BRE DAYLIGHT & SUNLIGHT ASSESSMENT FOR:

Land Behind No. 1 High Street (Rear Buildings)

Hampton Hill

TW12 1NA

DOCUMENT CONTROL

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VERSION	DATE	PROJECT STAGE	STATUS	DESCRIPTION
1.0	22/08/2022	Strategic Design	Planning Submission	Initial report as per the Revision A Proposed Drawings

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1. EXECUTIVE SUMMARY

This daylight/sunlight assessment has been prepared to support the planning application for the proposed development at Land behind No. 1 High Street, Hampton Hill, TW12 1NA. The site is located under the jurisdiction of the London Borough of Richmond upon Thames. This assessment has been produced based on planning drawings provided by 'Husband & Partners Architects'. The existing rear buildings were used for office purposes and the applicant wants to convert them into residential units x 5 Nos by altering the internal layout of the existing rear buildings. The applicant wishes to calculate the internal daylight for each habitable room for the newly proposed residential units.

The primary purpose of this daylight/sunlight study is to determine the Average Daylight Factor for each habitable room and compare these results with the minimum standards of BS 8206-2008 Part 2 Code of Practice for Daylighting. Building modelling was carried out using the IES VE software and daylighting analysis was carried out using the FlucsDL module in the IES VE software. A total of 11 habitable rooms from the five residential units were simulated and analysed for the average daylight factor. The achieved Average Daylight Factor (ADF) for the habitable rooms is greater than that of the Target Daylight Factor.

Hence, all the habitable rooms of the proposed residential units have passed the BRE daylighting compliance. Therefore, the proposed development is fully BRE compliant in terms of daylight access.

Sr #	Site	Habitable Room name	Target Daylight Factor (BS 8206-2008 Part 2)	Achieved - Average Daylight Factor (ADF)	Compliance
1	1 High Street, Hampton Hill, TW12 1NA (Rear Building)	Flat 1_LIVING/DINING/KITCHEN	2.0	5.70	PASS
2		Flat 1_BEDROOM 1	1.0	5.20	PASS
3		Flat 1_BEDROOM 2	1.0	5.20	PASS
4		Flat 2_LIVING/DINING/KITCHEN	2.0	6.80	PASS
5		Flat 2_BEDROOM	1.0	5.60	PASS
6		Flat 3_LIVING/DINING/KITCHEN	2.0	8.60	PASS
7		Flat 3_BEDROOM	1.0	9.10	PASS
8		Flat 4_LIVING/DINING/KITCHEN	2.0	8.80	PASS
9		Flat 4_BEDROOM	1.0	3.80	PASS
10		Flat 5_LIVING/DINING/KITCHEN	2.0	2.30	PASS
11		Flat 5_BEDROOM	1.0	4.10	PASS

2. CURRENT POLICIES, REGULATIONS AND BENCHMARK

Regulations

- Building regulations – No minimum daylight standard

Standards & Guides

- BS 8206-2 2008 Code of Practice for Daylighting
- BRE Designing Buildings for Daylighting
- Site Layout Planning for Daylight and Sunlight", 2nd edition 2011

BS8206-2 2008 Code of Practice for Daylighting describes good practice in Daylighting design and presents criteria intended to enhance the wellbeing and satisfaction of people in buildings, recognizing that the aims of good lighting go beyond achieving minimum illumination for task performance.

The assessment criteria for dwellings are related to the minimum acceptable value of the Average Daylight Factor (ADF). A design in which ADF can meet or exceed these minimum requirements is recognised as able to provide satisfactory daylight levels for the occupants, thus reducing the need for artificial lighting.

- Daylight Assessment

The BRE Guidelines refer to the minimum ADF inside dwellings, as described by the BS 8206-2008, Part 2 Code of Practice for Daylighting. The BRE guidelines also recommend the No Skyline or Daylight Distribution Contour test, as the process to assess the uniformity of the daylight within the room. The No Skyline or Daylight Distribution Contour shows the extent of light penetration into a room, at the working plane level which is set at 0.85 m above the finished floor level.

This daylight study aims to calculate the Average Daylight Factor (ADF) for the proposed unit and compare this against minimum standards.

Table 1: Minimum ADF, BS 8206-2008 Part 2 Code of Practice for Daylighting

Space	Average Daylight Factor (ADF) %
Living Room	1.50
Kitchen	2.00
Bedroom	1.00
Study	1.50

The Building Research Establishment Guidelines – Site Layout Planning for Daylight provide advice on the design to achieve satisfactory daylight conditions within buildings and set out calculation and assessment procedures.

3. SITE LOCATION AND DESCRIPTION

The proposed site is located on the Land behind No. 1 High Street, Hampton Hill, TW12 1NA. The site is located under the jurisdiction of the London Borough of Richmond upon Thames. The existing rear buildings were used for office purposes and the applicant wants to convert them into residential units x 5 Nos by altering the internal layout of the existing rear buildings. The applicant wishes to calculate the internal daylight for each habitable room for the newly proposed residential units.

The key plan of the site is shown in Figure 1.

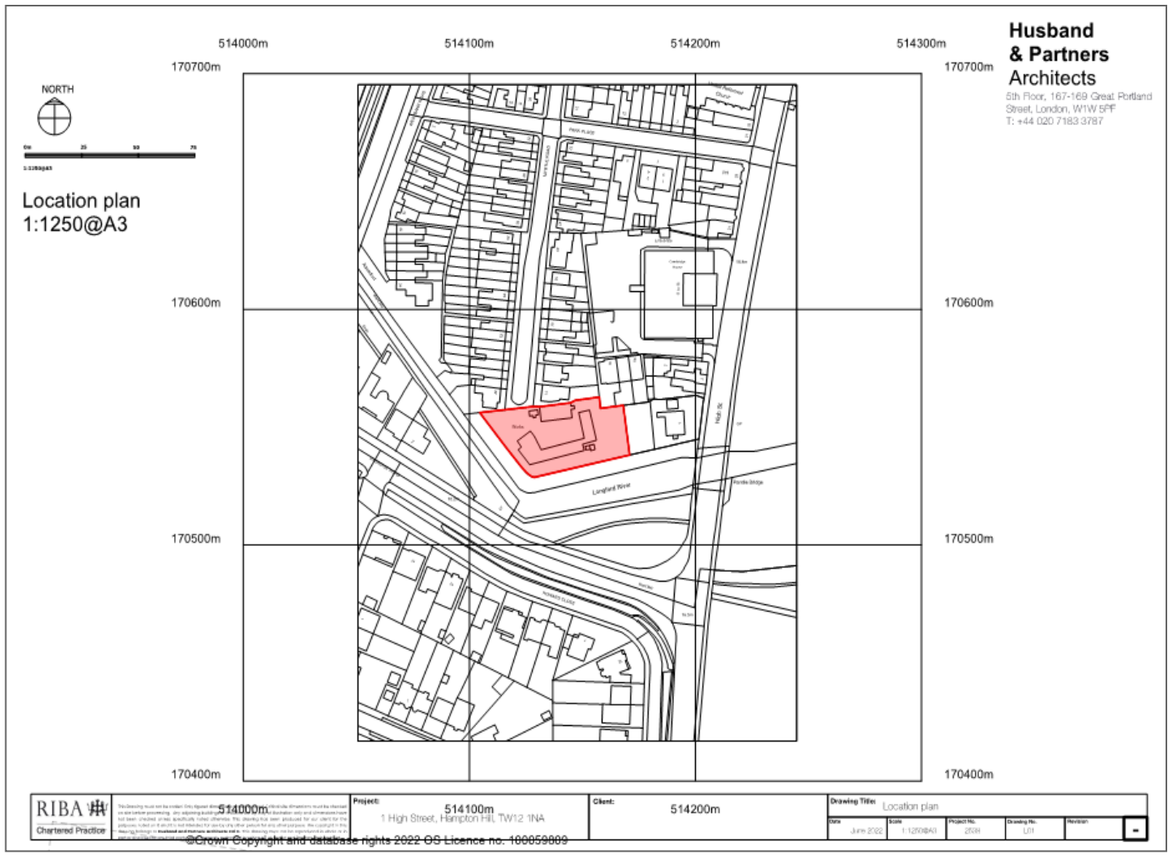


Figure 1: Key Plan Showing the Site

Figure 2: The Aerial View of the Site

The site is in the busy area of the high street. The site is adjacent to the Longford River and surrounded by various residential and commercial units. There are a lot of grown trees present around the site.

Figure 3: The Existing Site Photographs

Figure 4: The Existing Site Photographs

Figure 5: The Existing Site Photographs

Figure 6: The Existing Site Photographs

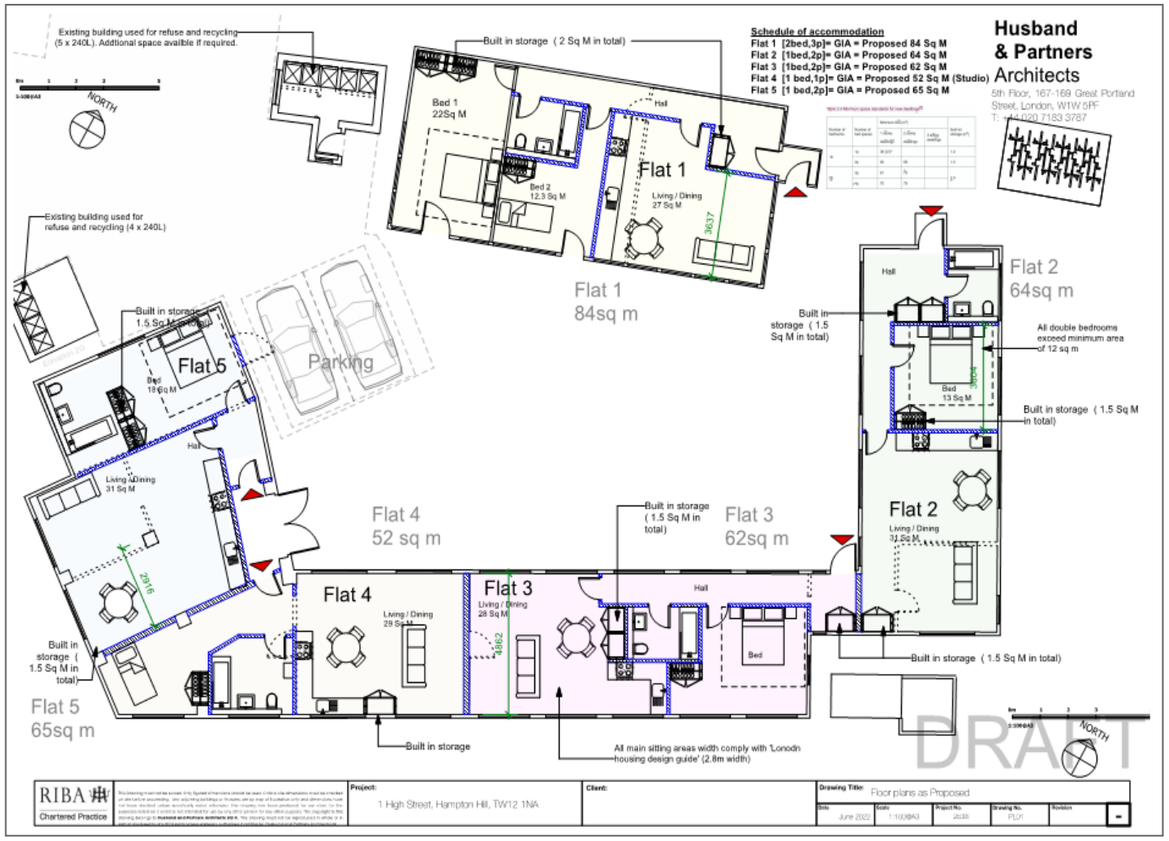


Figure 7: Proposed Floor Plans with Residential Units x 5 Nos.

