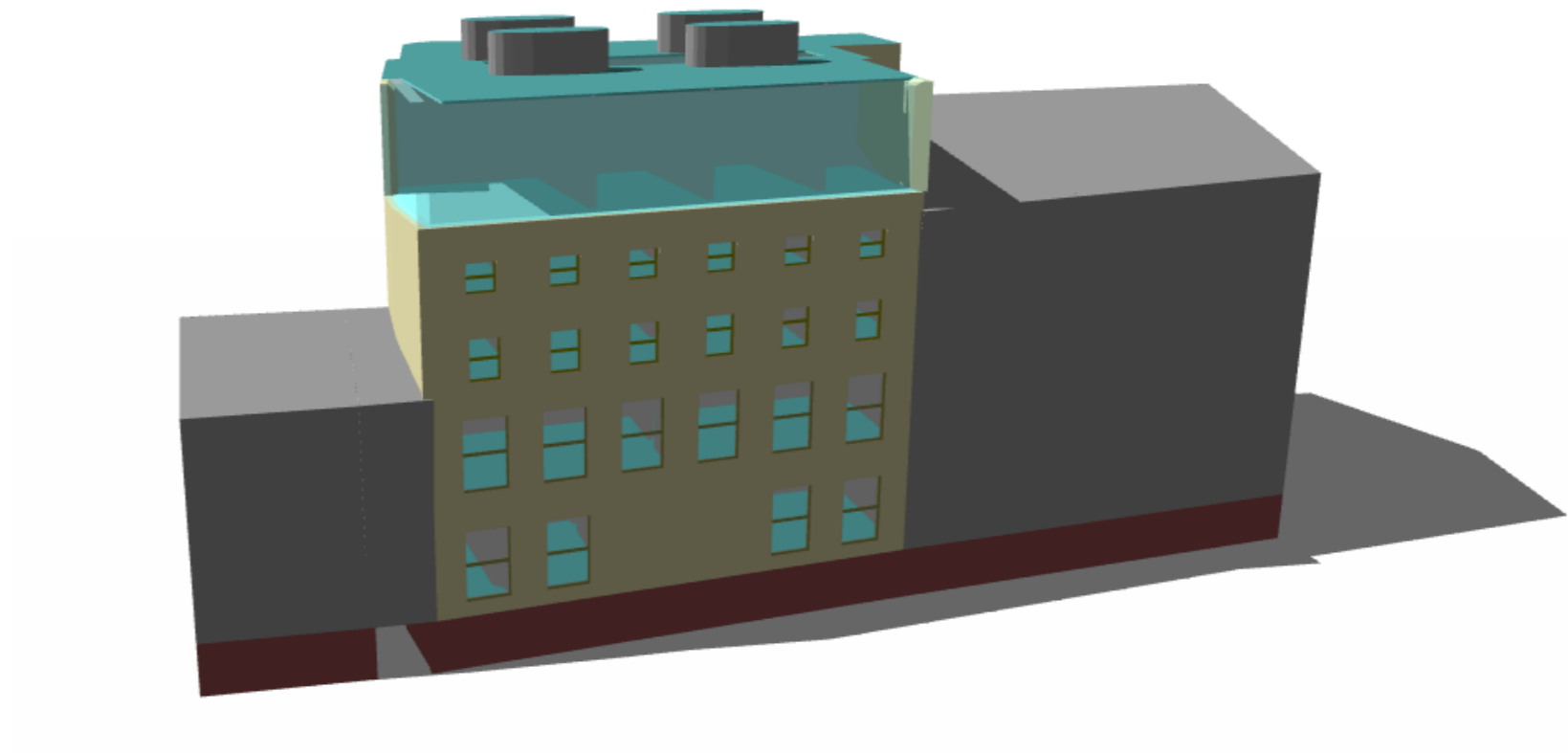


3 & 4  
Great Georges St.  
Waterford



Environmental Analysis Report  
IN2 Project No. A2337  
13/09/2024  
REV00

## Revision History

Date	Revision	Description
13/09/2024	00	Initial issue for review

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## 1.0 Executive Summary

This report compiles the environmental analysis as undertaken by IN2 Engineering Design Partnership for the proposed renovation of 3-4 Great George's Street, Waterford.

