TOURNAY GODFREY LTD
BUILDING SERVICES ENGINEERS

J1111 // HEATHFIELD YOUTH CENTRE

DAYLIGHT MODELLING REPORT

DECEMBER 2023

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Report History

Issue number	Suitability	Date	Details
P01	S1	28/11/2023	For Comment
P02	S2	15/12/2023	For Comment

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1. EXECUTIVE SUMMARY

Tournay-Godfrey ltd have conducted a daylight modelling assessment for the proposed Stage 4 Heathfield Youth Centre development.

In order to give context to the result of the assessment, design criteria have been established by referring to the relevant BREEAM criteria for 'visual comfort' (section 2).

The building has been modelled using IES-VE (2023) and simulated using the Radiance component within the software. The geometry of the building has been updated to reflect the latest Revit model provided by LRA-retinue (section 3).

The results have been presented (section 4) with mitigation techniques suggested for the spaces which fail to meet the design criteria.

The main results show that:

- All spaces provide a sufficient level of daylight (measured by average daylight factor)
- The majority of spaces do not meet the requirements for % area compliant and uniformity ratio, which means that the natural light distribution within most spaces is not at a desirable level. Window size and/or positioning may be reconfigured to improve this result.

2. DESIGN CRITERIA

In lieu of any specific targets for the scheme, **BREEAM** credit *Hea 01 - Visual Comfort* has been utilised as a point of reference for the daylight modelling assessment.

The aim of Hea 01 is to encourage best practice in visual performance and comfort by ensuring daylighting, artificial lighting and occupant controls are considered.

With respect to this assessment, the focus is only on the **daylighting criteria** of the credit. Maximising exposure to natural daylight and providing an external view out provides users with a connection to nature. This can in turn support mental wellbeing, for example by improving people's mood and reducing the symptoms of depression. Increasing the level of daylight within the building also reduces the need for artificial lighting, which can reduce operational costs and environmental impacts of the building. Further to this, naturally lit environments increase occupant productivity and support the regulation of circadian rhythms.

With regards to daylighting, the BREEAM credit Hea 01 – Visual Comfort criteria are as follows:

Building Type	**Average Daylight Factor**	**Minimum % Area to Comply**	**Other Criteria**
Educational Buildings	**2%**	**80%**	A uniformity ratio of at least 0.3 or a minimum point daylight factor of at least 0.3 times the relevant average daylight factor

The **average daylight factor** is the average indoor illuminance (from daylight) on the working plane within a room. This is expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane under an unobstructed 'CIE Standard Overcast Sky'.

3. MODELLING

Daylight Modelling has been carried out using the **Radiance component of IES-VE modelling software** (2023).

3.1. GEOMETRY

The thermal model geometry which has been created as part of the project has been updated as per plans, sections and elevations taken from the latest Revit model and utilised for this assessment.

Model File Number	Issued
231103_2141-LRA-AB-ZZ-M3-A-001-HEATHFIELD YOUTH CENTRE -2023	03 / 11 / 2023

Note: The external shading devices (except canopies) and window recesses have **not** been modelled for the simulation of this assessment and should only be included if deemed necessary by the overheating assessment.