Figure 8: 3-D Render View of Proposed Development

Therefore, this daylight/sunlight study aims to calculate the Average Daylight Factor (ADF) for each habitable room of the proposed residential units and compare this against the minimum BS 8206-2008 Part 2 standard.

4. INTERNAL DAYLIGHT ASSESSMENT

4.1 STEP 1- MODEL BUILDING

Building modelling was carried out using the IES VE software and Daylighting analysis was carried out using the FlucsDL module in the IES VE software. The model was built based on the proposed drawings provided by 'Husband & Partners Architects'.

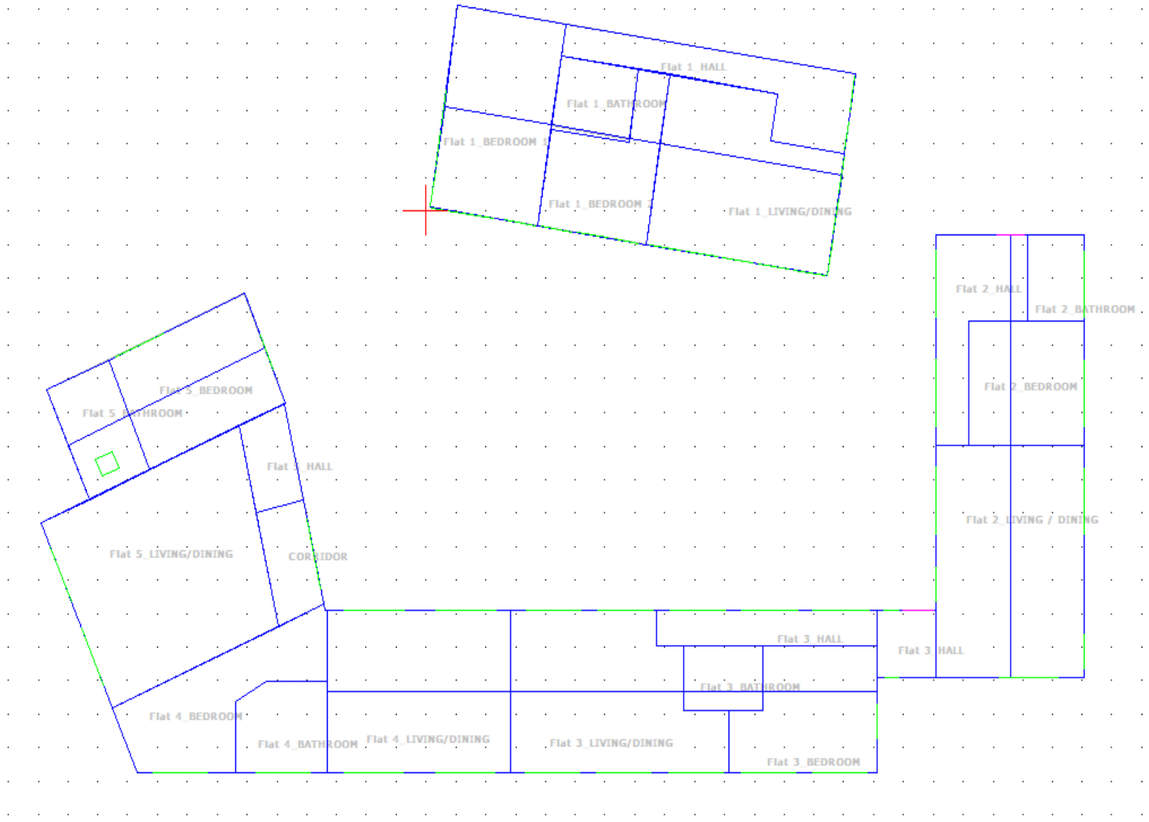


Figure 9: 2-D Site Scenario in IES VE Software

Figure 9 shows that 2-D site scenario in IES-VE software and Figure 10 & Figure 11 shows that 3-D site scenario in IES-VE software. All the habitable rooms of the proposed residential units are modelled along with windows and openings. Once, the IES VE site model is completed next step is to assign the various model input parameters.

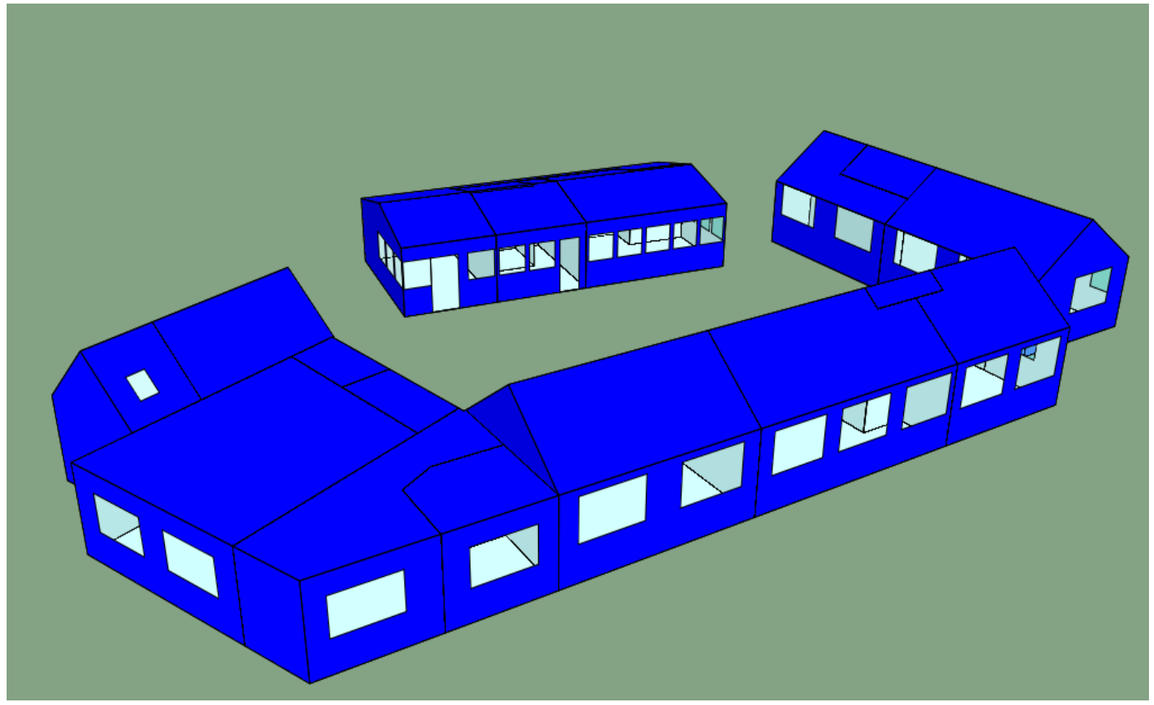


Figure 10: 3-D Site Scenario in IES VE Software (Front View)

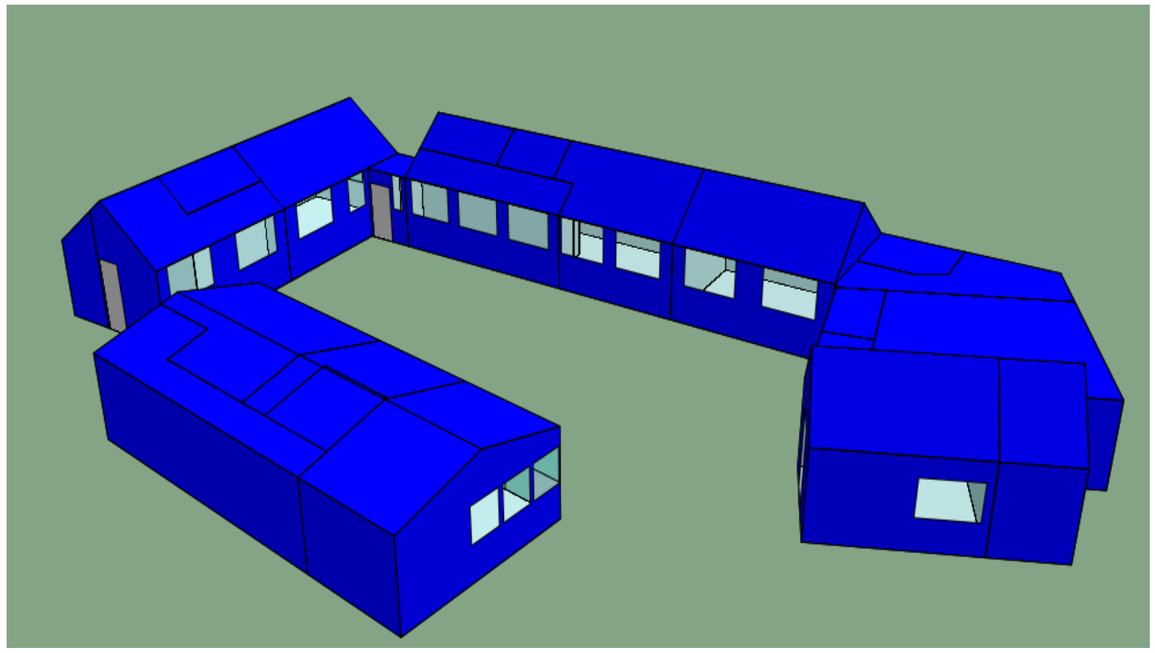


Figure 11: 3-D Site Scenario in IES VE Software (Side View)

4.2 STEP 2- MODEL INPUT PARAMETERS

The following model input parameters have been set into IES VE software. The working surface height is set at 0.85 m above from finished floor level. The default room surface maintenance factor has been set which is 0.90.

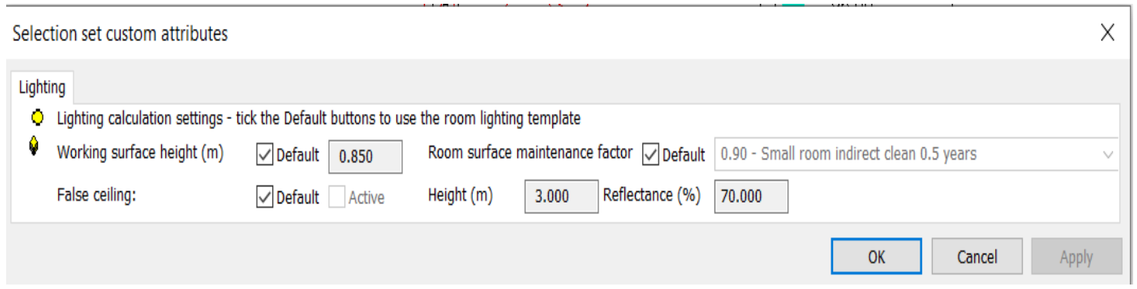


Figure 12: Custom Attributes into IES VE Software

The surface properties have been set within IES VE software for each building room component like floor, walls, roofs, openings etc. Reflectances values were taken from the IES VE database with the surface type category.

