex	Window Ref Pr	Window Name	Window Area (m ²)	Orientation (°)	VSC Ex (%)	VSC Pr (%)	Pr / Ex
W19	W19	2*1.2	2.09	52.48772	37.07	35.00	0.94
W20	W20	2*1.2	2.09	52.48772	30.32	28.31	0.93
W21	W21	2*1.2	2.09	322.4877	31.84	29.93	0.94
W22	W22	2*1.2	2.09	52.48772	38.94	37.03	0.95
W23	W23	2*1.2	2.09	52.48772	38.94	37.32	0.96
W24	W24	2*1.2	2.09	142.4877	24.50	24.50	1.00
W25	W25	2*1.2	2.09	52.48772	38.78	38.07	0.98
W26	W26	2*1.2	2.09	52.48772	38.62	37.95	0.98
W27	W27	2*1.2	2.09	52.48772	37.90	37.02	0.98
W28	W28	2*1.2	2.09	52.48772	33.84	33.52	0.99
W29	W29	2*1.2	2.09	142.4877	38.94	38.94	1.00
W30	W30	2*1.2	2.09	142.4877	38.94	38.94	1.00
W31	W31	2*1.2	2.09	142.4877	38.94	38.94	1.00
W32	W32	2*1.2	2.09	142.4877	38.94	38.94	1.00
W33	W33	2*1.2	2.09	142.4877	38.94	38.94	1.00
W34	W34	2*1.2	2.09	232.4877	38.94	38.48	0.99
W35	W35	2*1.2	2.09	232.4877	38.94	38.48	0.99
W36	W36	2*1.2	2.09	232.4877	38.94	38.19	0.98
W37	W37	2*1.2	2.09	232.4877	38.94	38.24	0.98
W38	W38	2*1.2	2.09	232.4877	38.94	38.34	0.98
W39	W39	2*1.2	2.09	232.4877	32.82	32.03	0.98
W40	W40	2*1.2	2.09	232.4877	37.86	37.00	0.98
W41	W41	2*1.2	2.09	232.4877	38.54	37.65	0.98
W42	W42	2*1.2	2.09	322.4877	38.94	36.42	0.94
W43	W43	2*1.2	2.09	322.4877	38.94	36.32	0.93
W44	W44	2*1.2	2.09	322.4877	38.94	36.32	0.93
W45	W45	2*1.2	2.09	322.4877	38.94	36.24	0.93