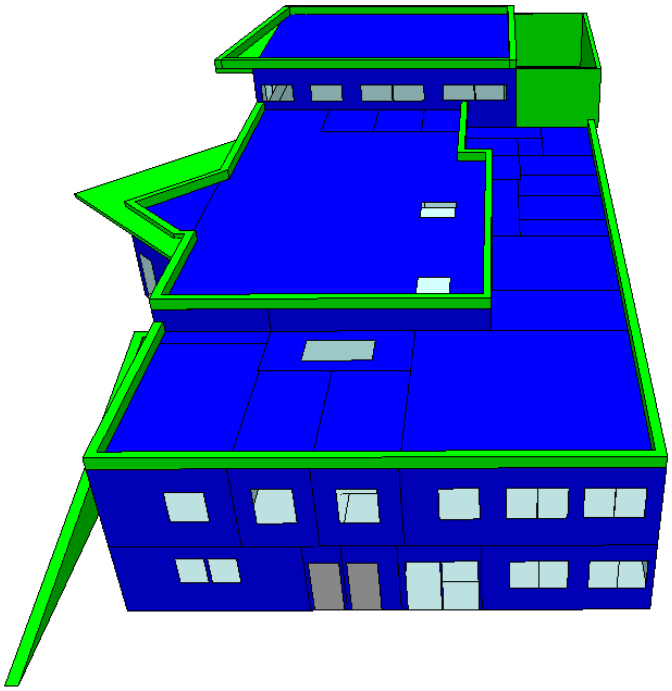


Figure 1: IES-VE Model North View

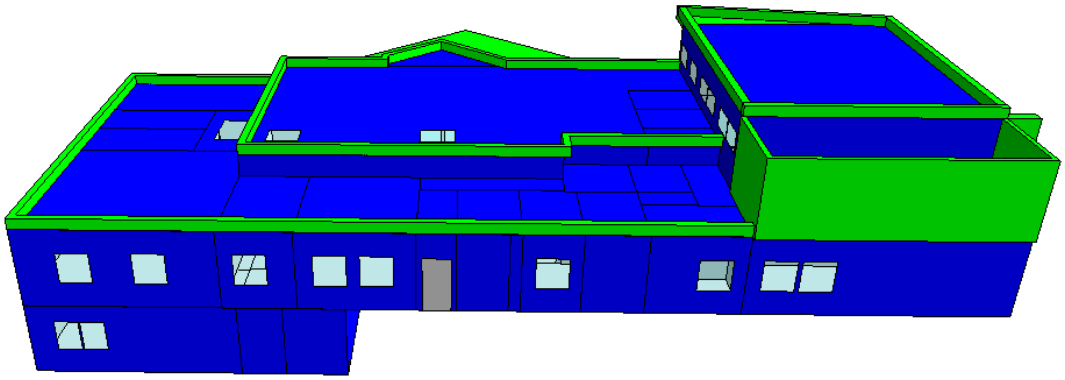


Figure 2: IES Model West View

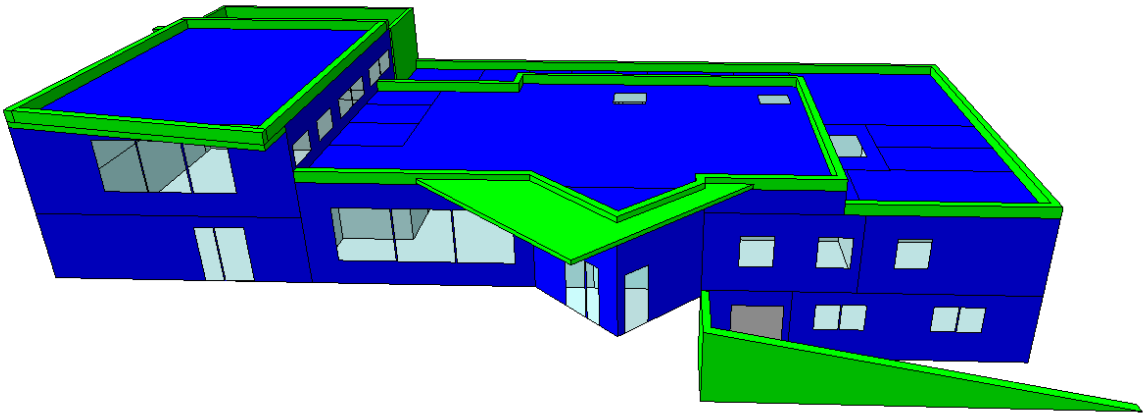


Figure 3: IES Model East View

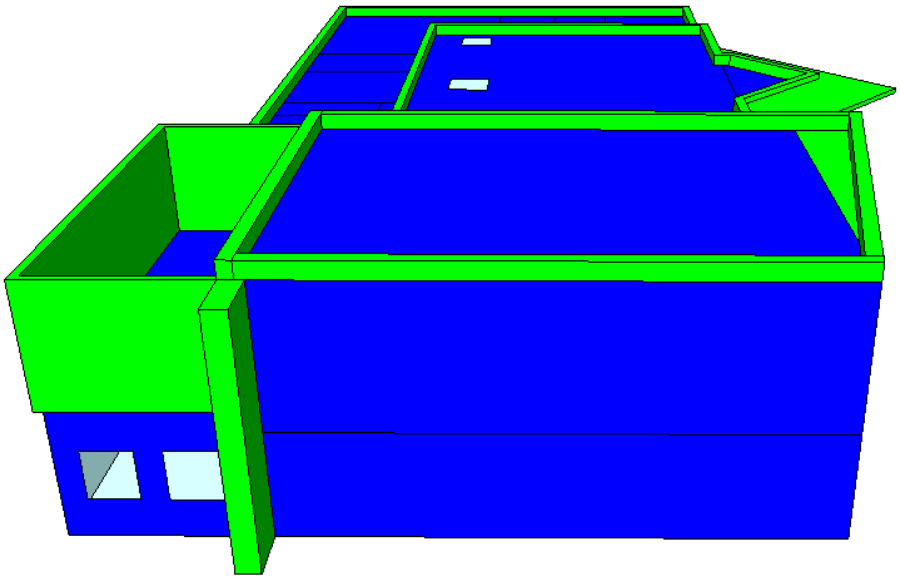


Figure 4: IES Model South View

3.2. INTERNAL BUILDING SURFACES

As the proposed internal building surfaces are as yet undefined, the following default reflectance values have been used for the relevant surfaces in the assessment.

Building Element	Reflectance Value
Internal Walls	0.50
Ceilings	0.70
Floors	0.20

The glazing specification is also as yet unconfirmed and there fore a nominal value has been used for the visible light transmittance from the external windows.

Building Element	Visible Light Transmittance
External Glazing	0.60

Visible light transmittance of the glazing would need to be confirmed during the Stage 4, as this could change the results. The value of 0.6 is a conservative approach and it is expected this would be approved once the final glazing system is confirmed and therefore should improve the results.

3.3. EXTERNAL CONDITIONS

The standard design day for daylight factor calculations is based on the standard *CIE overcast Sky for 21 September at 12:00pm, with a Ground Ambient light level of 11921 Lux.

