Overheating Analysis – TM 59 & TM52

For

North King Street Student Accommodation

At

139-149 North King Street, Dublin 7

For

Ringline Investments Limited

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Document History

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Executive Summary

An overheating analysis has been carried out by Axiseng for the proposed student accommodation at 139-149 North King Street, Dublin 7. While CIBSE TM59 is required for residential buildings and CIBSE TM52 is required for non-residential, this development falls between both standards due to the shared spaces and landlord areas throughout the building. As such, this analysis includes a hybrid approach to assessments for both CIBSE TM59 and CIBSE TM52 based on room type.

CIBSE TM59 and TM52 are both referenced within TGD Part L 2022 as official guidance to assess any overheating risks in domestic and commercial applications.

The CIBSE TM59 methodology outlines two criteria which residential rooms should pass:

- Criteria A - For living rooms, kitchens, and bedrooms: the number of hours where the difference between the operative temperature and maximum acceptable temperature is greater than or equal to one degree (K) shall not be more than 3 percent of occupied hours during the summer months.

- Criteria B - For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours. (Note: 1% of the annual hours between 10 pm to 7 am is 32 hours)

CIBSE TM52 establishes criteria for evaluating overheating in normally occupied, naturally ventilated spaces of non-residential buildings.

- Criteria 1 requires that naturally ventilated spaces do not exceed the maximum comfortable temperature by more than 1 degree Celsius for more than 3% of occupied hours.

- Criteria 2 limits the amount of overheating allowed in a single day, with a weighted measure that accounts for degrees and hours of overheating.

- Criteria 3 sets a hard limit for maximum operative temperature. No space can exceed the maximum comfortable temperature by more than 4°C.

From discussions with the design team, it was confirmed that bedroom window openings would have adequate security measures to allow occupants to open windows past 10pm in situations where internal temperatures may become uncomfortable. Window openings are generally provided by louvred screen except in some cases within the protected structure at ground and first floor level.

The shared kitchen/living spaces throughout the building required a combination of measures to avoid overheating in line with TM52. These are detailed within the report but include the addition of blinds and introducing mechanical ventilation, where required.

CIBSE TM59 states that if blinds are used within the thermal analysis, then the results with and without blinds should be included for information purposes. A summary of these results can be found in the tables on the following page with the full results found in Appendix A, B and C.

Manchester 2020s DSY 1 Weather File – Bedrooms TM59				
TM59 Results				
Room	Passing Criteria A	Passing Criteria B	Failing	% Passing
Bedrooms (QTY 299)	299	299	0	100%
Studios (QTY 62)	62	62	0	100%

North King Street – Overheating Occupied Rooms (no blinds) TM52				
TM52 Criterion (58 Rooms)	Criteria 1	Criteria 2	Criteria 3	Failing 2+ criterion
Qty of Occupied Rooms Failing	6	38	0	6

North King Street – Overheating Occupied Rooms (with blinds) TM52				
TM52 Criterion (58 Rooms)	Criteria 1	Criteria 2	Criteria 3	Failing 2+ criterion
Qty of Occupied Rooms Failing	0	13	0	0

Abbreviations

Abbreviation	Explanation
DSY	Design Summer Year
iSBEM	Interface for Simplified Building Energy Model
TM59	CIBSE Technical Memorandum 59
TM52	CIBSE Technical Memorandum 52

1. Introduction

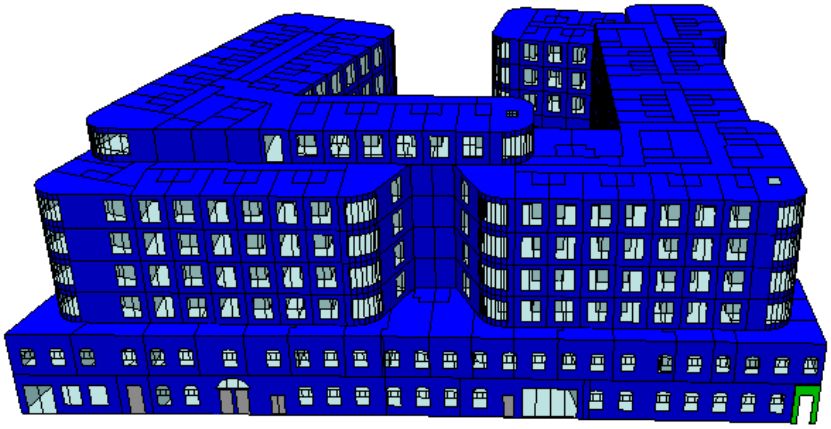
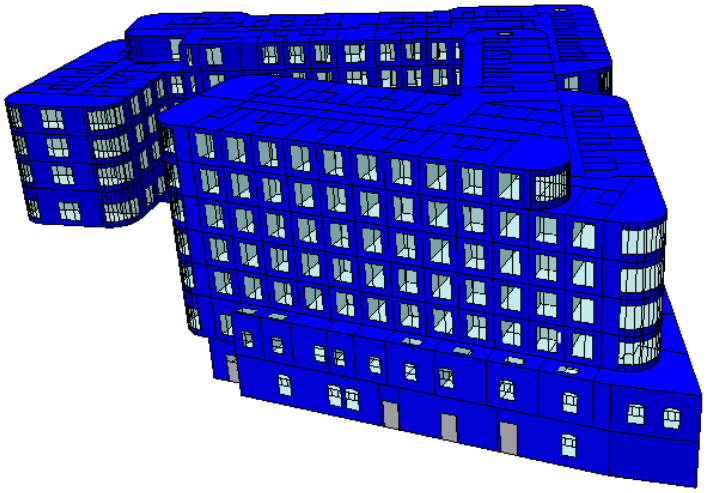
Axiseng carried out a CIBSE TM59 and CIBSE TM52 overheating study for the proposed student accommodation development at North King Street, Dublin 7. This study involved building a thermal model of the proposed 7-storey structure and running analysis on internal temperature and comfort levels. The analysis included outdoor weather conditions for the months of May through September.