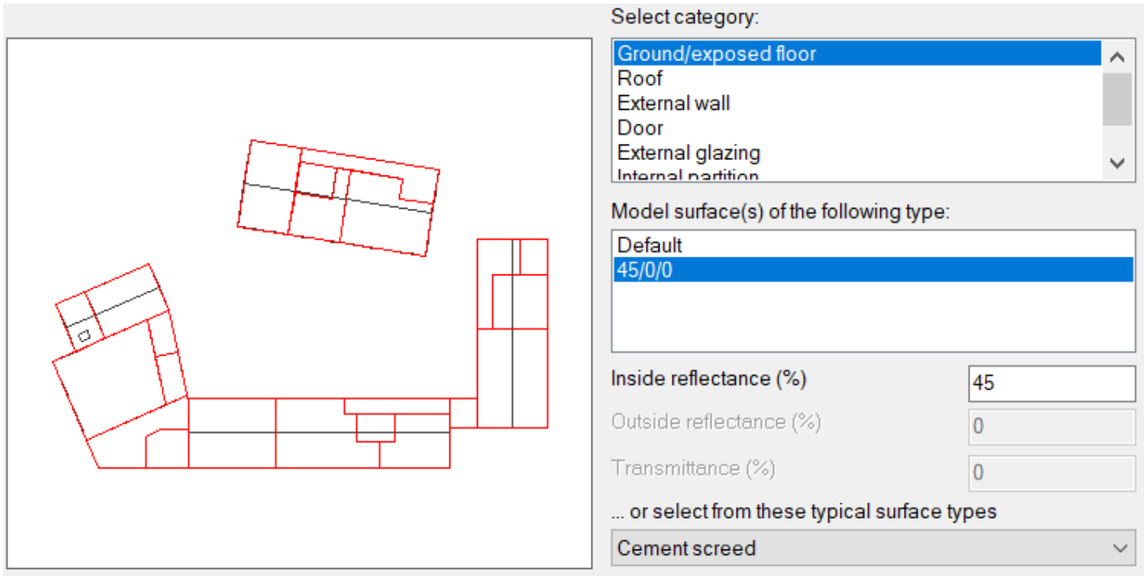


Figure 13: Surface Properties- Ground/Exposed Floor

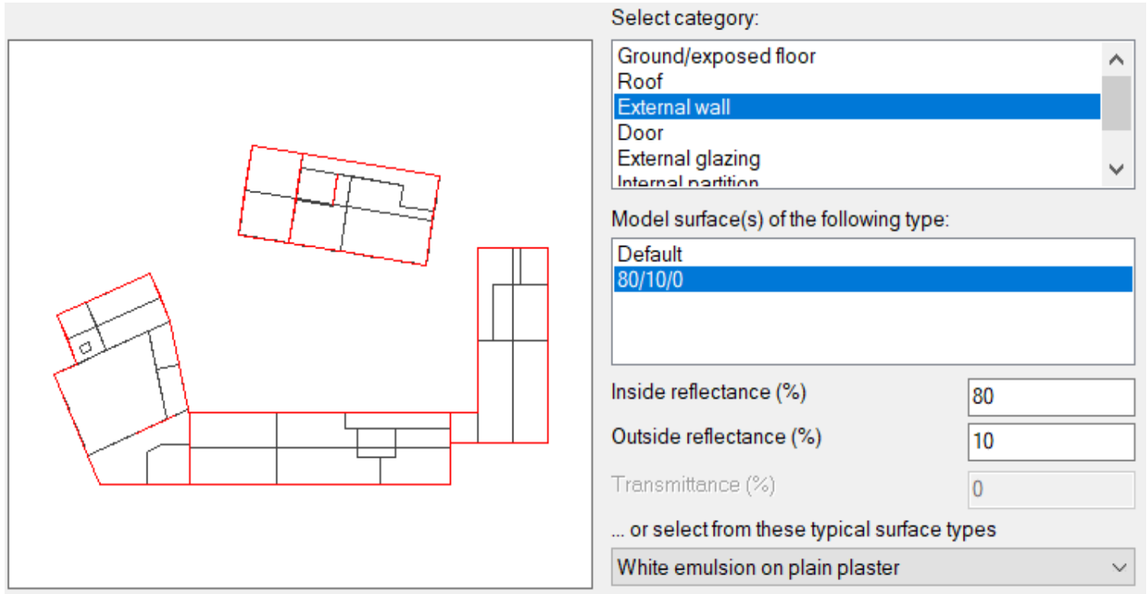


Figure 14: Surface Properties - External Wall

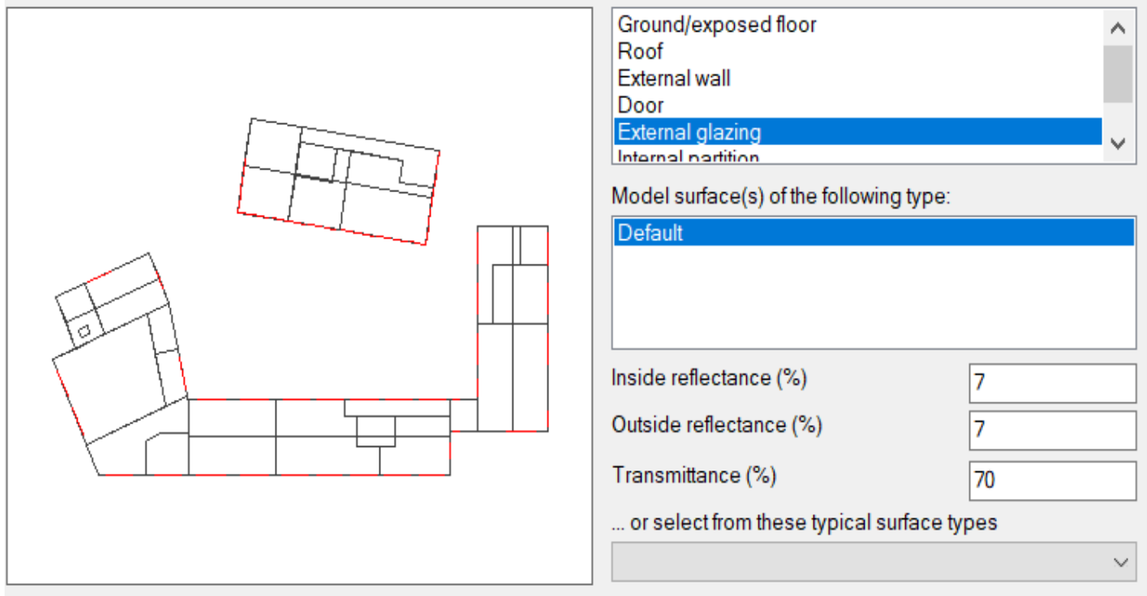


Figure 15: Surface Properties - External Glazing

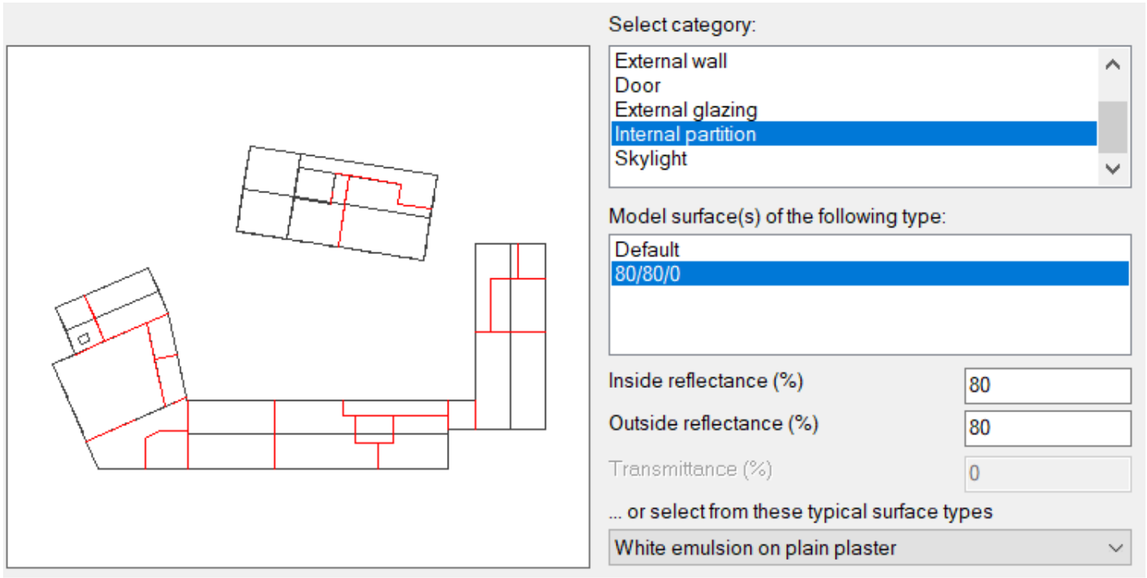


Figure 16: Surface Properties-Internal Partitions

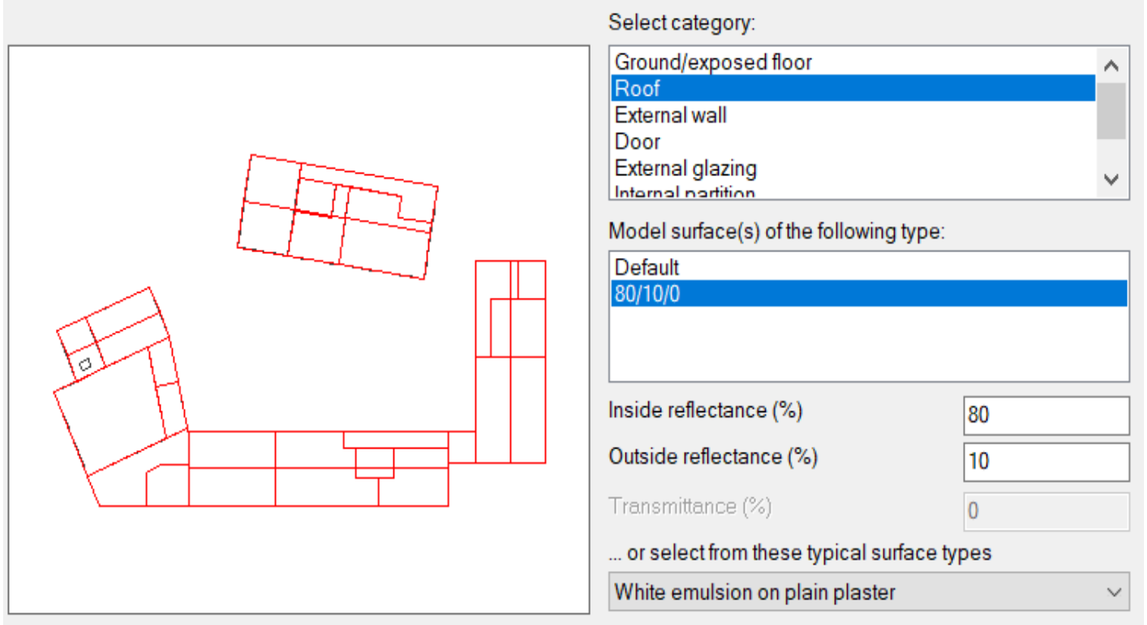


Figure 17: Surface Properties - Roof

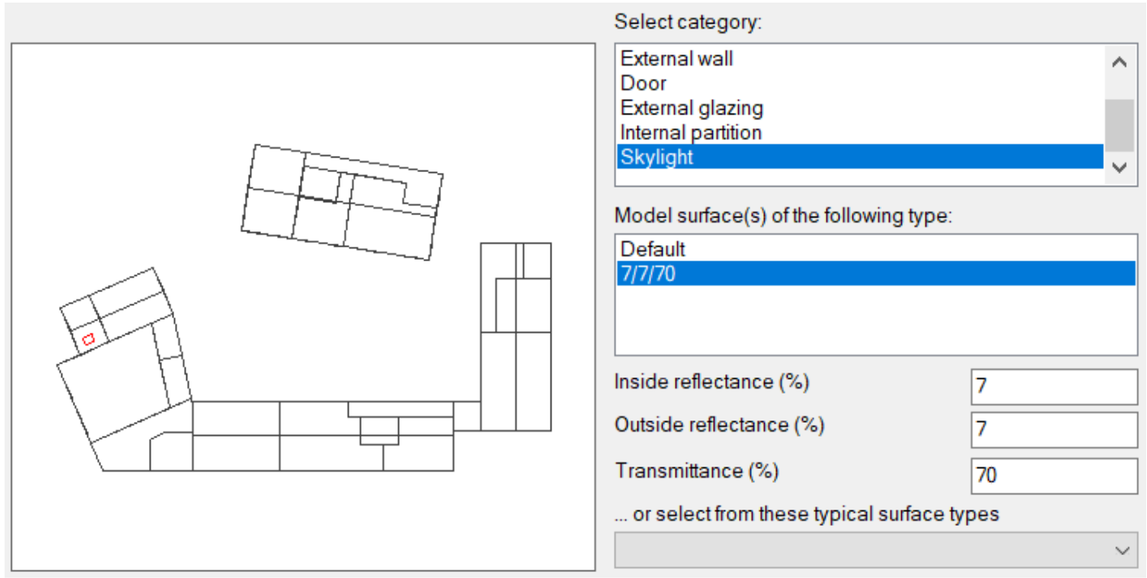


Figure 18: Surface Properties - Skylight

4.3 STEP 3- MODEL CALCULATION SETTINGS

After all the model input parameters were set, the modelling parameters are set based on guidance within the relevant daylight guidance documents.