**CIE being the Commission Internationale de l´Eclairage, or International Commission on Illumination.*

4. RESULTS

Design Criteria:	Average Daylight Factor (%)	% Area Compliant	Uniformity Ratio	Result Comments
	> 2%	*> 80%*	*> 0.30*	
GF.04 Multi Use Suite	2.1	90.9	0.26	All spaces achieves a greater than 2% daylight factor, demonstrating good levels of daylight. Uniformity is generally low and could be improved by repositioning the windows to provide greater spread of light.
GF.05 Fitness Suite	3.2	94.4	0.23	
GF.11 Hot Desk Office	2.6	65.3	0.19	
GF.12 Coffee Bar	2.4	97.5	0.18	
GF.16 1-2-1 Meeting	2.3	58.3	0.18	
GF.15 1-2-1 Meeting	2.4	58.9	0.19	
GF.02 Foyer	2.6	74.7	0.07	
GF.03 Admin Office	2.5	80.6	0.11	
GF.17 Sensory Room	2.0	70.4	0.12	
LFL.03 Music Room	3.6	67.8	0.09	
LFL.02 Art Room	2.0	59.1	0.07	
GF.13 Kitchen	3.3	84.2	0.18	

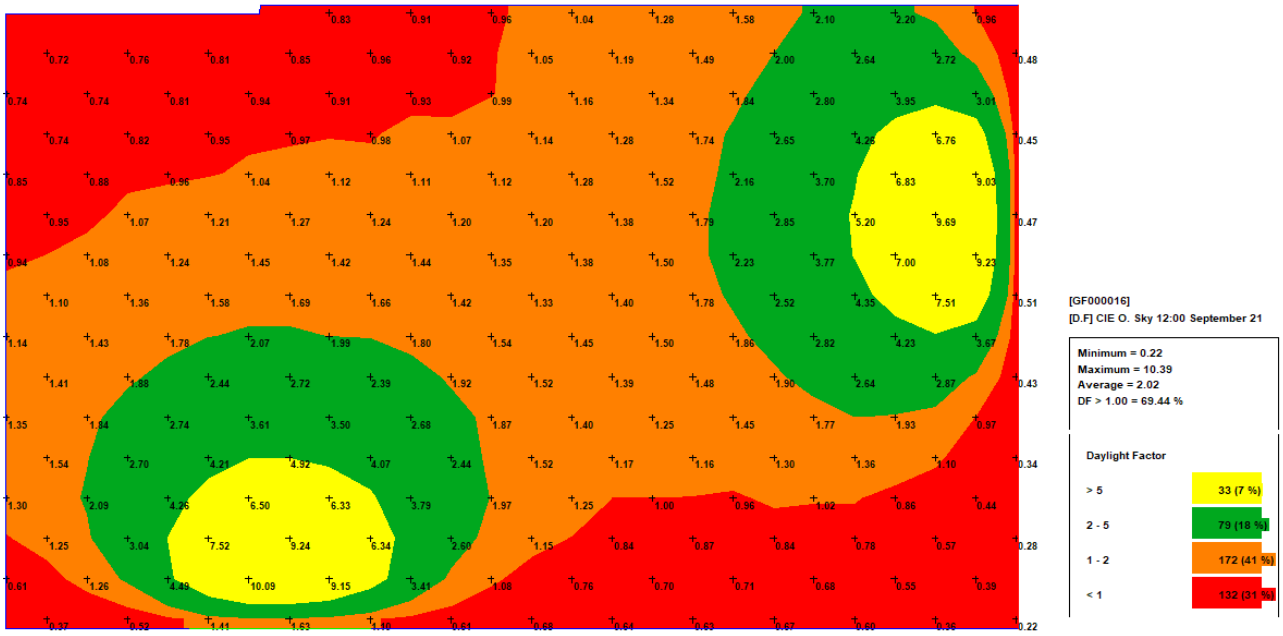
5. CONCLUSION

The results show that for 100% of spaces in the building, the average daylight factor (DF), is at a sufficient level above 2%. This means that these spaces will receive good levels on natural daylight to the space, minimising the need for artificial lighting (reducing operational energy) and promoting visual comfort and the associated benefits this brings.

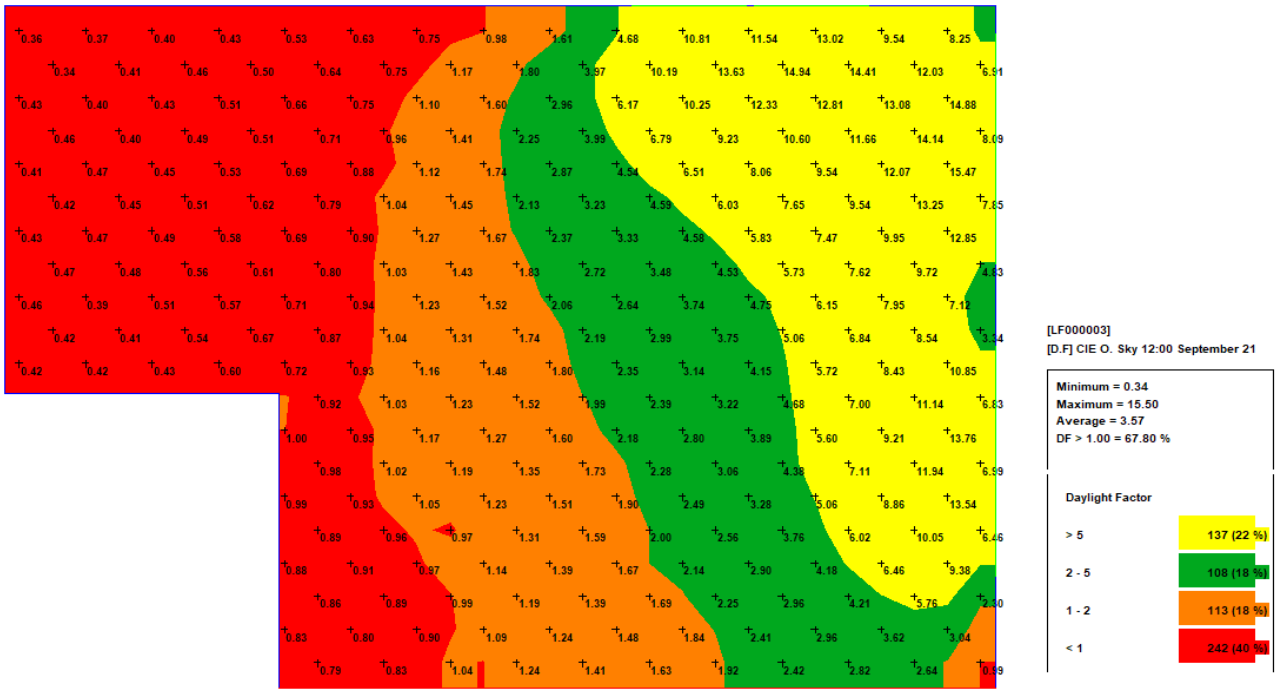
The majority of spaces do not meet the BREEAM Hea 01 credit requirements for % area compliant and uniformity ratio, which means that the natural light distribution within most spaces is not at a desirable level. Window size and/or positioning may be reconfigured to improve this result.