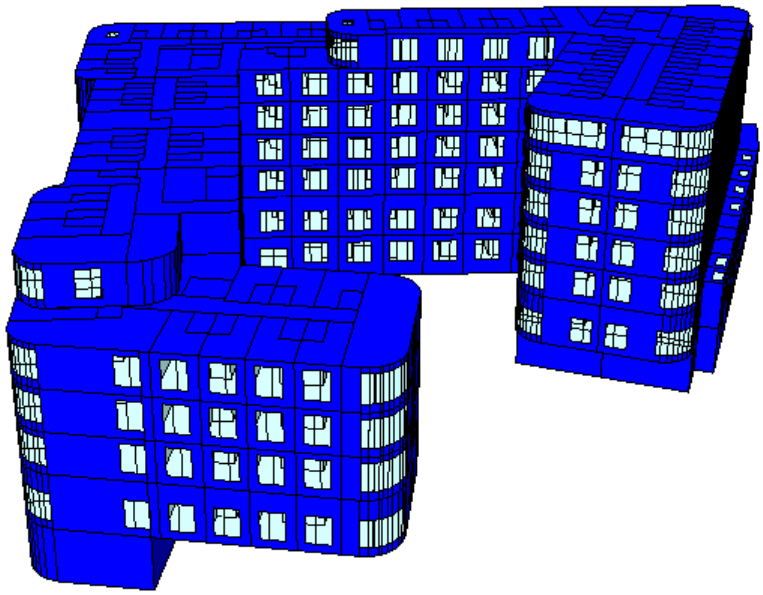
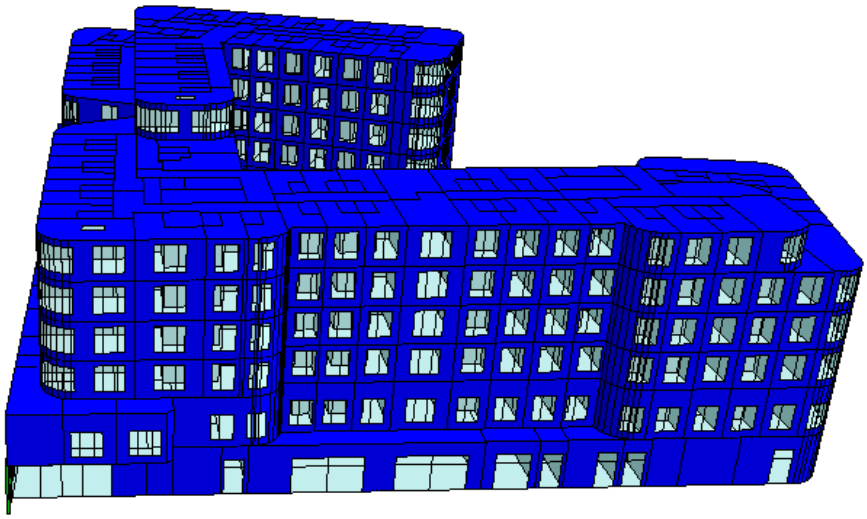
1.1 Simulation Software Used

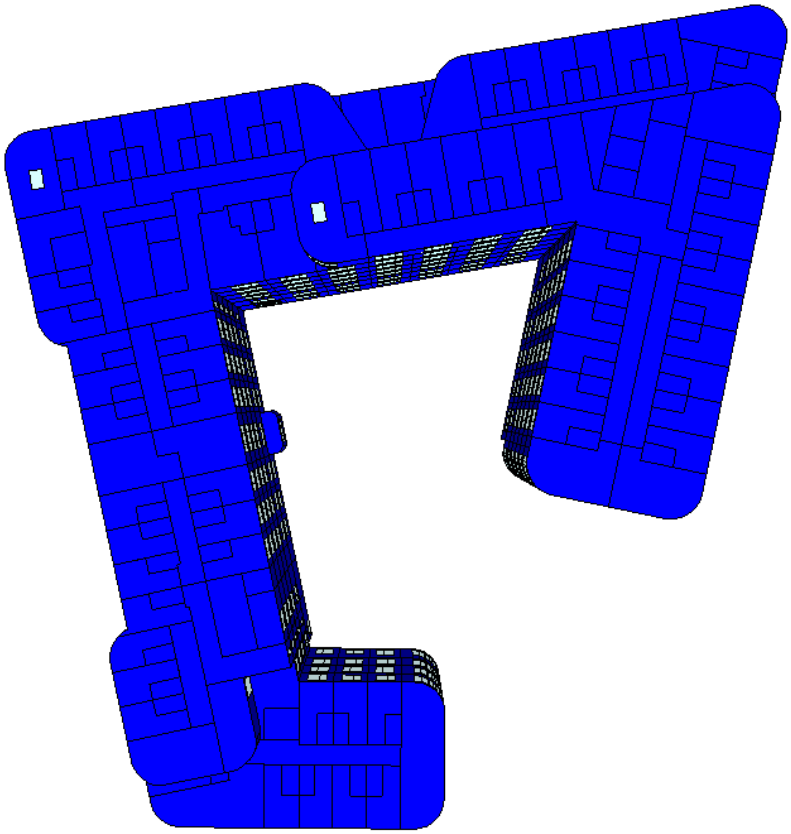
The software used to demonstrate compliance for this credit was the Virtual Environment version 2023.3.1.0 by Integrated Environmental Solutions. The module within the software toolkit used was Apache simulation. This software was selected in accordance with CIBSE AM11 (Building Energy and Environmental Modelling) as it provides full dynamic thermal analysis using real weather data.

2. Building Performance Simulation Modelling

A Building performance simulation model for the building was constructed using IES Virtual Environment. Adjacent buildings have not been included.