Part L of the Building Regulations 2022 requires control of excessive solar gain to minimise use of energy for cooling. The analysis in Section 2.0 describes how a representative energy model was used to assess solar gain in accordance with the requirements of TGD Part L 2022 for the proposed renovation.

All spaces were determined to fully comply with the requirements based on glazing with a solar transmittance (g-value) of  $\leq 0.39$  for the majority of the glazing, with a g-value of  $\leq 0.34$  required for south facing glazing, the details of which are included in Appendix A.

Occupant comfort was assessed in accordance with the adaptive comfort methodology of CIBSE TM52 based on provision of openings through side hung manual opening windows in Section 3.0 for the renovated office spaces throughout the existing building. The predicted performance results and required minimum free opening areas for each occupied space are presented in Appendix B.

A Double Skin Façade design was used to provide cooling and ventilation for the top storey meeting rooms based on provision of openings through high and low openings. The predicted performance results and required minimum free opening areas for each occupied space are presented in Appendix B.

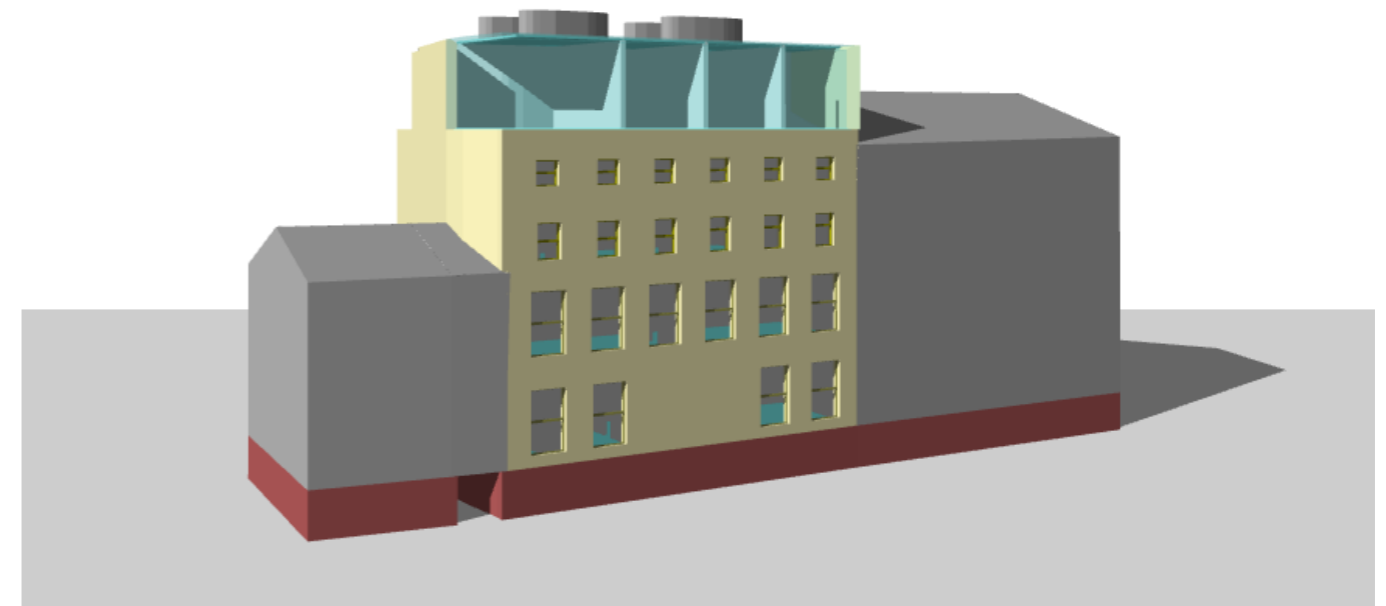


Figure 1.1 – TAS 3D Proposed Renovation at 3-4 Georges Street Waterford

## 2.0 Solar Gain Compliance

### 2.1 Methodology

TGD Part L 2022 of the Building Regulations requires limitation of solar gain through the building fabric to minimise energy required for cooling or enable natural ventilation discomfort as applicable.

Thermal analysis was undertaken as part of a feasibility study for the proposed renovation of 3-4 Great George's Street, Waterford. This involved creating a 3D representational model of the building including its form, materials and constructions, glazing, occupancy profiles and operation (i.e., opening / closing windows / heating system control etc.).