6. APPENDIX: Detailed Results

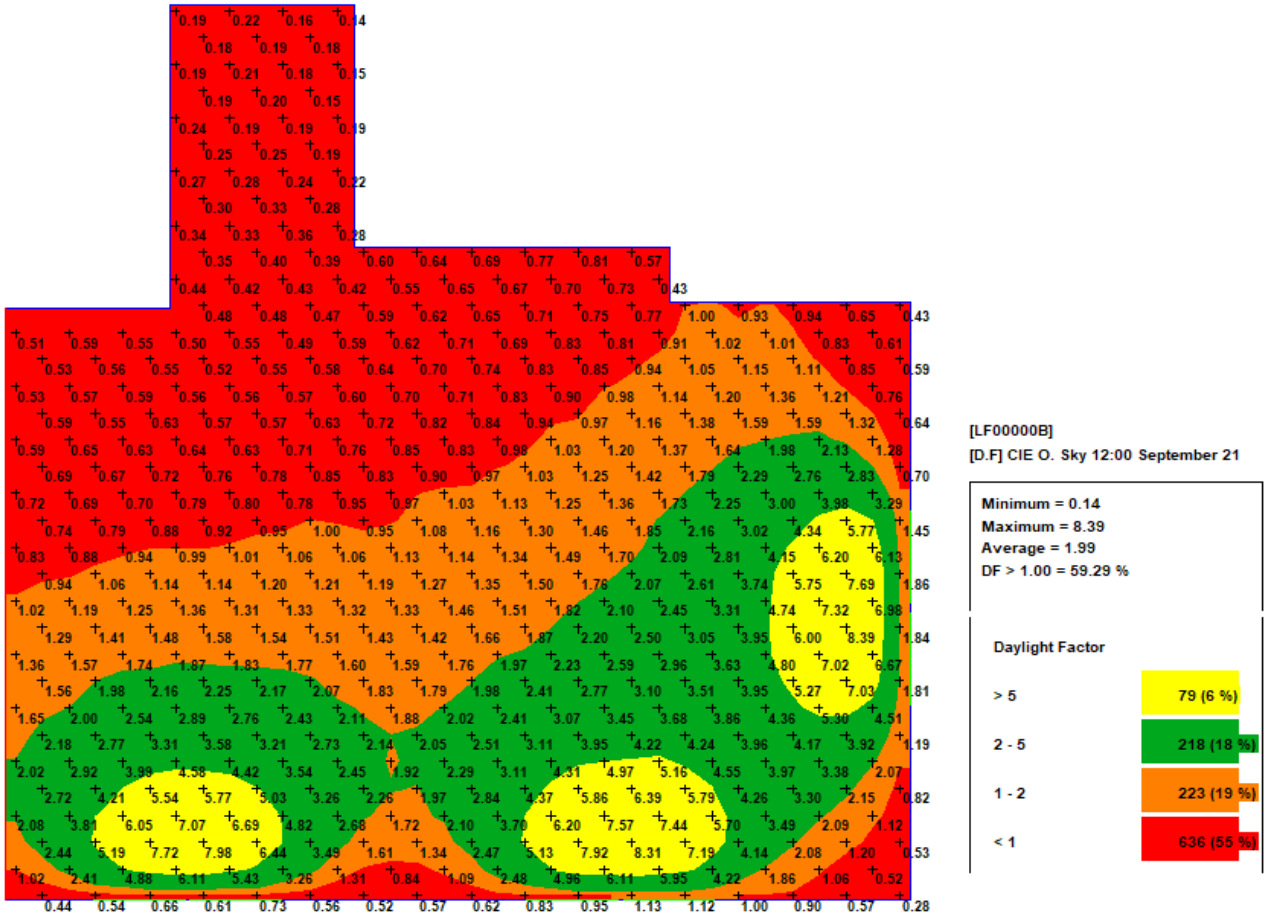
GF.17 Sensory Room



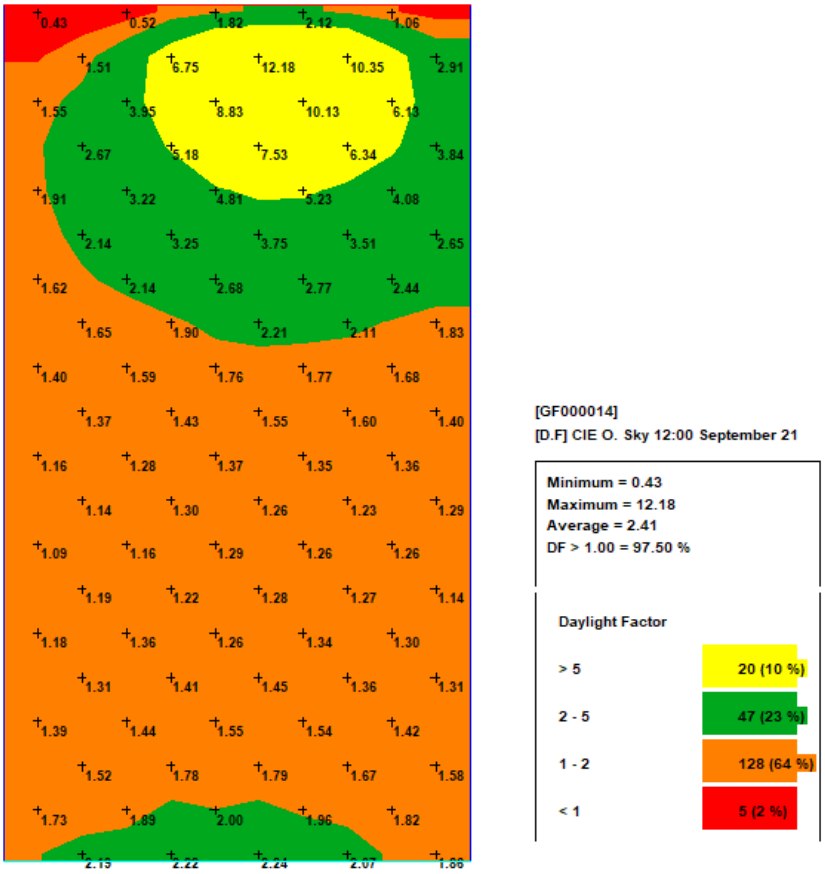
LFL.01 Music Room



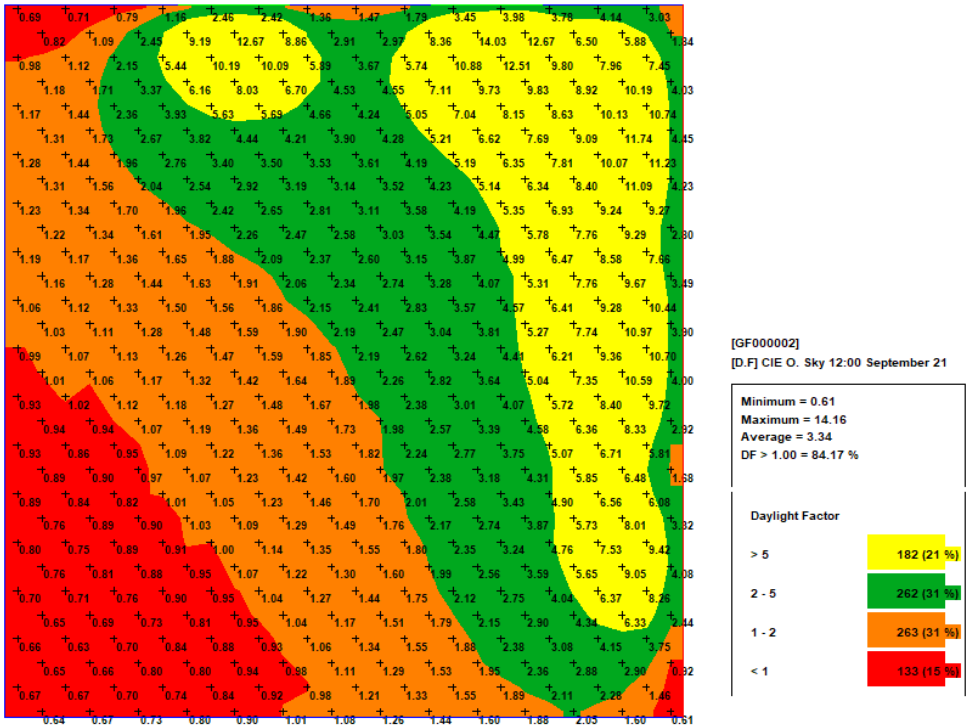