IES VE Simulation Model	
North View	
East View	

South View	
West View	

Aerial Plan View	
Google Maps Site Plan View	

3. Overheating Criteria

3.1 CIBSE TM59 – Assessment of Overheating Risk in Homes

CIBSE TM59 establishes two criteria to evaluate the overheating risk for domestic buildings, shown in the table below. As this building shall adopt a hybrid approach between TM59 & TM52, only the bedrooms and studios have been analysed using the TM59 methodology. Refer to Section 3.2 for TM52.

CIBSE TM59 Guidelines		
TM59 Criteria	Applicable Rooms	Criteria Details
A	Living rooms, kitchens, and bedrooms	"The number of hours during which DT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 percent of occupied hours." $\Delta T = T_{operative} - T_{maximum}$ $T_{operative}$: the actual operative temperature in the room $T_{maximum}$: the maximum acceptable temperature Note: See CIBSE TM52 Criteria 1 for further clarification
B	Bedrooms only	"The operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 10 pm and 7am is 32 hours, so 33 or more hours above 26°C will be recorded as a failure)"
Corridors, only where communal pipework is present		If an operative temperature of 28 °C is exceeded for more than 3% of the total annual hours, then this should be identified as a significant risk.

3.2 CIBSE TM52 – Assessment of Overheating in Commercial Buildings

The three criteria of CIBSE TM 52 apply to all occupied spaces that are naturally ventilated in commercial buildings and are shown in the table below. Any space which fails 2 out of 3 criteria has failed the minimum CIBSE TM 52 requirements.

CIBSE TM52 Guidelines	
Criteria	Criteria Details
1	ΔT cannot exceed 1 degree kelvin for more than 3% of occupied hours, where: ΔT = Toperative – Tmaximum Toperative: the actual operative temperature in the room Tmaximum: the maximum acceptable temperature
2	The weighted exceedance (We) must be less than or equal to 6 in any one day where: $We=\Sigma(he*Wf)$ he = time (hours) Wf =Weighting factor = ΔT when ΔT > 0, otherwise Wf = 0 NOTE: See CIBSE TM52 guide for more information.
3	ΔT cannot exceed 4 degrees kelvin at any time.

3.3 Methodology Limitations

CIBSE TM 59 and CIBSE TM52 acknowledge that the risk of overheating in homes and other buildings is a serious concern given the reality of predicted future increased summer temperatures. The methodologies are a prescriptive dynamic thermal modelling approach which seeks to identify rooms in buildings that are at risk of overheating. By necessity, many assumptions must be made about occupant behaviour and internal gains.

Consequently, the results of this analysis should be interpreted as a risk assessment, rather than an accurate prediction of the internal environment. Actual performance may vary depending on differences in occupant behaviour, as-built fabric performance, window openings and final HVAC system details.

4. Software Inputs

4.1 Thermal Fabric & Glazing Performance

Thermal Fabric Elements	North King Street Target U-Value & Thermal Mass
Proposed New External Wall	U = 0.18 W/m^{2}K Km = 128.9 Kj/m^{2}K
Historic External Wall local no double skin	U = 1.78 W/m^{2}K Km = 128.9 Kj/m^{2}K
Proposed New Window & Historic Windows*	U = 1.30 W/m^{2}K G = 0.35/LT = 0.71
Skylight	U = 1.30 W/m^{2}K G = 0.4/LT = 0.71
Ground/ Exposed Floor	U = 0.20 W/m^{2}K Km = 36 Kj/m^{2}K
Internal Floor/Ceilings	U = 0.64 W/m^{2}K Km = 70.0Kj/m^{2}K
Internal Walls	U = 0.96 W/m^{2}K Km = 6.70 Kj/m^{2}K
Proposed New Roof	U = 0.18 W/m^{2}K Km = 13.35 Kj/m^{2}K
Notes: There is no maximum or minimum required U-Value for internal walls or floors outlined in TGD Part L Table 1. iSBEMie provides default values based on a generic construction type. *Historic Windows are provided with an internal secondary glazing	

4.2 Air Tightness and Infiltration

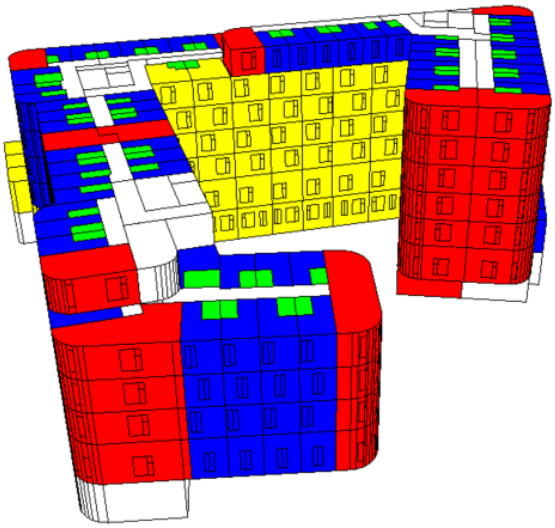
The target air permeability performance for the development is 3m^3 / hr / m^2, when tested for an internal to external pressure difference of 50 Pascals. For the purpose of the overheating assessment this equates to 0.15 ACH of infiltration.