Daylighting calculations have been set as follows –

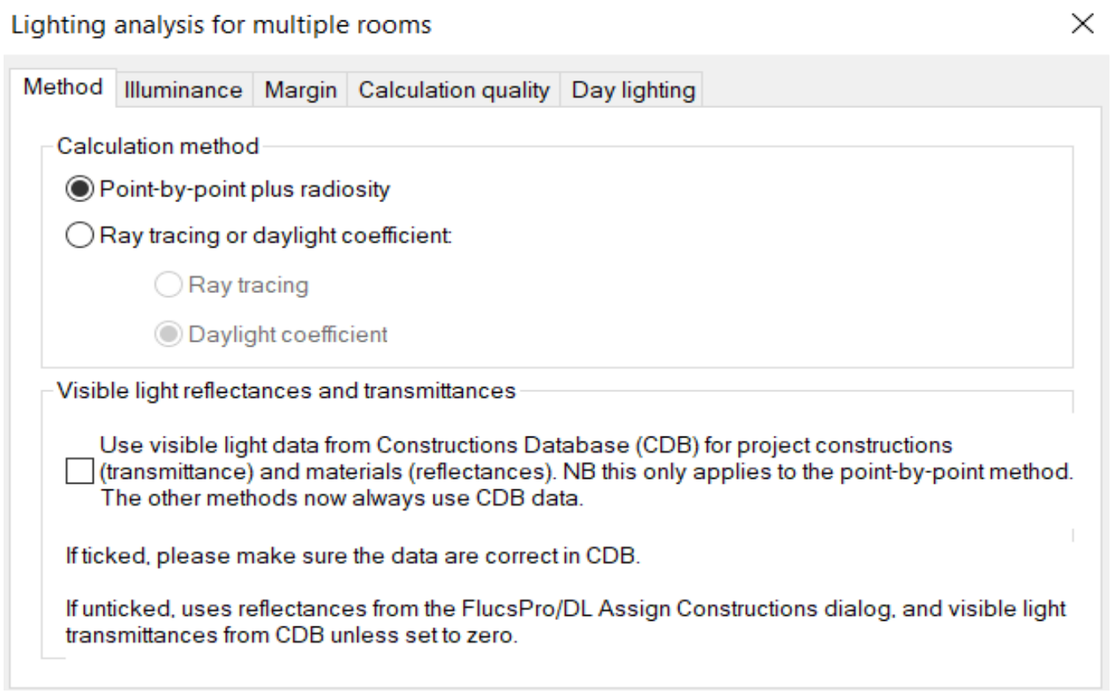


Figure 19: Daylighting Calculation Method – Point by Point Plus Radiosity

Daylighting calculation method has been set to 'Point–by-Point plus Radiosity'.

This option progressively takes the surface patch, whose as-yet unreflected flux is largest, reflects this flux to all the other room surfaces, note it as now having been reflected, and repeats this process until there are no patches with unreflected flux above a minimum value or until the maximum number of reflections has been performed. The value of the largest remaining unreflected flux, and the number of shoots, are displayed in the progress dialogue box so that you can monitor the convergence of the calculation.

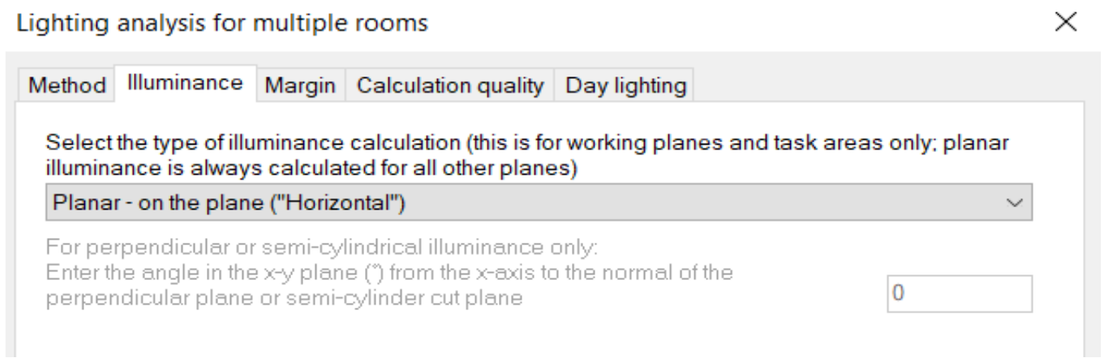


Figure 20: Illuminance Calculations – Planar on the Plane (Horizontal)

This is the simple illuminance on the receiving plane. Usually, this is a horizontal plane, hence the term "horizontal".

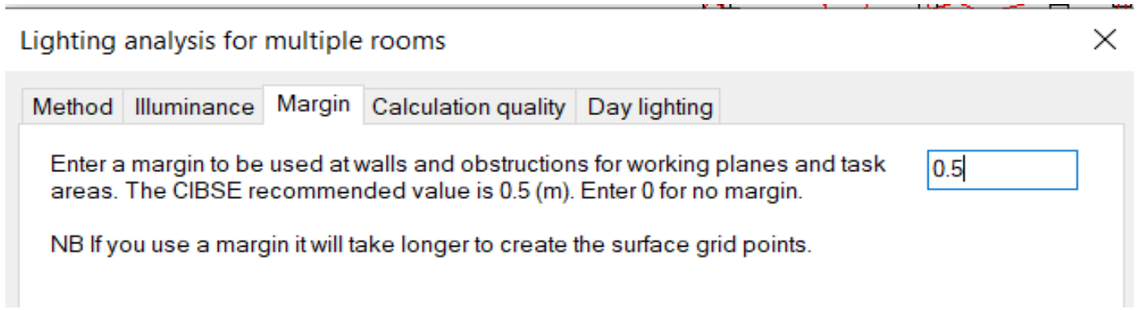


Figure 21: Margin Settings

Enter the margin to be left uncalculated at the edges of working surfaces. Because the grid size is constant, the calculations will be inaccurate when the working surface is close to a room surface. In these calculations, margins have been set at 0.5

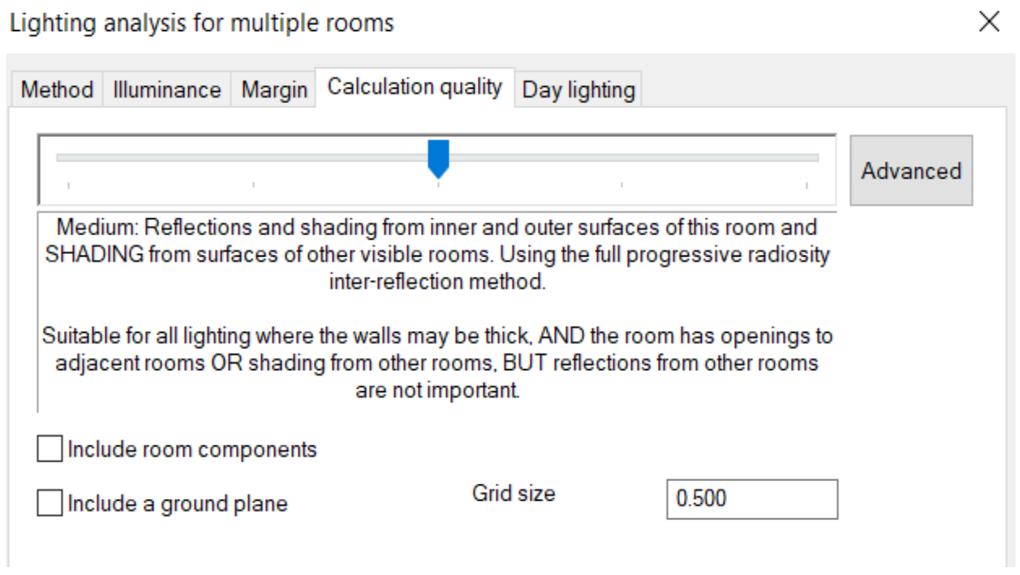


Figure 22: Calculations Quality - Low/Medium

The Daylighting calculation quality has been set to **Medium**. This will take into account reflections and shading from the inner and outer surfaces of the room and shading from surfaces of other visible rooms. The Grid size was set to 0.500

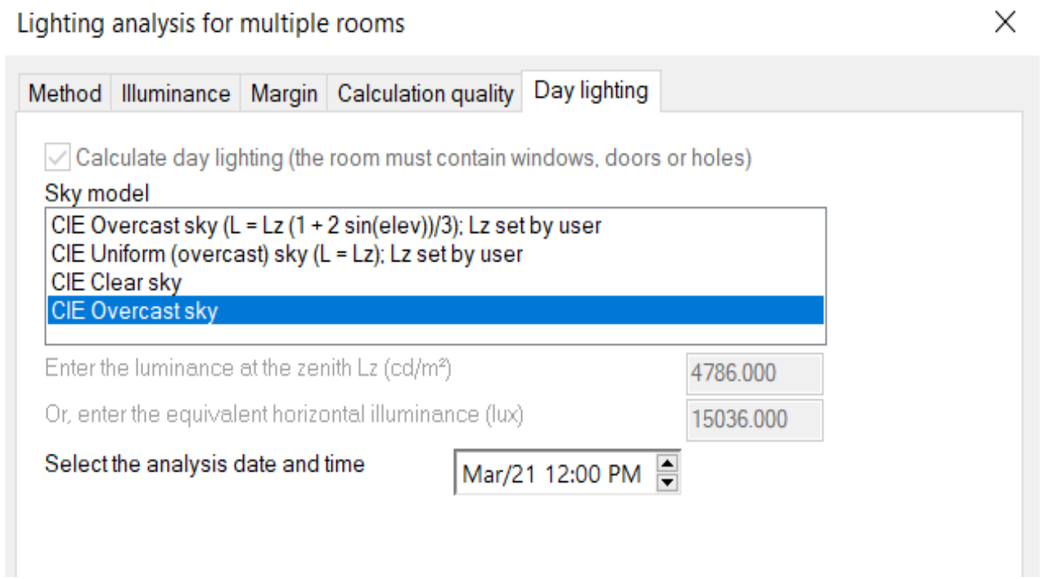


Figure 23: Calculation Sky Model – CIE Overcast Sky

The Sky Model was set to CIE Overcast sky. The date and time were selected as 21st March at 12.00 PM.