LFL.07 Art Room



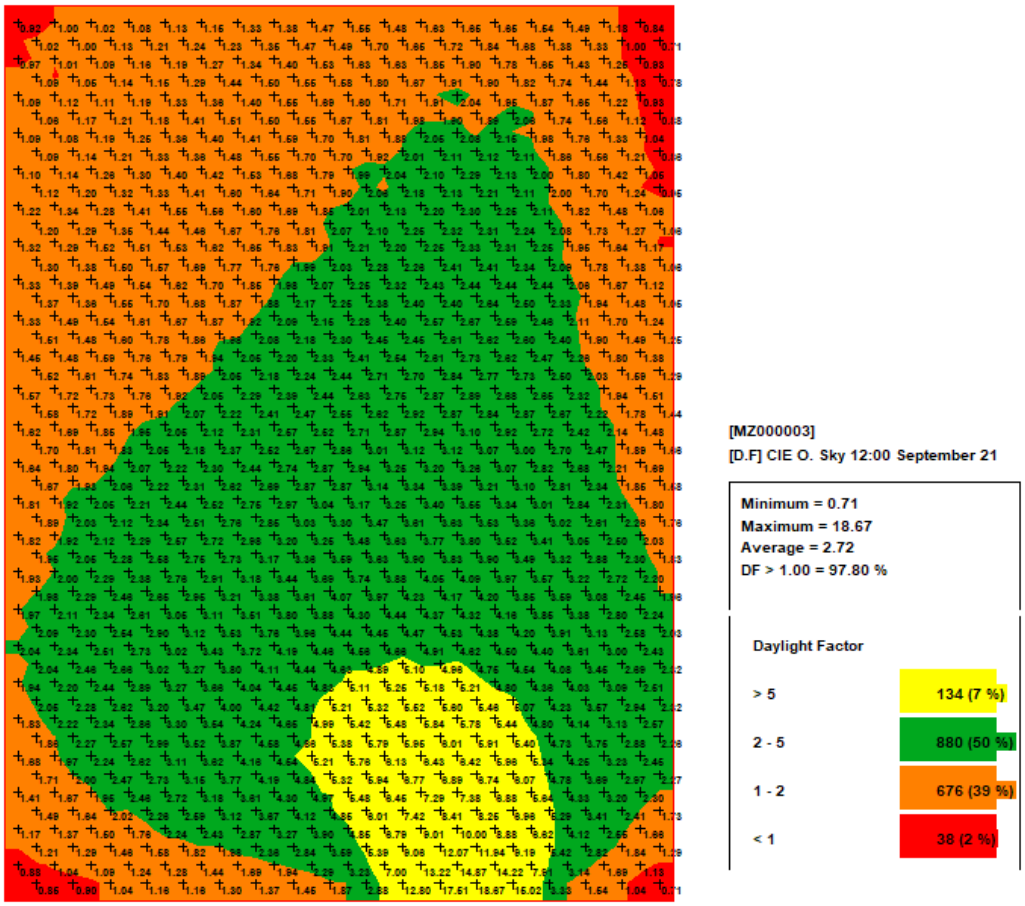
GF.12 Coffee Bar



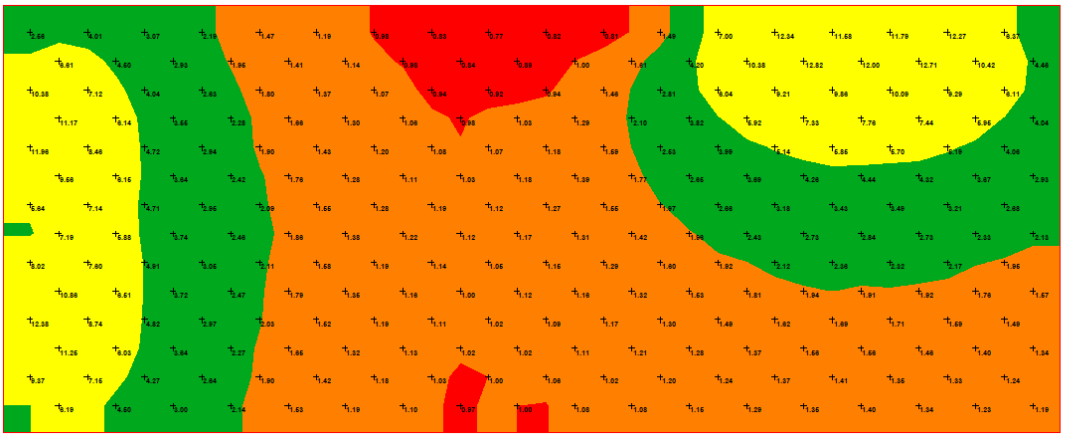
GF.13 Kitchen



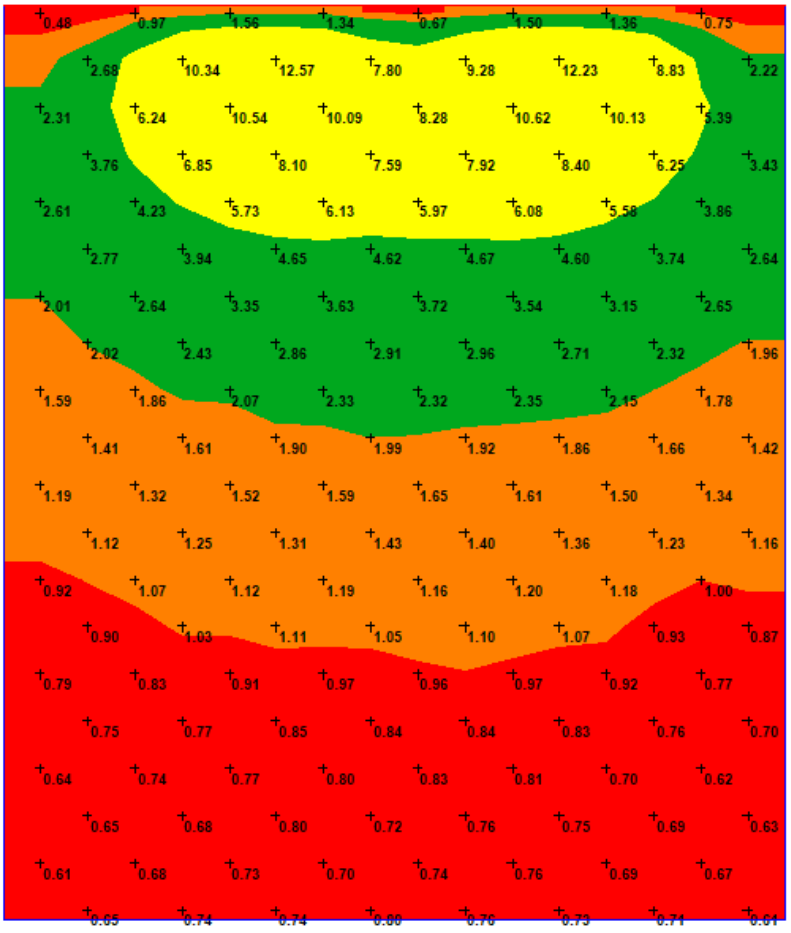