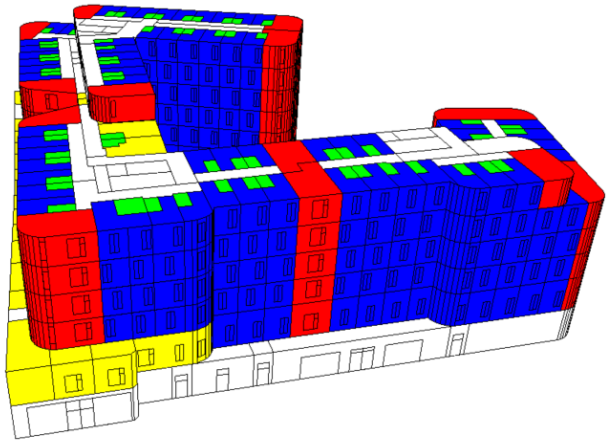
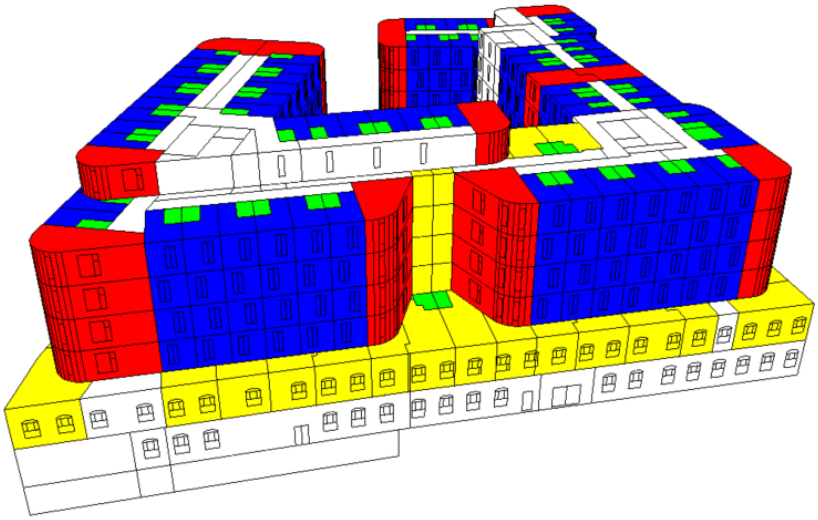
Air Tightness	Performance
Air Permeability	3 m^3 / hr / m^2 @ 50 Pa

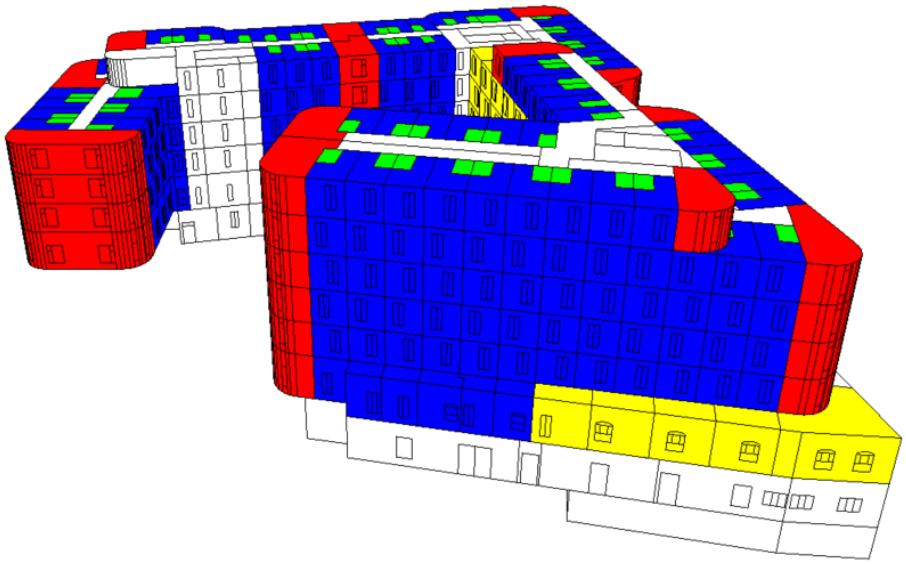
The nominal air speed is set to 0.10m/s as per the assumptions outline in TM52 and TM59.

4.3 Room Thermal Templates

The following graphics outline the room types present throughout the development, the shared kitchen living rooms have been assigned the TM59 profile for a 3-bed living/kitchen, however internal gains have been updated to suit occupancy and expected loads etc.

LEGEND	
South View	

West View	
North View	

East View	

4.4 CIBSE TM59 and CIBSE TM52 Building Category

As part of the thermal comfort categories outlined in CIBSE TM59 and TM52, this student accommodation complex has been considered as Category II – New Build.

4.5 HVAC System

Each shared living space, bedroom and ensuite will be heated via. electric radiators. These electric heaters should have some level of thermostatic control via. an onboard control module to turn-off during the summer months. The amenity spaces at ground floor level shall be heated and cooled via. a variable refrigerant flow system.

Where a cooker has been shown on layouts, cooker hood extract has been included. These have been modelled to run at the same time as the peak equipment loads in the corresponding space.

Where required, the shared kitchen/living rooms shall be provided with mechanical heat recovery ventilation in line with the below flow rates in addition to openable windows to avoid overheating.

All ventilation inputs are detailed in the below table.

System Type	Area Serving	Max Flow Rate (L/s)	Heat Exchanger Efficiency (%)
Dedicated Extract	Bedroom Ensuite	10 ACH	NA
MVHR (shared kitchen/living)	Spaces may be required, see below options.	0 – 200l/s	75
MVHR	Amenity Spaces/Offices/Meeting Room Ground Floor	10 l/s/p	75
Dedicated Extract	WC Laundry Plant Room	10 ACH 15 ACH 20 l/s	NA
Cooker Hood Extract	Bedrooms/Shared kitchen	30l/s each cooker	NA

4.6 Internal Heat Gains

In line with CIBSE TM59, all of the bedrooms, studio and living rooms in the proposed development have been assigned internal heat gains according to their space type, shown in the table below. For shared kitchen and living rooms, occupancy and equipment gains have been adjusted depending on number of associated single bedrooms and number of cooker points. The Studio apartments are bedrooms as well as living room/kitchens, so they have the load associated with a living room/kitchen.