The energy model was constructed to include, internal conditions attributed to each zone specifying values for infiltration, lighting, occupancy, equipment, heating emitter type and space design temperature, based on number of seats illustrated on floor plans or in their absence occupancy based on typical occupant density for the type of space.

The building model was then simulated against representational climate data on an hour-by-hour basis, which includes data for Air Temperature, Relative Humidity, Solar Radiation (Direct and Diffuse) and Wind Speed / Direction.

Using the model, the predicted solar gain throughout the summer period was calculated for each perimeter occupied space within the building and the result compared against the maximum allowable benchmark target as defined within the methodology.

### 2.2 Results

The analysis found all spaces to full comply with the requirements based on glazing with a solar transmittance (g-value) range between 0.34 on the South Façade & Rooftop Glazing, and 0.39. The details of the solar gain analysis are illustrated in Appendix A, demonstrating how compliance was determined throughout.

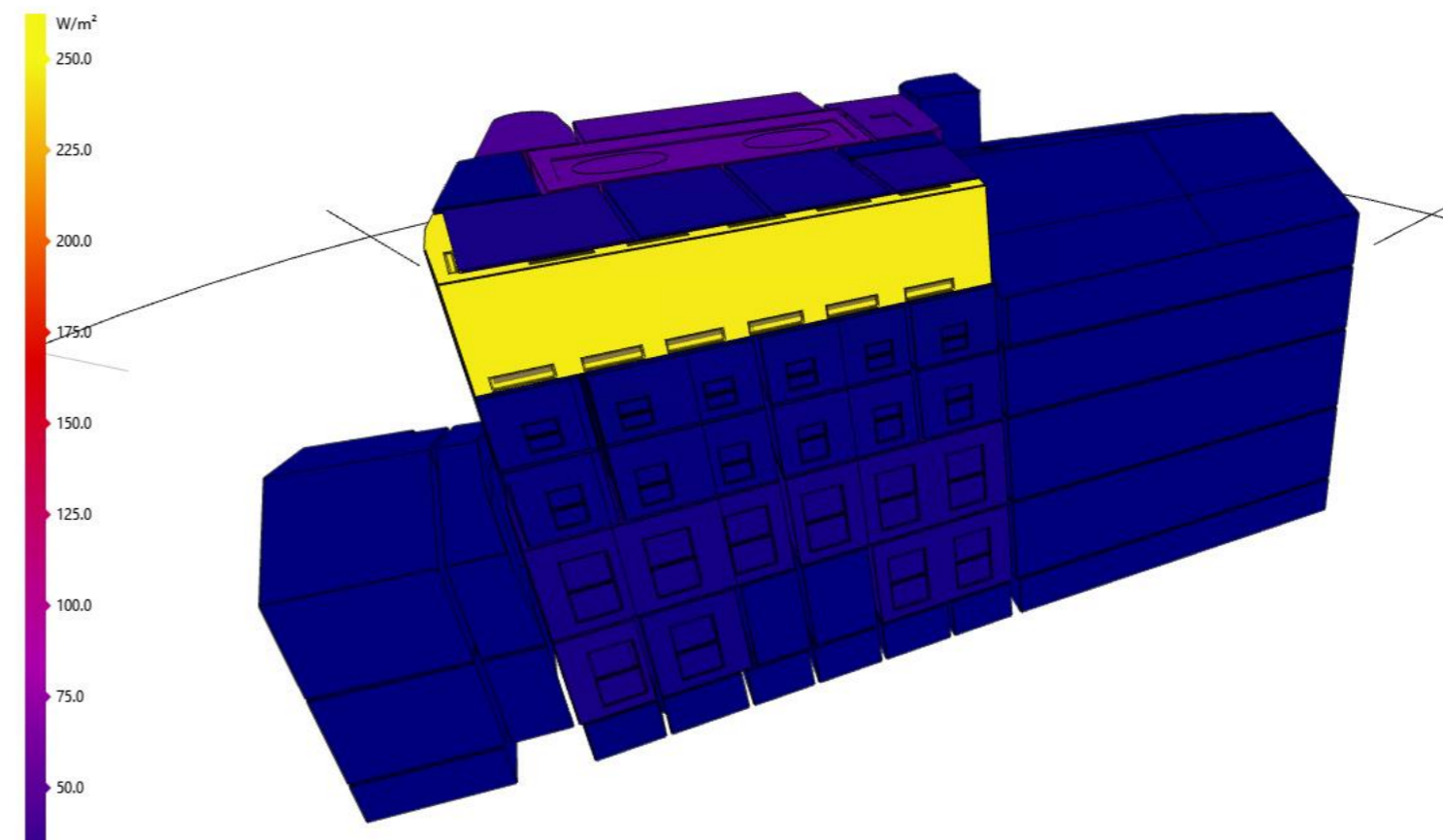


Figure 2.1 - Solar Gain Analysis Model from TAS

## 3.0 Natural Ventilation

### 3.1 CIBSE TM52 – The Limits of Thermal Comfort

TGD Part L 2022 of the Building Regulations requires compliance with CIBSE TM52 for Naturally ventilated buildings.

CIBSE TM52 is an adaptive thermal comfort methodology, in that it acknowledges that people will adapt to higher internal temperatures during continuous warm weather periods. Conversely, it accounts for thermal discomfort that will be experienced during cooler external conditions, or if hotter weather suddenly occurs. The recently released Met Eireann Climate Data for Cork deemed the most suitable for the analysis considering the building location with the temperature profiles illustrated in Figure 3.2.