GF.04 Multipurpose Space



GF.05 Fitness Suite



GF.11 Hot Desk



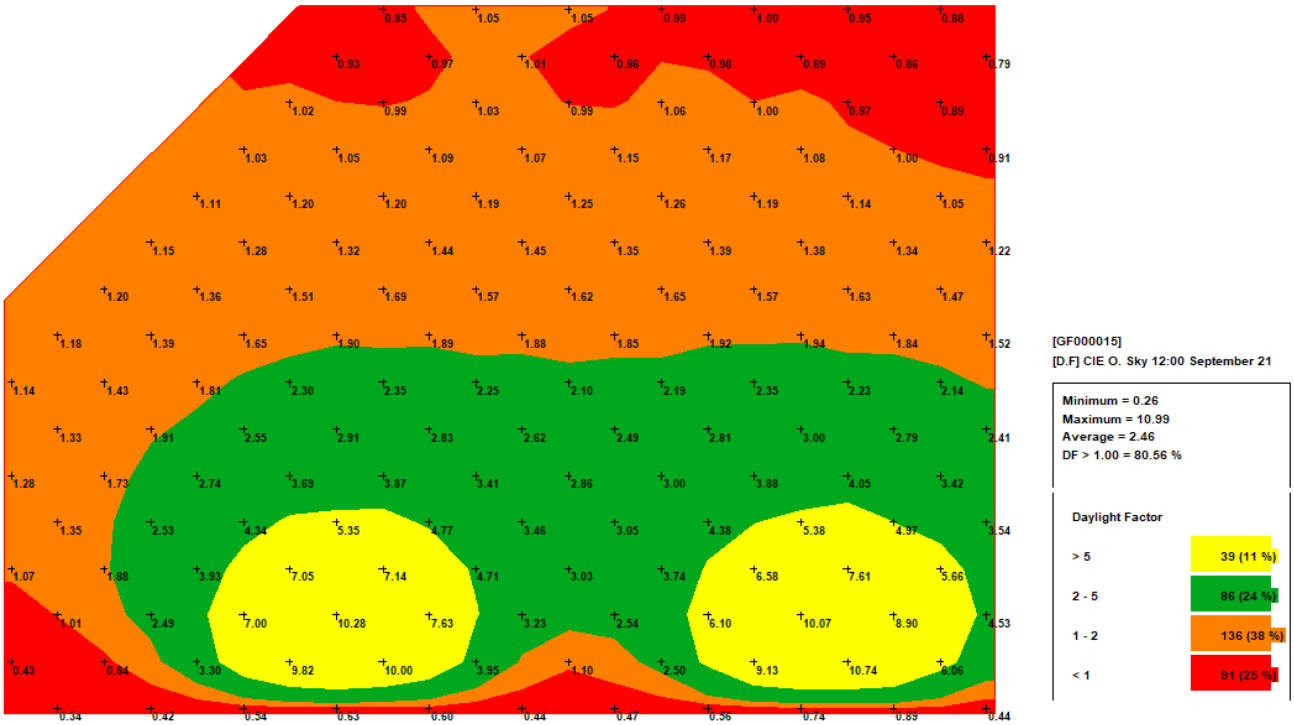
[GF000011]
[D.F] CIE O. Sky 12:00 September 21