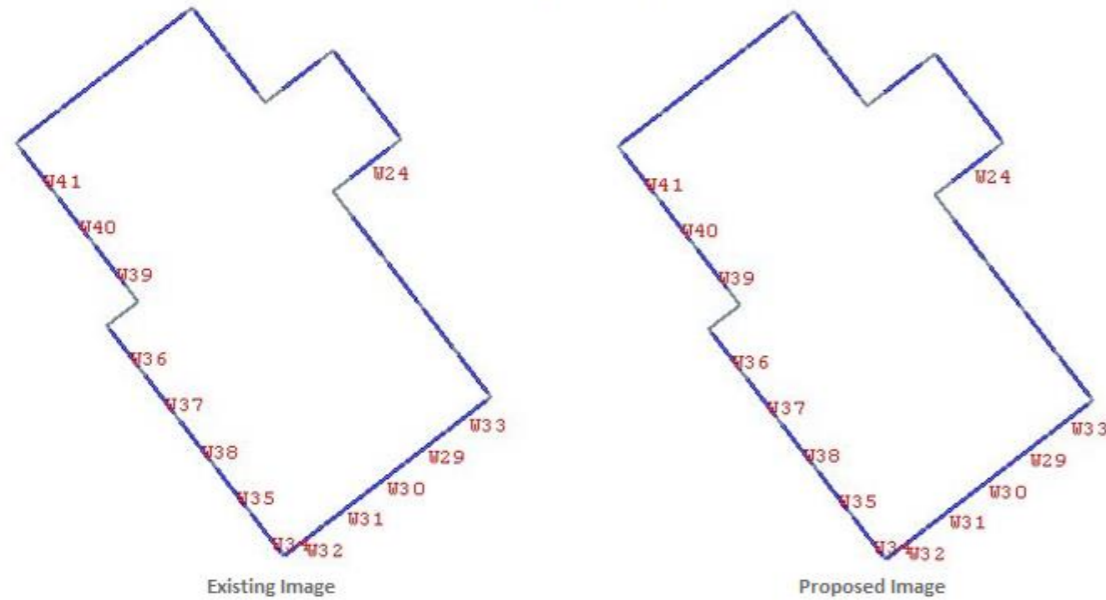
Window Results

Window Ref Ex	Window Ref Pr	Window Name	Window Area (m ²)	Orientation (°)	VSC Ex (%)	VSC Pr (%)	Pr / Ex
W1	W1	2*1.2	2.09	232.4644	37.82	37.62	0.99
W2	W2	2*1.2	2.09	232.4644	38.64	38.41	0.99
W3	W3	2*1.2	1.54	232.4644	33.12	33.02	1.00
W4	W4	2*1.2	2.09	232.4738	38.94	38.61	0.99
W5	W5	2*1.2	2.09	232.4738	38.94	38.65	0.99
W6	W6	2*1.2	2.09	322.4877	38.94	38.19	0.98
W7	W7	2*1.2	2.09	322.4877	38.94	38.13	0.98
W8	W8	2*1.2	2.09	322.4877	38.94	38.09	0.98
W9	W9	2*1.2	2.09	322.4877	38.94	38.17	0.98
W10	W10	2*1.2	2.09	52.48772	38.94	38.61	0.99
W11	W11	2*1.2	2.09	52.48772	38.94	38.57	0.99
W12	W12	2*1.2	2.09	52.48772	38.94	38.60	0.99
W13	W13	2*1.2	2.09	52.48772	38.94	38.52	0.99
W14	W14	2*1.2	2.09	52.48772	38.94	38.51	0.99
W15	W15	2*1.2	2.09	142.4877	38.94	38.94	1.00
W16	W16	2*1.2	2.09	142.4877	38.94	38.94	1.00
W17	W17	2*1.2	2.09	142.4877	38.94	38.94	1.00
W18	W18	2*1.2	2.09	142.4877	38.94	38.94	1.00

Appendix B – Sunlight: Annual Probable Sunlight Hours

Annual Probable Sunlight Hours

Existing Building Grd



Room References

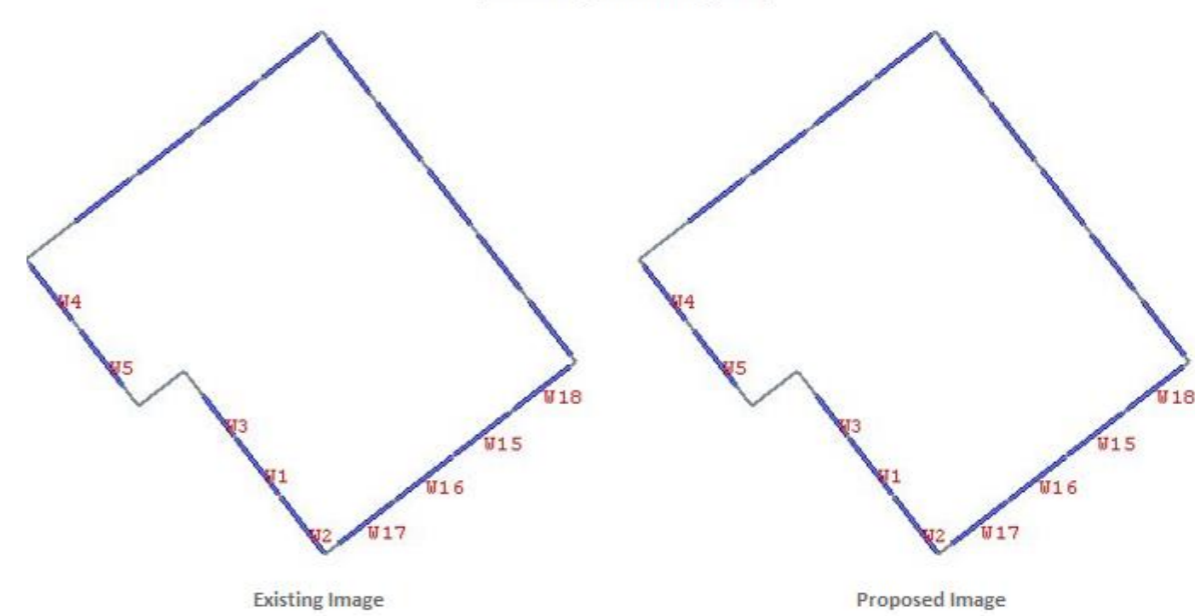
Building Reference:
Room Use:

Floor Reference: 00 Existing House
Floor Area (m²): 200.73

Window Results

Window Ref Existing	Window Ref Pr	Window Name	Window Area (m ²)	Orientation (°)	Annual Existing (%)	Annual Proposed (%)	Annual Proposed / Existing (%)	Winter Existing (%)	Winter Proposed (%)	Winter Proposed / Existing (%)
W24	W24	2*1.2	2.09	142.4877	41.74	41.74	100.00	10.34	10.34	100.00
W29	W29	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W30	W30	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W31	W31	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W32	W32	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W33	W33	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W34	W34	2*1.2	2.09	232.4877	68.99	68.99	100.00	24.59	24.59	100.00
W35	W35	2*1.2	2.09	232.4877	68.99	68.99	100.00	24.59	24.59	100.00
W36	W36	2*1.2	2.09	232.4877	68.99	68.99	100.00	24.59	24.59	100.00
W37	W37	2*1.2	2.09	232.4877	68.99	68.99	100.00	24.59	24.59	100.00
W38	W38	2*1.2	2.09	232.4877	68.99	68.99	100.00	24.59	24.59	100.00
W39	W39	2*1.2	2.09	232.4877	42.36	42.36	100.00	9.79	9.79	100.00
W40	W40	2*1.2	2.09	232.4877	57.95	57.95	100.00	16.13	16.13	100.00
W41	W41	2*1.2	2.09	232.4877	63.51	63.51	100.00	19.58	19.58	100.00

Existing Building 1st



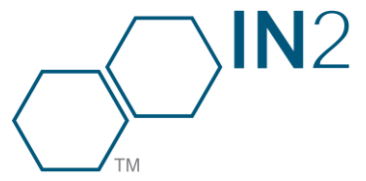
Room References

Building Reference:
Room Use:

Floor Reference: 01 Existing House
Floor Area (m²): 107.24

Window Results

Window Ref Existing	Window Ref Pr	Window Name	Window Area (m ²)	Orientation (°)	Annual Existing (%)	Annual Proposed (%)	Annual Proposed / Existing (%)	Winter Existing (%)	Winter Proposed (%)	Winter Proposed / Existing (%)
W1	W1	2*1.2	2.09	232.4644	67.35	67.35	100.00	24.43	24.43	100.00
W2	W2	2*1.2	2.09	232.4644	67.50	67.50	100.00	24.59	24.59	100.00
W3	W3	2*1.2	1.54	232.4644	64.68	64.68	100.00	24.43	24.43	100.00
W4	W4	2*1.2	2.09	232.4738	68.99	68.99	100.00	24.59	24.59	100.00
W5	W5	2*1.2	2.09	232.4738	68.99	68.99	100.00	24.59	24.59	100.00
W15	W15	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W16	W16	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W17	W17	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00
W18	W18	2*1.2	2.09	142.4877	81.83	81.83	100.00	31.01	31.01	100.00



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