Instead of having a fixed temperature for compliance (i.e. 25°C), TM52 assess a Comfort Range (T max in Figure 4.2) which varies in accordance with the prevailing external weather conditions. Therefore, higher temperatures in the cooler earlier months (May/ June) and September are penalised more than during July/ August.

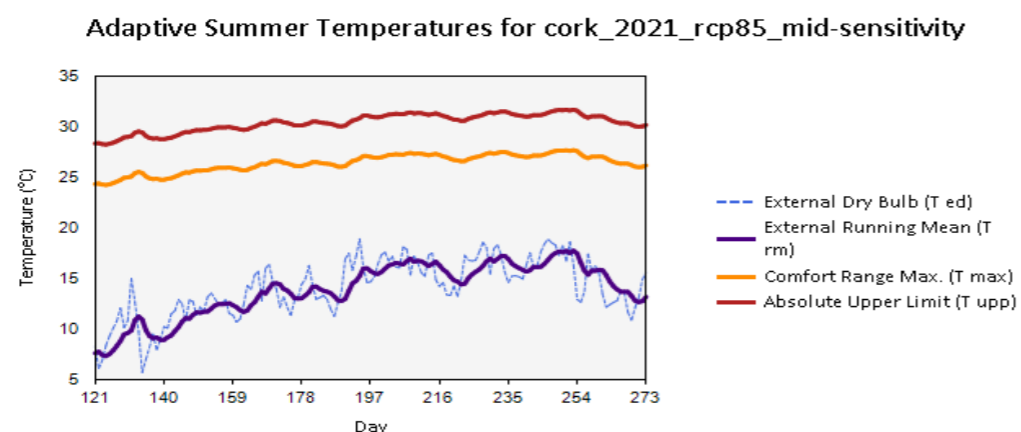


Figure 3.1: Adaptive Summer Temperatures profile from May to September

CIBSE TM52 includes categorisation of comfort in accordance with people’s sensitivity or fragility. Figure 4.2 indicates how differing categories are used depending on this expectation. Category II in CIBSE TM52 is defined as “Normal expectation (for new buildings and renovations)” and was therefore applied to all occupied spaces within the analysis.

The CIBSE TM52 methodology is a comprehensive thermal comfort assessment, in that three sub-criteria are checked for compliance. At least two of these three sub-criteria

must then be demonstrated to be in accordance with the methodology for compliance to be gained. The three sub-criteria are: -

- Summertime Hours adjusting for prevailing weather so that higher temperatures are penalised during colder conditions etc.
- Peak Day: An assessment is made of how hot conditions would be throughout an extreme summer day (measured in degree-hours).
- Peak Hour: An absolute upper peak temperature must not be exceeded at any time of the year.

The assessment methodology therefore accounts for matters of thermal comfort where for example, conditions could be generally warm in a room throughout the year and deemed tolerable, but extreme hot conditions could be experienced on a particular day / hour which may deem natural ventilation unacceptable.