Minimum = 0.48
Maximum = 12.57
Average = 2.58
DF > 1.00 = 65.31 %

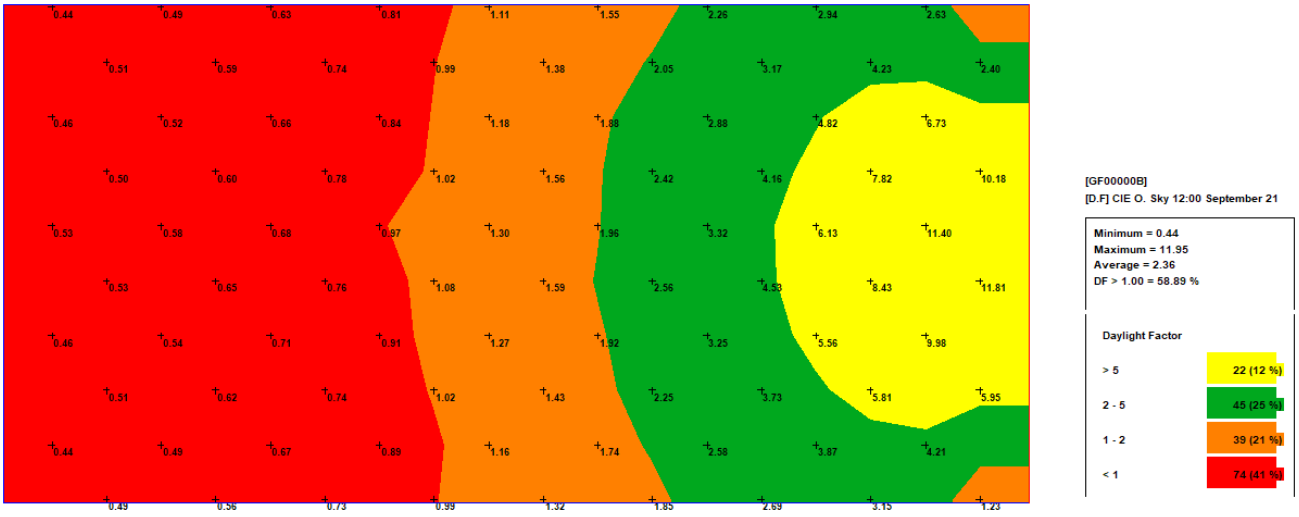
Daylight Factor

> 5	47 (14 %)
2 - 5	72 (22 %)
1 - 2	90 (28 %)
< 1	111 (34 %)