CIBSE TM59 INTERNAL HEAT GAINS

Table 2 Occupancy and equipment gain descriptions

Unit/ room type	Occupancy	Equipment load
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gains in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours

5.2 Lighting

For the purposes of the assessment, lighting energy is assumed to be proportional to floor area, and lighting loads are measured in W/m². From 6 pm to 11 pm, 2 W/m² should be assumed as the default for an efficient new-build home. This assumes that good daylight levels are available (also noting that only May to September is assessed within CIBSE TM52).

Figure 1 Heat gain profile

Number of people	Description	Peak load (W) Sensible	Peak load (W) Latent	Period 00–01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	21–22	22–23	23–24
	Hour ending			1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
1	Single bedroom occupancy	75	55	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
2	Double bedroom occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.7
2	Studio occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
1	1-bedroom living/kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1	1-bedroom living occupancy	75	55	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
1	1-bedroom kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
2	2-bedroom living/kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
2	2-bedroom living occupancy	150	110	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
2	2-bedroom kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
3	3-bedroom living/kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
3	3-bedroom living occupancy	225	165	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
3	3-bedroom kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
	Single bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Double bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Studio equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living/kitchen equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living equipment	150		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1	1	1	1	0.4	0.4
	Kitchen equipment	300		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	1	1	0.17	0.17	0.17	0.17
	Lighting profile	2 (W/m2)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0

The table below demonstrates the internal heat gains applied to each non-residential room type. In the absence of exact figures, NCM templates have been applied.

Internal Heat Gains – TM 52			
Room Type	Occupancy	Lighting	Equipment
Shared Kitchen/Living	As per layouts	4 W/m2 (18h-23h as per TM59)	450W per cooking point (as per TM59 profile for kitchen)
WCs	-	1.75 W/m2	NA
Communal corridors	NA	2 W/m2 (as per TM59 guidance)	NA
GF Amenity Spaces	NCM Templates	4 W/m2	NCM Templates
GF Laundry	1	4 W/m2	52 W/m2 (NCM template)
GF Plant Rooms	NA	4 W/m2	50 W/m2 (NCM template)
GF Refuse/Bike Stores	NA	4 W/m2	NA
GF Office	NCM Templates	4 W/m2	NCM Templates

4.7 Communal Corridors

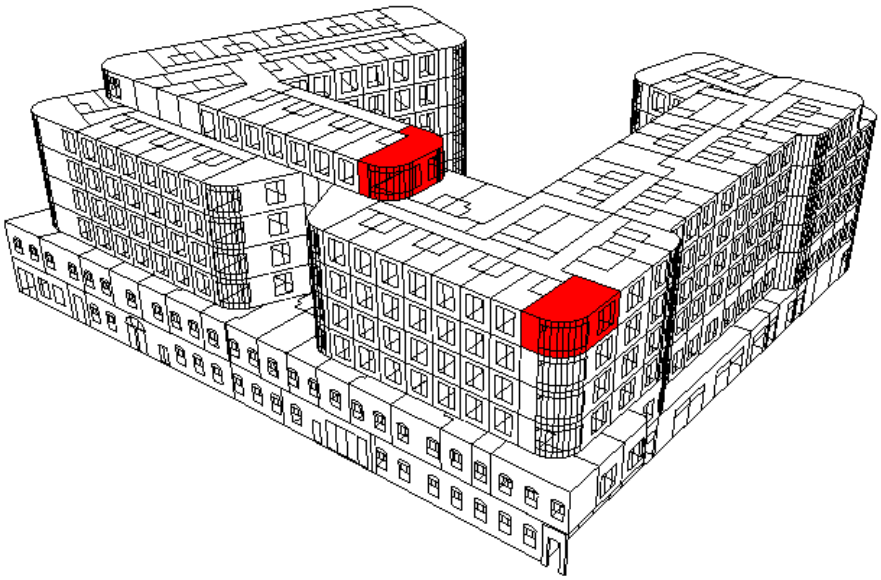
There are no significant additional gains in the communal corridors as there shall be no heating pipework passing through these spaces. AOV/AOW openings linked to specialist smoke shaft may be utilised to open in the corridors if internal temperatures exceed 23degC.

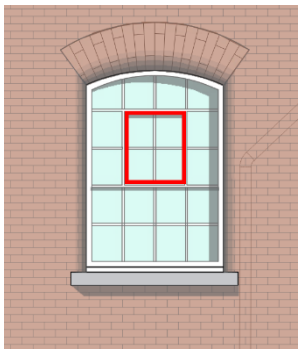
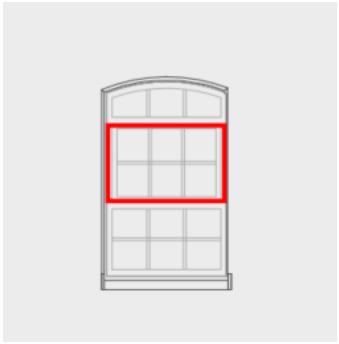
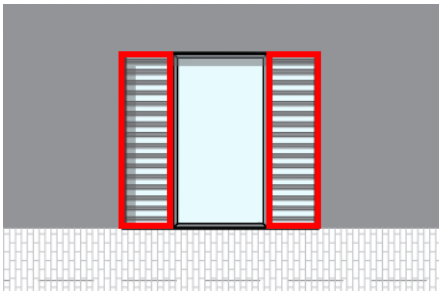
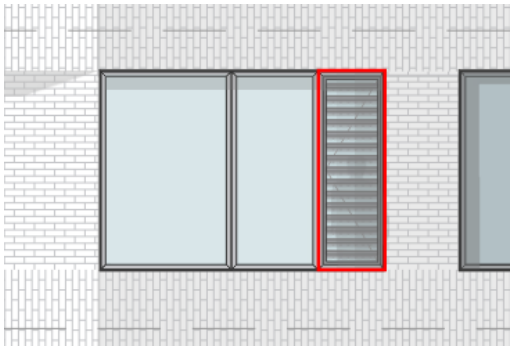
5. Natural Ventilation Parameters