### 3.2 CIBSE TM52 Results

The CIBSE TM52 assessment was undertaken for the proposed renovation of Georges St Waterford and allowing for Category II assessment of this area. It was determined that the space assessed was predicted to provide adaptive comfort in full compliance with CIBSE TM52 for occupied spaces. The results are presented in Appendix B.

It should be noted however that all the requirements of TGD Part F 2019 of the Building Regulations for background and purge ventilation need to be provided as part of the proposed building design.

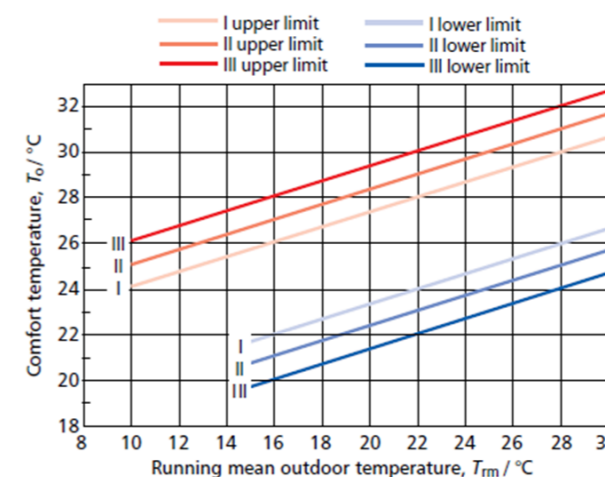


Figure 3.2: Comfort Range Adjustment (CIBSE TM52 Fig. 6)

## 4.0 APPENDIX A

Table A1 – SOLAR GAIN CHECK AND RESULTS

Zone Name	Floor Area (m <sup>2</sup> )	Actual Solar Gain (kWh)	Solar Gain Limit (kWh)	Solar Gain (%)	g-Value Modelled
Entrance Hallway 03	17.97	422.3	697.69	-39.47	0.39
Room 01/Office 01	41.15	843.99	1502.55	-43.83	0.39
Stairwell L00 02	26.20	545.49	2424.31	-77.50	0.39
Reception	28.24	405.15	873.98	-53.64	0.39
Office 01	63.10	1076.11	1383.33	-22.21	0.39
Office 02	35.07	1129.58	1280.09	-11.76	0.39
Office 03	63.43	1270.32	2237.27	-43.22	0.39
Office 04	66.19	1260.93	2223.53	-43.29	0.39
Office 05	34.57	1145.79	1299.14	-11.80	0.39
Office 06	39.07	1146.97	1388.29	-17.38	0.39
Office 07	43.15	1147.7	1496.36	-23.30	0.39
Stairwell L01 02	25.08	550.8	2301.12	-76.06	0.39
WC L02	24.33	147.89	845.56	-82.51	0.39
Office 08	37.54	295.51	1333.91	-77.85	0.39
Office 09	41.60	293.96	1364.97	-78.46	0.39
Office 10	23.73	148.19	1521.77	-90.26	0.39
Office 11	35.55	389.2	1306.87	-70.22	0.39
Office 12	39.18	390.39	1364.20	-71.38	0.39
Office 13	44.07	390.59	1490.40	-73.79	0.39
Stairwell L02 02	26.67	186.14	2400.66	-92.25	0.39
Office 14	37.54	186.25	1333.91	-86.04	0.39
Office 15	41.60	185.95	1364.97	-86.38	0.39
Office 16	23.73	93.33	2493.55	-96.26	0.39
Office 17	35.55	240.29	1306.87	-81.61	0.39
Office 18	39.18	240.43	1364.20	-82.38	0.39
Office 19	44.07	240.78	1490.40	-83.84	0.39
WC L03	24.33	93.28	845.56	-88.97	0.39
Stairwell L03 02	26.67	115.15	2400.66	-95.20	0.39
Meeting Room 1	26.33	342.79	885.12	-61.27	0.34
Meeting Room 2	26.85	342.97	902.56	-62.00	0.34
Meeting Room 3	32.40	870.12	1071.14	-18.77	0.34
Meeting Room 4	32.43	2377.69	2892.85	-17.81	0.34
Lift Lobby Roof	16.13	48.77	596.29	-91.82	0.34
Stairwell Roof 01	17.49	1376.94	2358.96	-41.63	0.34
Stairwell Roof 02	18.50	774.54	862.43	-10.19	0.34
Landing	65.00	1386.48	2174.48	-36.24	0.34
Roof WC	15.65	247.12	559.11	-55.80	0.34