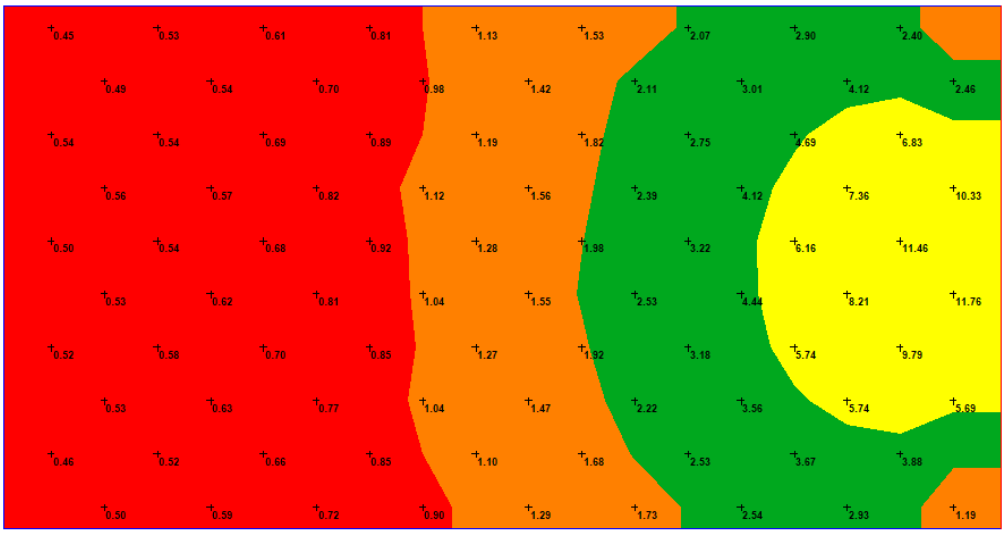
GF.03 Admin Office



GF.15 1-2-1 Meeting



GF.16 1-2-1 Meeting



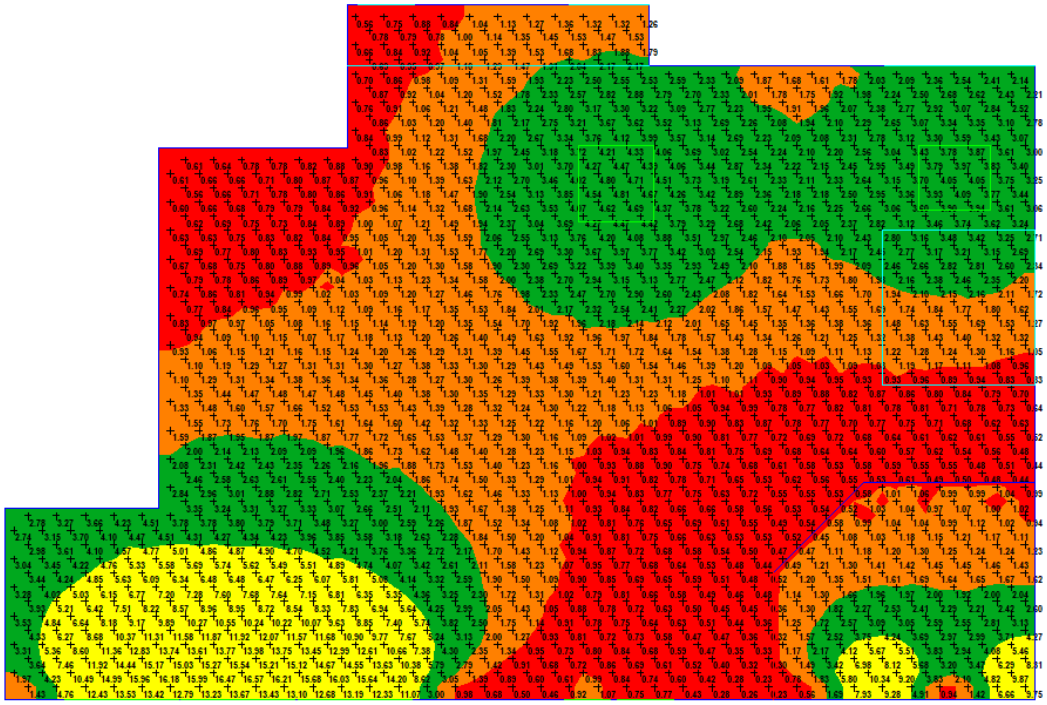
[GF000001]
[D.F] CIE O. Sky 12:00 September 21

Minimum = 0.41
Maximum = 11.81
Average = 2.33
DF > 1.00 = 58.33 %

Daylight Factor

> 5	22 (12 %)
2 - 5	45 (25 %)
1 - 2	38 (21 %)
< 1	75 (41 %)

GF.02 Foyer



[GF00000E]
[D.F] CIE O. Sky 12:00 September 21

Minimum = 0.19
Maximum = 16.57
Average = 2.58
DF > 1.00 = 74.73 %

Daylight Factor

> 5	276 (7 %)
2 - 5	902 (26 %)
1 - 2	939 (27 %)
< 1	1339 (38 %)