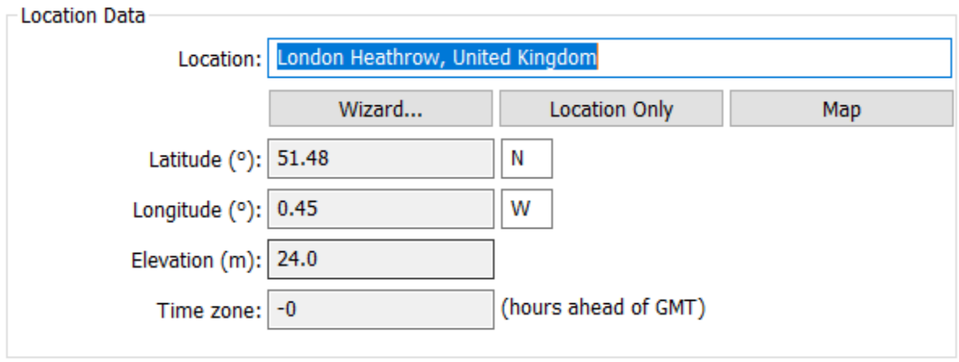


Figure 24: Site Location Data

The location was set to "London Heathrow, United Kingdom". The Latitude and Longitude were set as shown in Figure 24.

Once, all the input parameters and calculations settings have been set then the model is ready for daylighting simulation. The model will be required to simulate for average daylight factor for each habitable room i.e. Bedroom, living /dining/kitchen etc. The simulation results will be discussed in the next sections.

4.4 STEP 4 – MODEL ROOM ANALYSIS

After all input parameters and calculation method settings have been applied, the model is ready to simulate for daylight results. All habitable rooms have been analysed for the Average Daylight Factor (ADF). The following table shows the simulation performed and the simulation succeeded for each habitable room.

Table 2: List of Habitable Rooms with Simulation Performed and Simulation Succeeded Summary

Room ID	Room name	Analysis calculation	
		Performed	Succeeded
FL000006	Flat 2_BEDROOM	√	√
FL000007	Flat 2_LIVING/DINING	√	√
FL000000	Flat 4_LIVING/DINING	√	√
FL00000A	Flat 3_BEDROOM	√	√
FL000009	Flat 3_LIVING/DINING	√	√
FL00000D	Flat 4_BEDROOM	√	√
FL000004	Flat 5_LIVING/DINING	√	√
FL000011	Flat 5_BEDROOM	√	√
FL000001	Flat 1_BEDROOM 1	√	√
FL000013	Flat 1_LIVING/DINING	√	√
FL000015	Flat 1_BEDROOM 2	√	√

A total of **11 habitable rooms** have been analysed for the Average Daylight Factor (ADF). These rooms are all bedrooms, Kitchen, Living and Dining. The next section will discuss the simulation results.

4.5 STEP 5 – DAYLIGHTING SIMULATION RESULTS

Table 3 shows all habitable rooms with Average Daylight Factor (ADF) and their compliance.

Table 3: All Habitable Rooms with Average Daylight Factor and its Compliance

Sr #	Site	Habitable Room name	Target Daylight Factor (BS 8206-2008 Part 2)	Achieved - Average Daylight Factor (ADF)	Compliance
1	1 High Street, Hampton Hill, TW12 1NA (Rear Building)	Flat 1_LIVING/DINING/KITCHEN	2.0	5.70	PASS
2		Flat 1_BEDROOM 1	1.0	5.20	PASS
3		Flat 1_BEDROOM 2	1.0	5.20	PASS
4		Flat 2_LIVING/DINING/KITCHEN	2.0	6.80	PASS
5		Flat 2_BEDROOM	1.0	5.60	PASS
6		Flat 3_LIVING/DINING/KITCHEN	2.0	8.60	PASS
7		Flat 3_BEDROOM	1.0	9.10	PASS
8		Flat 4_LIVING/DINING/KITCHEN	2.0	8.80	PASS
9		Flat 4_BEDROOM	1.0	3.80	PASS
10		Flat 5_LIVING/DINING/KITCHEN	2.0	2.30	PASS
11		Flat 5_BEDROOM	1.0	4.10	PASS

It is seen that all the 11 habitable rooms ‘pass’ the target daylight factor compliance and achieved an average daylight factor greater than the minimum standard as per BS 8206-2008 Part 2 Standard. Hence proposed residential units pass the BRE daylight compliance.

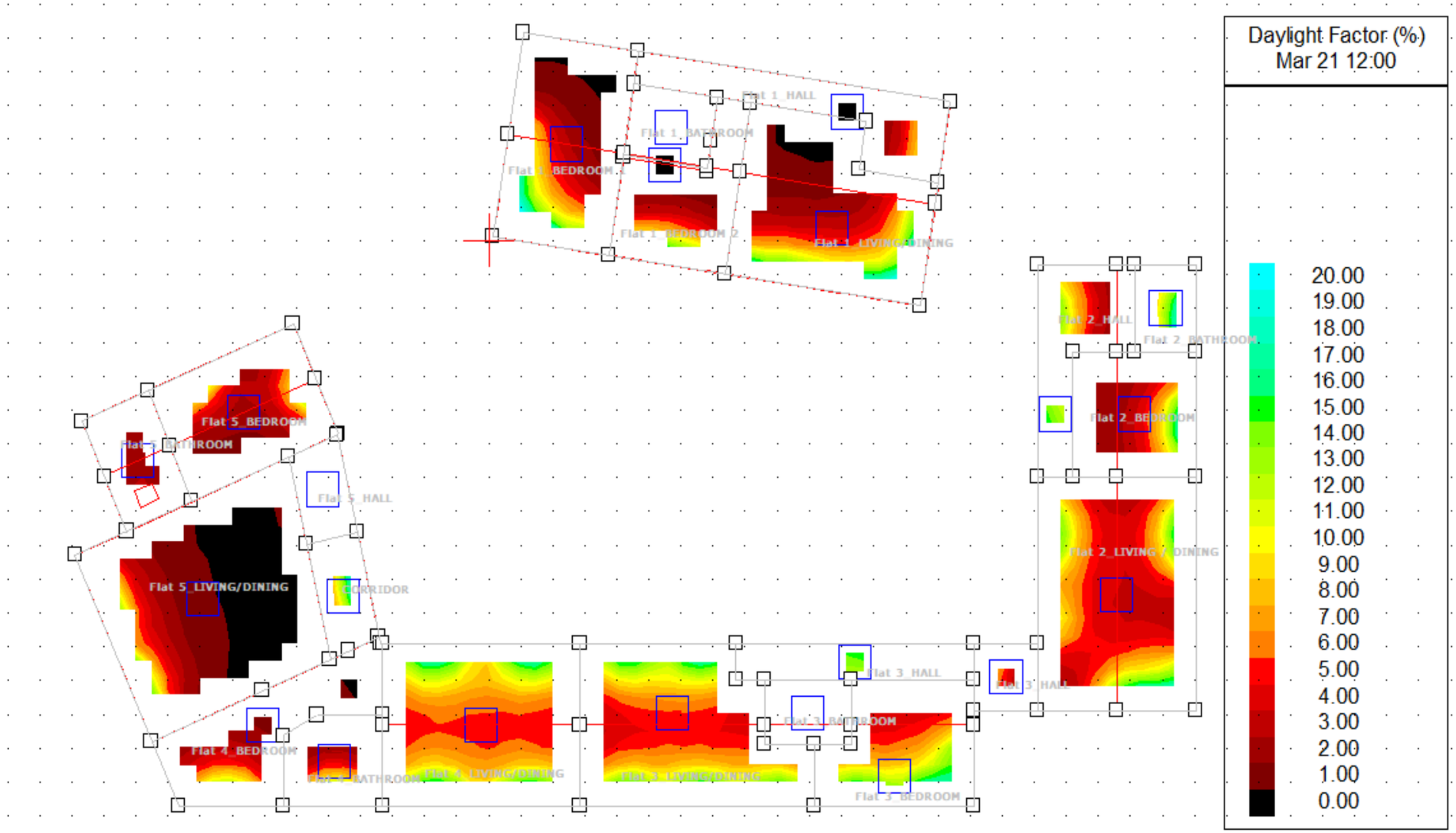
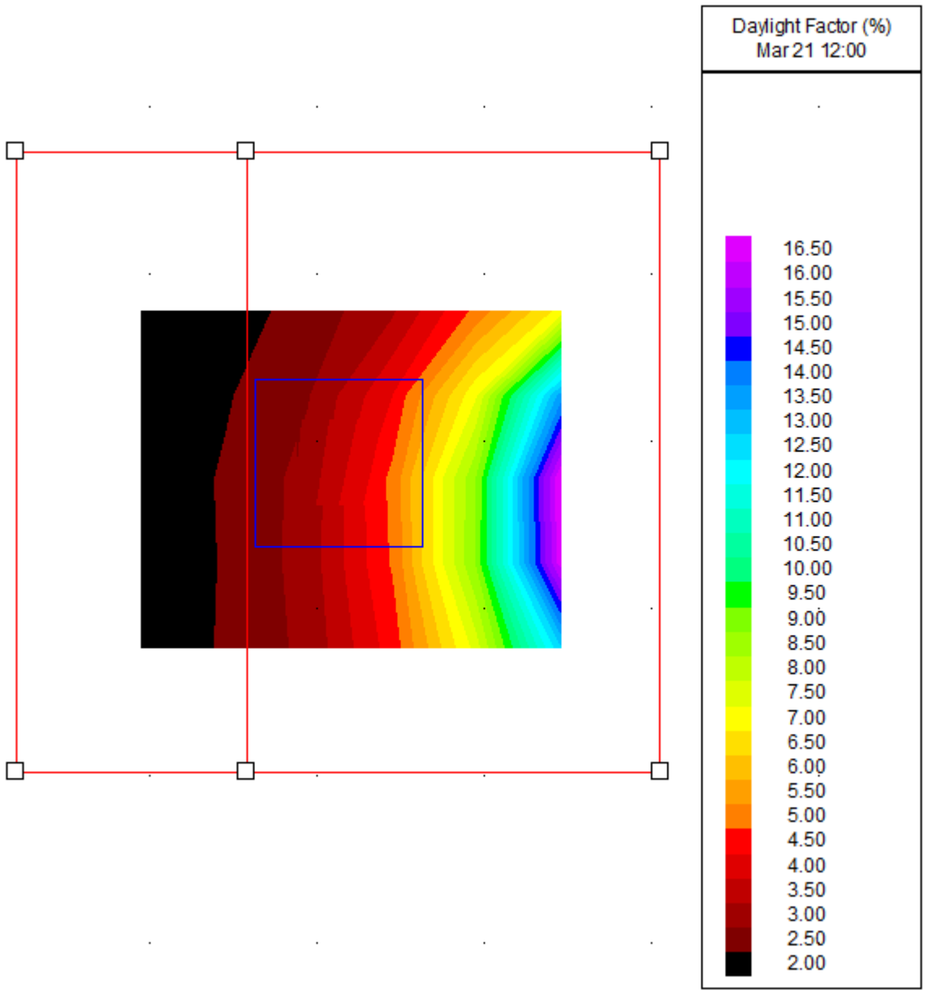


Figure 25: The Daylighting Simulation Results

The achieved Average Daylight Factor (ADF) for the habitable rooms is greater than that of the Target Daylight Factor. Hence, all the habitable rooms have passed the BRE daylighting compliance.