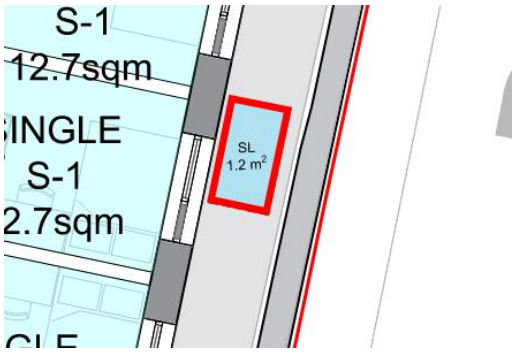
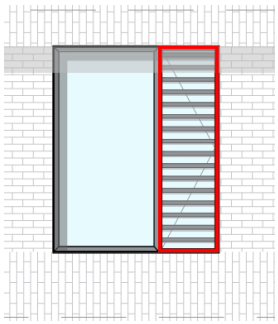
The following schedules were assigned to the different types of window openings throughout the building. These openings were gathered from the architectural elevations and window details. TM59 states that windows should be modelled as open if the room temperature exceed 22°C. It is assumed the opening will be closed during sleeping hours in unoccupied spaces (i.e., after 10pm).

Opening Type	Degree of Opening	Opening Schedule	Notes
Corridor Louvred Window Opening	65% Free Area Louvre	24/7, if Internal Temperature exceeds 22°C	N/A
Larger Historic Bedroom Window Opening	81% Allowable Opening Bottom Hinged 17.5deg Opening	24/7, if Internal Temperature exceeds 22°C	During detailed design, as details are provided on the proposal for the new secondary glazing and the existing glazing, these parameters may need to be updated
Skylight Opening	90% Allowable Opening Top Hinged 15deg Opening	24/7, if Internal Temperature exceeds 22°C	Assumed to be openable along the shorter edge with a 15deg opening. Assumed rain/security guard is provided.
Kitchen/Living Louvred Window Opening	65% Free Area Louvre	9am – 10pm, if Internal Temperature exceeds 22°C	Assumed to be Closed when the Room is Unoccupied
Studio Historic Window Opening	93% Allowable Opening Sash Window Type	24/7, if Internal Temperature exceeds 22°C	During detailed design, as details are provided on the proposal for the new secondary glazing and the existing glazing, these parameters may need to be updated. Security and rain protection to be confirmed by Architect.
Bedroom Louvred Window Opening	65% Free Area Louvre	24/7, if Internal Temperature exceeds 22°C	N/A

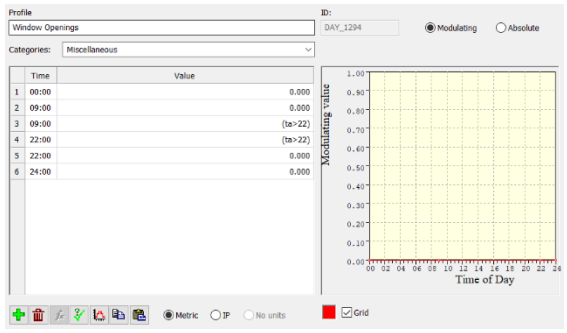
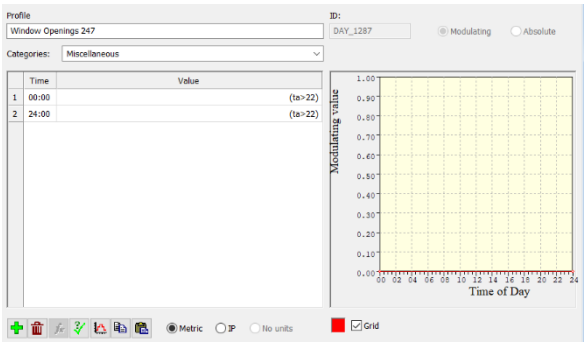
Two number shared kitchen/living rooms will, in addition to design window openings, require a roof mounted AOV 1.5m x 1m with a 15deg opening into the roof, in line with 'Skylight Opening' above. This addition will overcome the potential for overheating in these rooms. Location of the rooms and the skylights provided below.