## 5.0 APPENDIX B

Table B1 - REQUIRED FREE OPEN AREAS ASSESSED & TM52

Table B.1 - Adaptive Overheating CIBSE TM52																
Zone Criteria			Assumptions					Requirements			Performance					
Zone Name	Orientation	Room Type	Occupants	Diversity	Sensible Gain (W/m <sup>2</sup> )	Lighting Gain (W/m <sup>2</sup> )	Equipment Gain (W/m <sup>2</sup> )	Floor Area (m <sup>2</sup> )	Free Open Area (m <sup>2</sup> )	FOA % of Floor Area	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: Number of Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: Number of Hours Exceeding Absolute Limit	Result
Room 01/Office 01	NE / NW	Office Space	2	SCHEDULE 08:00-18:00	4	7	1	41.1	2.11	5.1%	1308	39	0	0	0	Pass
WC L02	Internal	Office Space	1	SCHEDULE 08:00-18:00	6	7	1	24.3	0.36	1.5%	1090	32	0	0	0	Pass
Office 08	Internal	Office Space	1	SCHEDULE 08:00-18:00	4	7	1	37.5	0.73	1.9%	1308	39	0	0	0	Pass
Office 11	S	Office Space	2	SCHEDULE 08:00-18:00	4	7	1	35.5	0.74	2.1%	1308	39	0	0	0	Pass
Office 12	S	Office Space	1	SCHEDULE 08:00-18:00	4	7	1	39.2	0.73	1.9%	1308	39	0	0	0	Pass
Office 13	S	Office Space	1	SCHEDULE 08:00-18:00	4	7	1	44.1	0.73	1.6%	1308	39	0	0	0	Pass
Office 14	Internal	Office Space	1	SCHEDULE 08:00-18:00	4	7	1	37.5	0.47	1.2%	1308	39	0	0	0	Pass
Office 15	Internal	Office Space	2	SCHEDULE 08:00-18:00	4	7	1	41.6	0.47	1.1%	1308	39	0	0	0	Pass
Office 16	Internal	Office Space	3	SCHEDULE 08:00-18:00	4	7	1	23.7	0.23	1.0%	1308	39	0	0	0	Pass
Office 17	S	Office Space	1	SCHEDULE 08:00-18:00	4	7	1	35.5	0.47	1.3%	1308	39	0	0	0	Pass
Office 18	S	Office Space	3	SCHEDULE 08:00-18:00	4	7	1	39.2	0.47	1.2%	1308	39	0	0	0	Pass
Office 19	S	Office Space	2	SCHEDULE 08:00-18:00	4	7	1	44.1	0.47	1.1%	1308	39	0	0	0	Pass
WC L03	Internal	Office Space	2	SCHEDULE 08:00-18:00	2	7	1	24.3	0.23	1.0%	1090	32	0	0	0	Pass
Landing	n/a	Office Space	4.4482218	SCHEDULE 08:00-18:00	2	7	1	65	6.496	0.0999385	1308	39	0	0	0	Pass
Meeting Room 1	Internal	Office Space	4	SCHEDULE 08:00-18:00	20	7	1	26.3	DOUBLE SKIN FACADE		1308	39	0	0	0	Pass
Meeting Room 2	Internal	Office Space	2	SCHEDULE 08:00-18:00	20	7	1	26.9	DOUBLE SKIN FACADE		1308	39	0	0	0	Pass
Meeting Room 3	Internal	Office Space	6	SCHEDULE 08:00-18:00	20	7	1	32.4	DOUBLE SKIN FACADE		1308	39	4	3	0	Pass
Roof WC	Internal	Office Space	1	SCHEDULE 08:00-18:00	6	7	1	15.6	DOUBLE SKIN FACADE		1090	32	0	0	0	Pass
Double Skin Facade	E	Office Space	2	SCHEDULE 08:00-18:00	2	7	1	16.6	2.28	13.7%	0	0	0	0	0	Pass
Meeting Room 4	S	Office Space	5.8320834	SCHEDULE 08:00-18:00	20	7	1	32.4	2.85	8.8%	1308	39	0	0	0	Pass