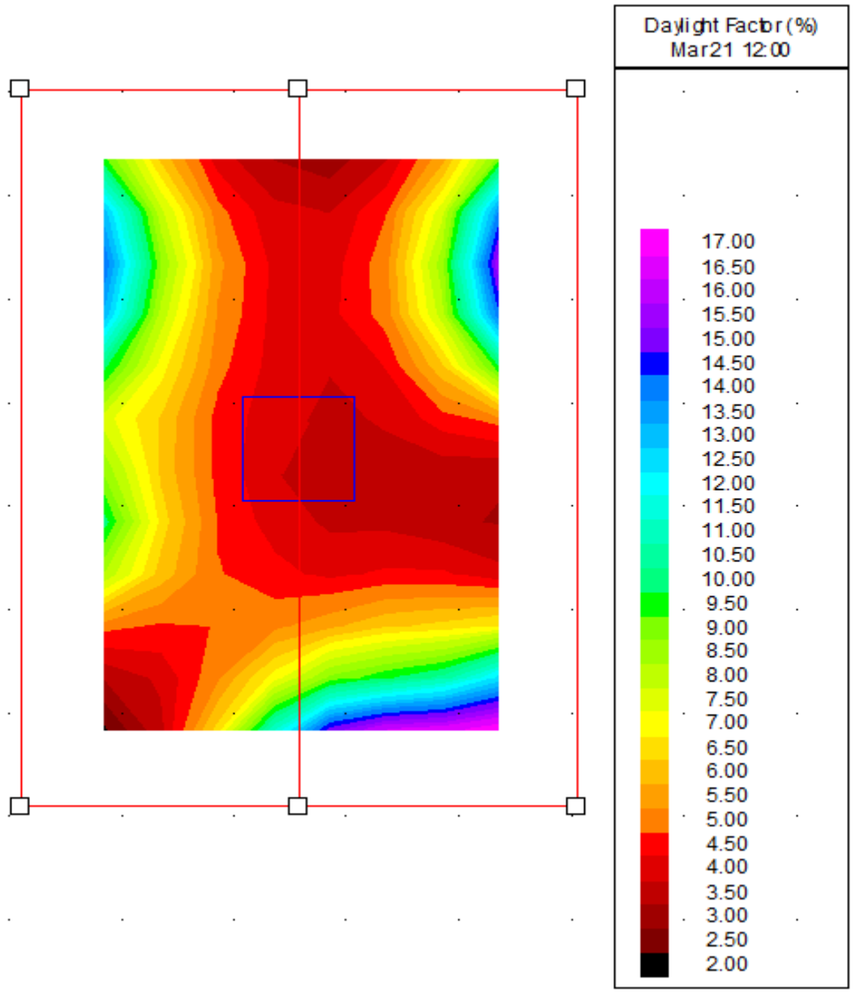
4.5.1 ROOM FL000006 (FLAT 2_BEDROOM)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=7.695m² Margin=0.50 m	Daylight factor	2.1 %	5.6 %	16.9 %	0.38	0.12
	Daylight illuminance	244.80 lux	650.59 lux	1979.46 lux	0.38	0.12
	Sky view	1.00	1.00	1.00	1.00	1.00



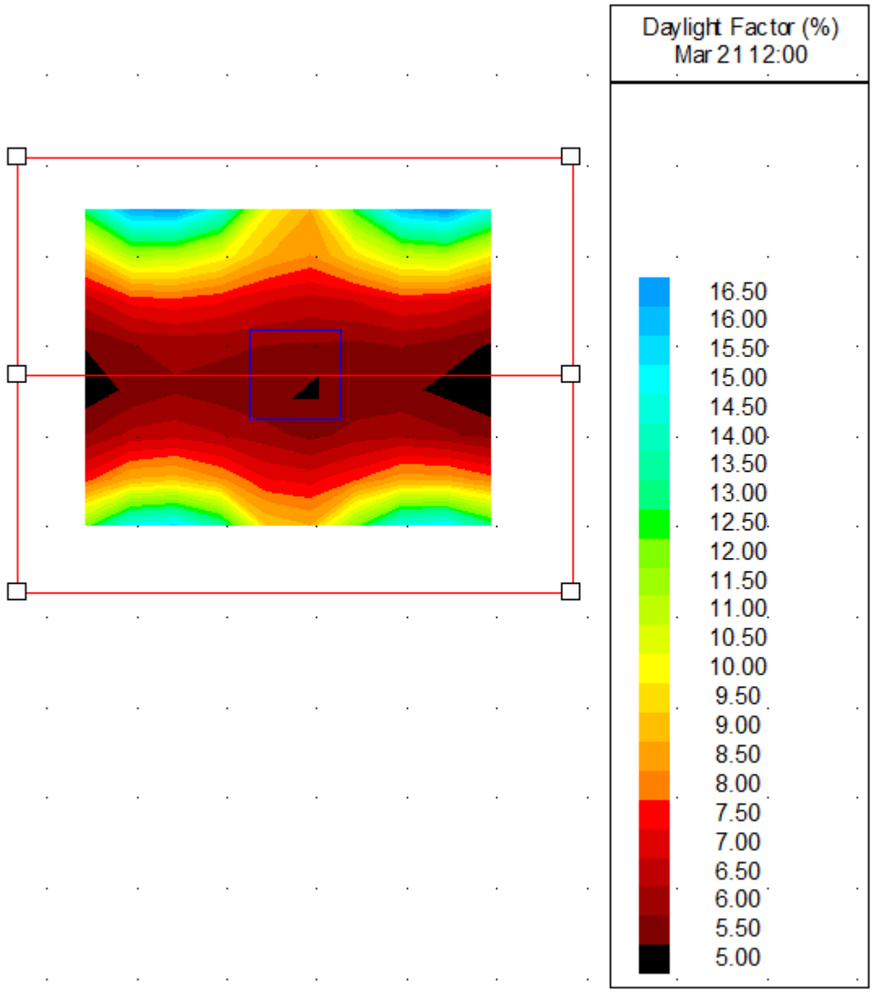
4.5.2 ROOM FL000007 (FLAT 2_LIVING/DINING/KITCHEN)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=23.404m² Margin=0.50 m	Daylight factor	2.4 %	6.8 %	17.4 %	0.36	0.14
	Daylight illuminance	284.27 lux	792.82 lux	2033.10 lux	0.36	0.14
	Sky view	1.00	1.00	1.00	1.00	1.00



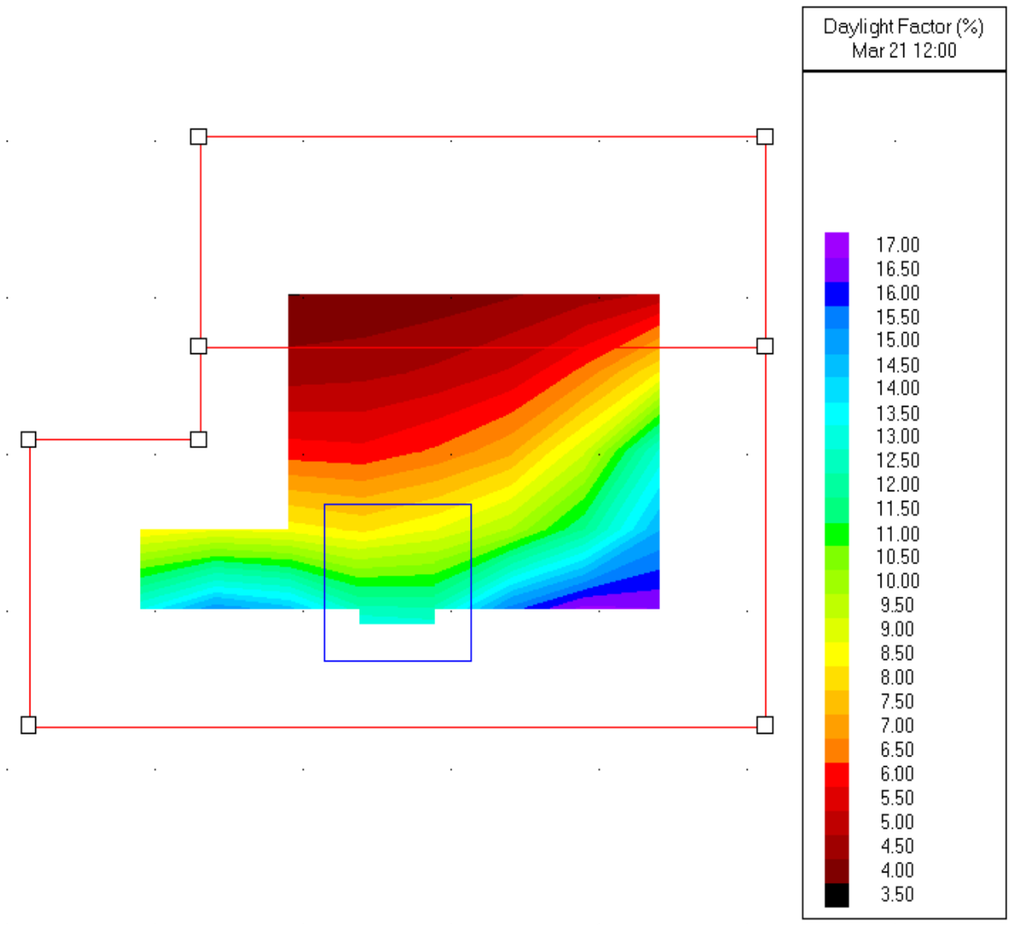
4.5.3 ROOM FL000000 (FLAT 4_LIVING/DINING/KITCHEN)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=19.699m² Margin=0.50 m	Daylight factor	5.1 %	8.8 %	16.9 %	0.57	0.30
	Daylight illuminance	591.87 lux	1032.24 lux	1979.53 lux	0.57	0.30
	Sky view	1.00	1.00	1.00	1.00	1.00



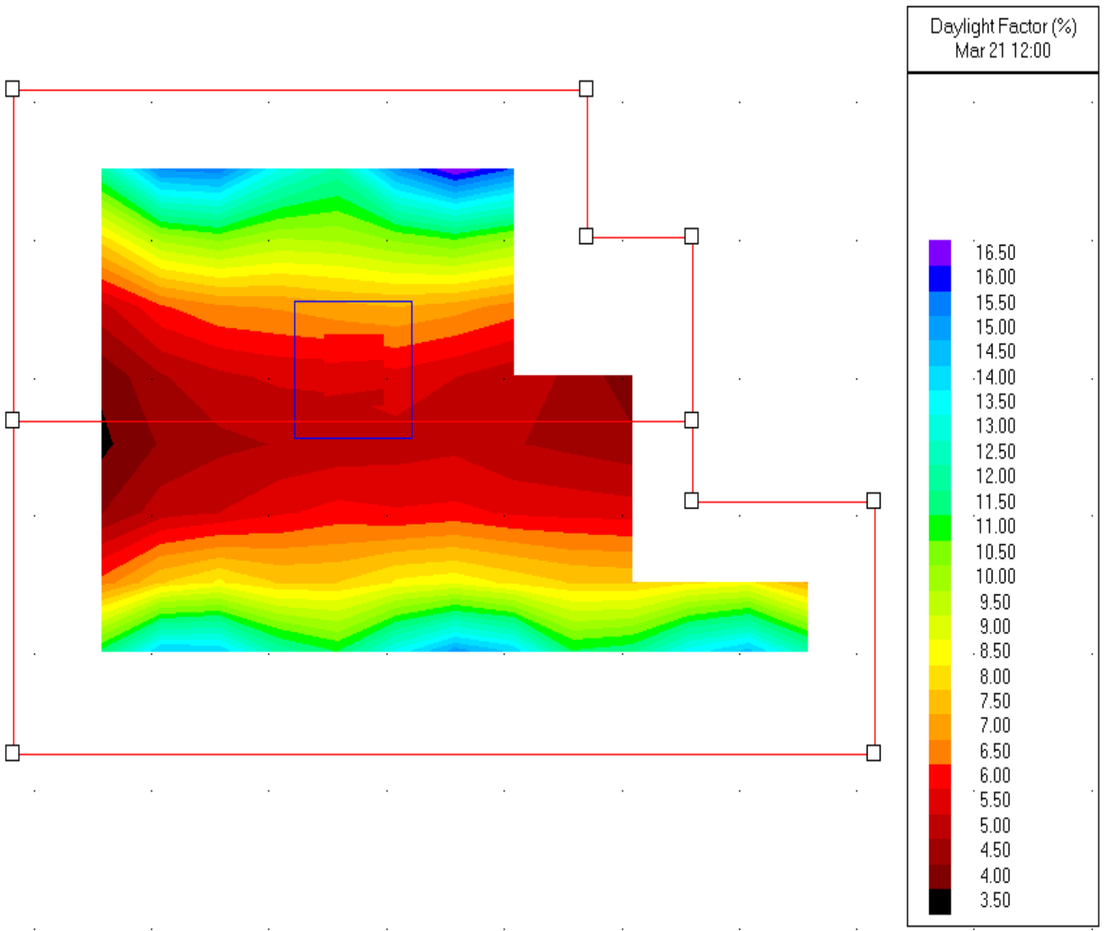
4.5.4 ROOM FL00000A (FLAT 3_BEDROOM)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=8.717m² Margin=0.50 m	Daylight factor	4.0 %	9.1 %	17.2 %	0.44	0.23
	Daylight illuminance	465.36 lux	1065.67 lux	2007.20 lux	0.44	0.23
	Sky view	1.00	1.00	1.00	1.00	1.00