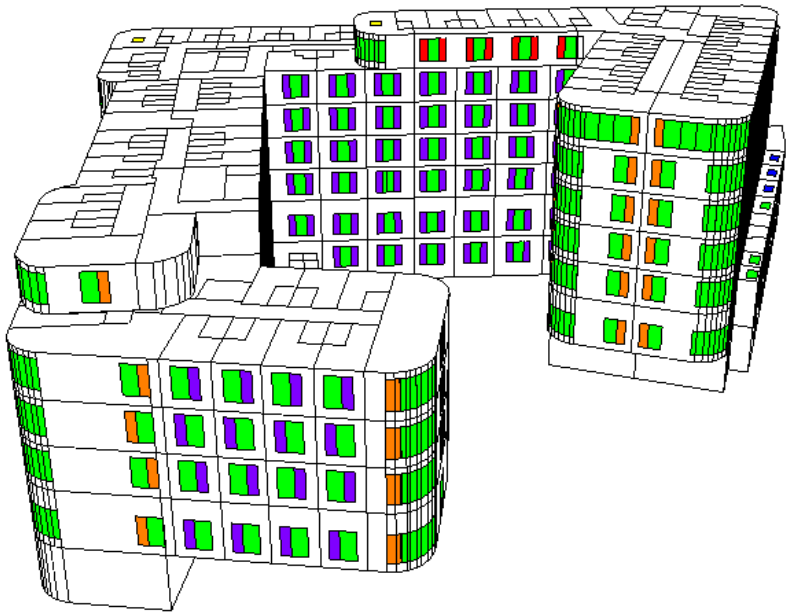


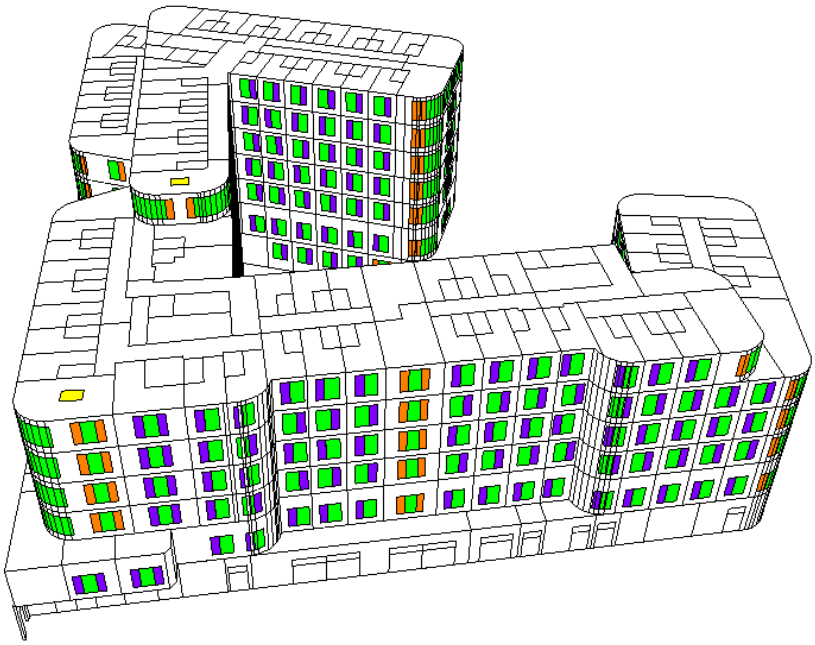
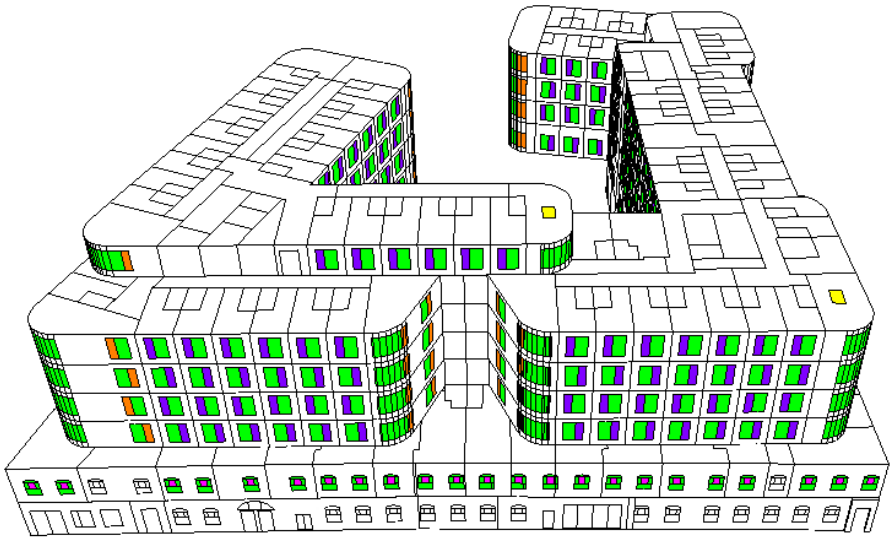
Opening Type	Architectural Drawing Openings
Larger Historic Window Opening	
Studio Historic Window Opening	
Corridor Louvred Window Opening	
Kitchen/Living Louvred Window Opening	

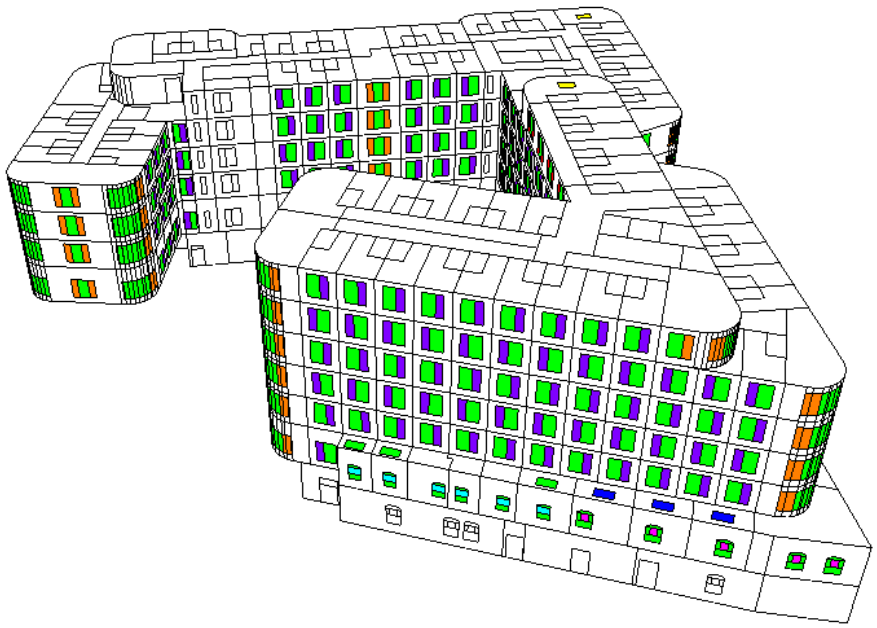
Skylight Opening	
Bedroom Louvred Window Opening	

Window opening time profiles.

	
Kitchen/Living Room Openings	Bedroom Openings

Macroflo Opening Inputs	
LEGEND	
South View	

West View	
North View	

East View	

6. Internal Blinds

Internal blinds have been used within this assessment, in line with Architect's design intent. Some kitchen/living spaces require the use of blinds to overcome overheating. Similar to some of the openable windows, these blinds were scheduled to be lowered when the internal temperature reached 22°C, between the hours of 9am and 10pm (as shown in the profile below). As per TM59 blinds were assigned to non-openable sections. The blinds were assumed to be Cream Holland Linen Blinds, with a shading coefficient of 0.4 and a short-wave radiant fraction of 0.3, per Table 8 from the IESVE Apache User Guide.