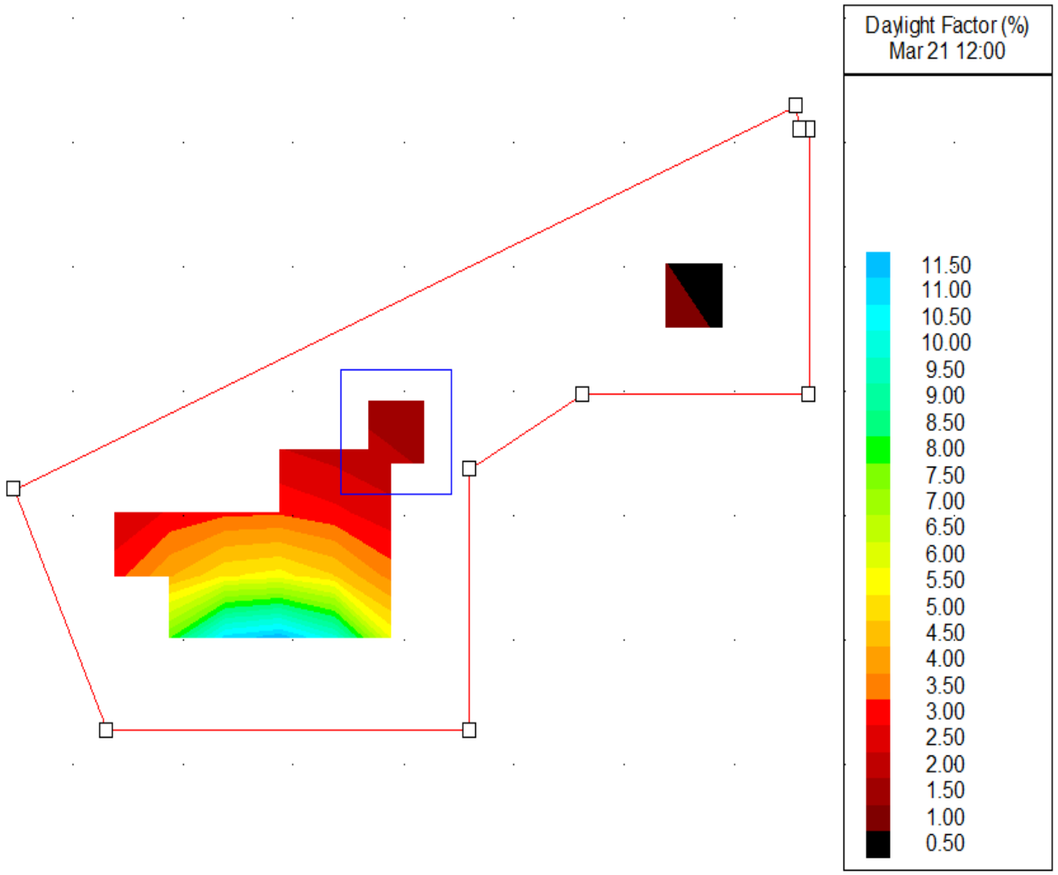
4.5.5 ROOM FL000009 (FLAT 3_LIVING/DINING/KITCHEN)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=18.576m² Margin=0.50 m	Daylight factor	3.9 %	8.6 %	16.9 %	0.45	0.23
	Daylight illuminance	451.09 lux	1003.45 lux	1982.10 lux	0.45	0.23
	Sky view	1.00	1.00	1.00	1.00	1.00



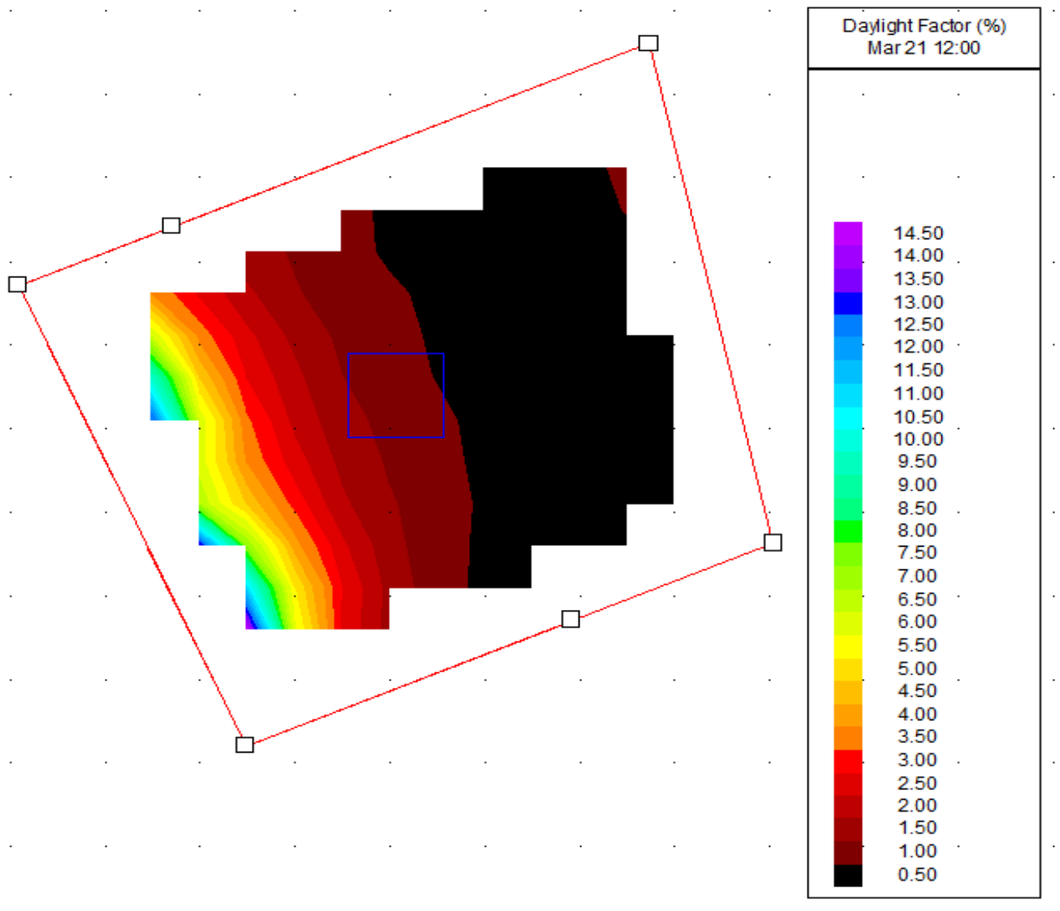
4.5.6 ROOM FL00000D (FLAT 4_BEDROOM)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=7.026m² Margin=0.50 m	Daylight factor	0.8 %	3.8 %	11.8 %	0.21	0.07
	Daylight illuminance	93.51 lux	444.65 lux	1377.20 lux	0.21	0.07
	Sky view	0.00	0.90	1.00	0.00	0.00



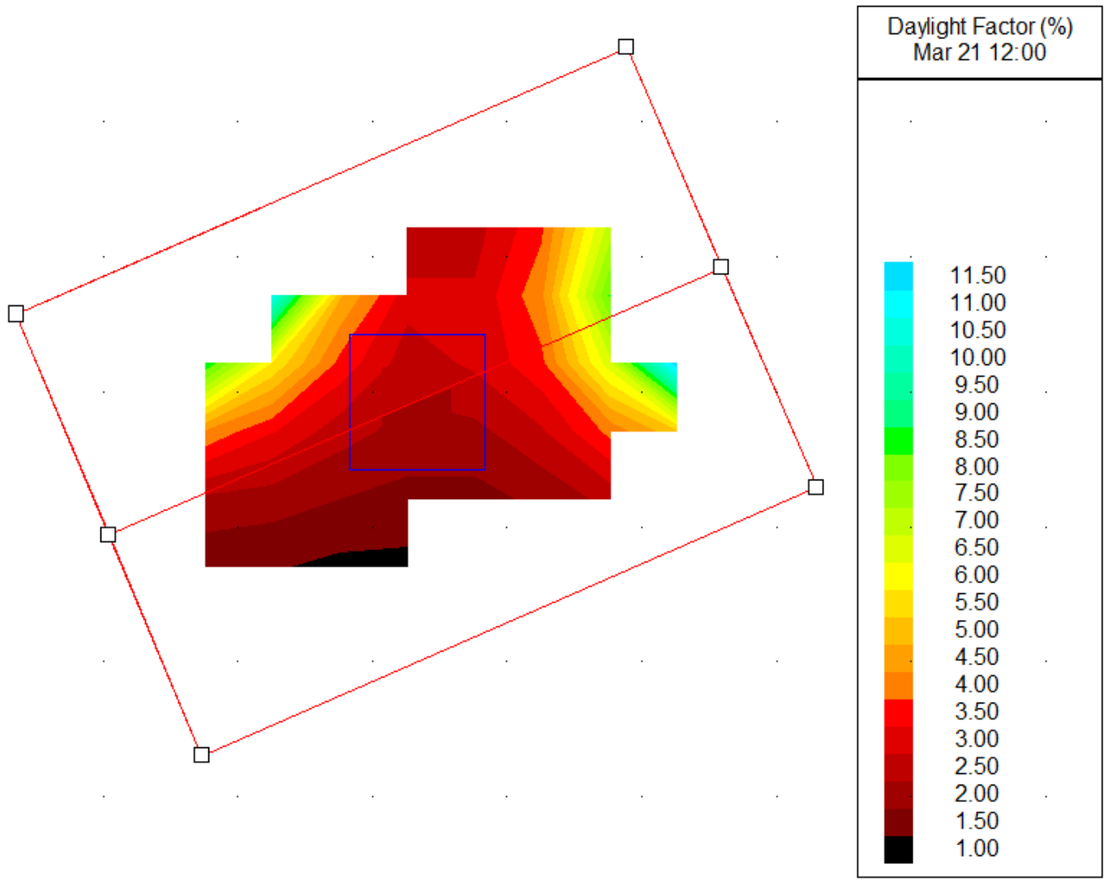
4.5.7 ROOM FL000004 (FLAT 5_LIVING/DINING/KITCHEN)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=28.302m² Margin=0.50 m	Daylight factor	0.5 %	2.3 %	14.7 %	0.23	0.04
	Daylight illuminance	61.68 lux	273.95 lux	1722.98 lux	0.23	0.04
	Sky view	1.00	1.00	1.00	1.00	1.00



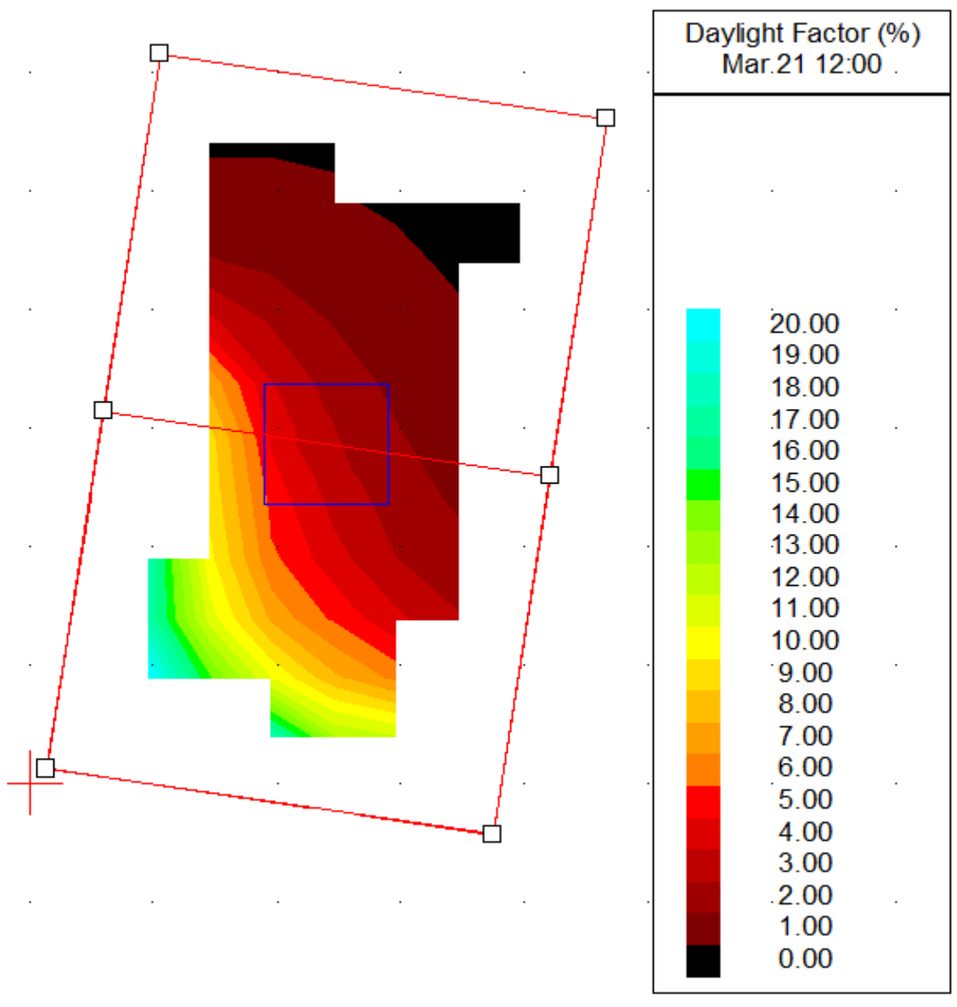
4.5.8 ROOM FL000011 (FLAT 5_BEDROOM)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=10.104m² Margin=0.50 m	Daylight factor	1.1 %	4.1 %	11.9 %	0.27	0.09
	Daylight illuminance	128.73 lux	473.99 lux	1388.58 lux	0.27	0.09
	Sky view	1.00	1.00	1.00	1.00	1.00



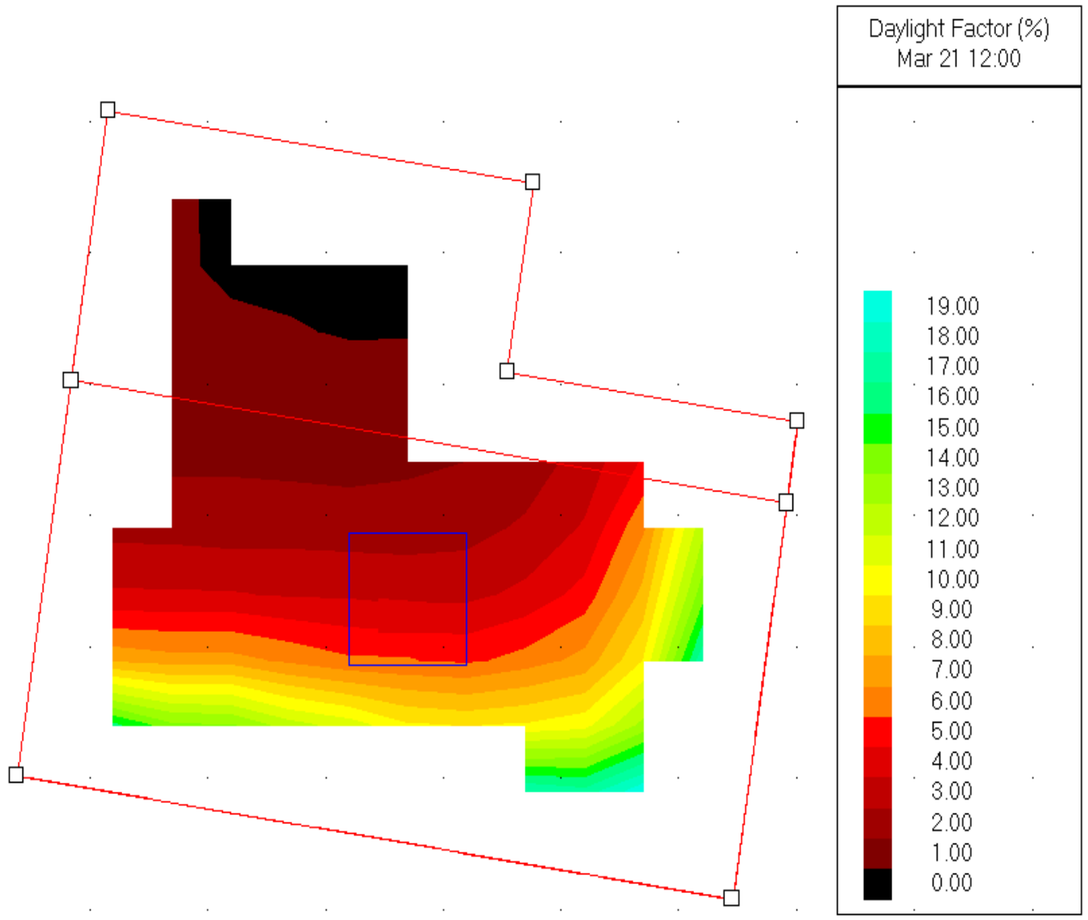
4.5.9 ROOM FL000001 (FLAT 1_BEDROOM 1)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=13.514m² Margin=0.50 m	Daylight factor	0.7 %	5.2 %	20.9 %	0.12	0.03
	Daylight illuminance	76.17 lux	613.54 lux	2442.69 lux	0.12	0.03
	Sky view	1.00	1.00	1.00	1.00	1.00



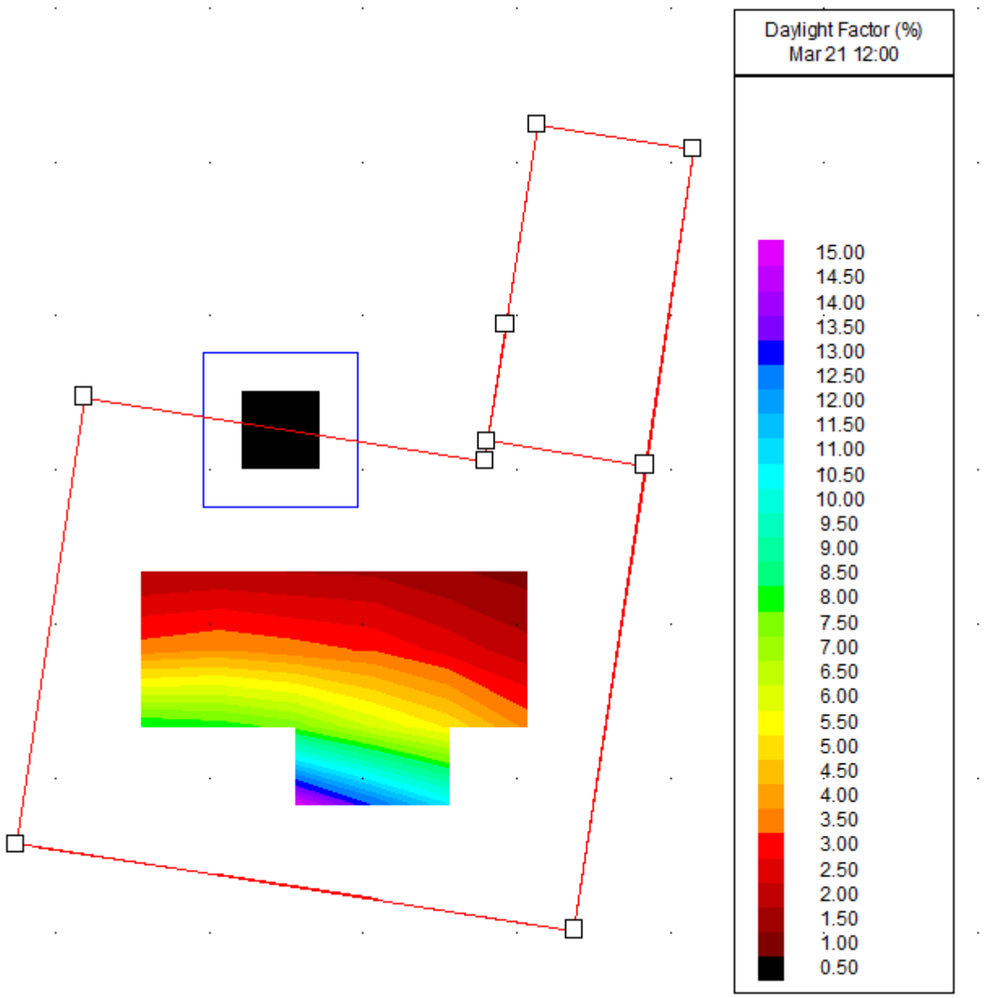
4.5.10 ROOM FL000013 (FLAT 1_LIVING/DINING/KITCHEN)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=17.621m² Margin=0.50 m	Daylight factor	0.9 %	5.7 %	19.7 %	0.15	0.04
	Daylight illuminance	101.67 lux	667.53 lux	2301.20 lux	0.15	0.04
	Sky view	1.00	1.00	1.00	1.00	1.00



4.5.11 ROOM FL000015 (FLAT 1_BEDROOM 2)

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=5.212m² Margin=0.50 m	Daylight factor	1.3 %	5.2 %	15.3 %	0.25	0.09
	Daylight illuminance	153.46 lux	612.09 lux	1783.60 lux	0.25	0.09
	Sky view	1.00	1.00	1.00	1.00	1.00



5. CONCLUSION

This daylight/sunlight assessment has been prepared to support the planning application for the proposed development at 1 High Street, Hampton Hill, TW12 1NA. The site is located under the jurisdiction of the London Borough of Richmond upon Thames. This assessment has been produced based on planning drawings provided by 'Husband & Partners Architects'.

The existing rear buildings were used for office purposes and the applicant wants to convert them into residential units x 5 Nos by altering the internal layout of the existing rear buildings. The applicant wishes to calculate the internal daylight for each habitable room for the newly proposed residential units.

The primary purpose of this daylight/sunlight study is to determine the Average Daylight Factor for each habitable room and compare these results with the minimum standards of BS 8206-2008 Part 2 Code of Practice for Daylighting. Building modelling was carried out using the IES VE software and daylighting analysis was carried out using the FlucsDL module in the IES VE software.

The achieved Average Daylight Factor (ADF) for the habitable rooms is greater than that of the Target Daylight Factor. **Hence, all the habitable rooms of the proposed unit have been passed the BRE Average Daylight Factor compliance. Therefore, the proposed development is fully BRE compliant in terms of daylight access.**