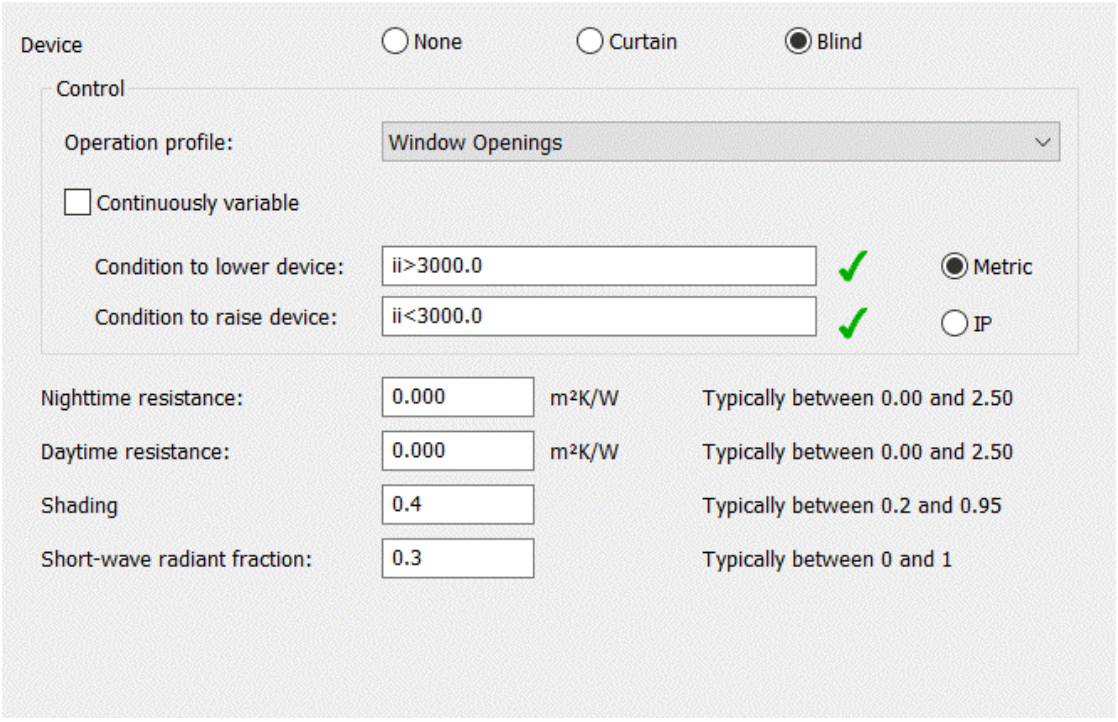
When internal blinds are used in a thermal analysis, CIBSE TM59 requires that results without blinds are also included in the report, but these results are not required to pass the criteria. These results are outlined in Appendix B.

Internal Blind Inputs

Table 8 Shading Coefficient and Short-wave Radiant Fraction for Blinds and Curtains

Shading device	Shading Coefficient	Short-wave Radiant Fraction
Dark green open-weave plastic blind	0.81	0.5
Venetian blind	0.61	0.3
White cotton curtain	0.54	0.3
Cream Holland linen blind	0.40	0.3
Mid-pane Venetian blind	0.44	0.4

(From BRE data)



7. Weather Files

Dynamic thermal simulation software packages currently provide the facility for building designs to be assessed under external climatic conditions specific to geographic location. CIBSE TM59 and TM52 suggest that buildings should be evaluated using a Design Summer Year (DSY1) file for the 2020s and suggests also evaluating more extreme weather files where applicable.

CIBSE TM59 Guidance	The weather file used for the methodology should be the DSY1 (design summer year) file most appropriate for the site location for the 2020s, high emissions, 50% percentile scenario; the guidance given in section 3.2 should be followed. The assessor must discuss with the client any need to assess overheating risk under heatwave or future climate change conditions using more extreme DSYs (i.e. DSY2 or DSY3) or future weather years. The same overheating tests described herein can be used.
CIBSE TM52 Guidance	It is arguable whether thermal discomfort over a whole season or year is a good measure of overheating, or whether perceptions of overheating are actually caused by periods of thermal discomfort concentrated in a shorter period of time. In building simulations a 'design summer year' (DSY) is used to test the likelihood of overheating. Presently such DSYs are chosen for their high average temperature and may not be the most likely to cause discomfort.

These DSY files have been created for 14 sites in the UK. The industry norm for Ireland is to use the Manchester weather file for the 2020's as it is a similar latitude to that of Dublin.

8. Results

Due to the hybrid nature of this assessment, results shall be provided for TM59 analysis of the bedrooms and studios, and TM52 analysis for all other occupied spaces.

8.1 Bedrooms – CIBSE TM59 Results

To comply with CIBSE TM59 all bedrooms, including studios, in the development need to pass the following criteria:

- Criteria A - For living rooms, kitchens, and bedrooms: the number of hours where the difference between the operative temperature and maximum acceptable temperature is greater than or equal to one degree (K) shall not be more than 3% of occupied hours during the summer months.
- Criteria B - For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours (Note: 1% of the annual hours between 10 pm to 7 am is 32 hours)

The following table indicates the passing ratio when windows are opened, in line with Architect design intent, including the skylight opening in some rooms, as detailed in Section 5. In this scenario the bedrooms are fully compliant with TM59. Living/kitchen spaces have been excluded and shall be included in Section 8.2 TM52 results. The full table of TM59 results with blinds can be found in Appendix A. Blinds are not required for compliance, however, have been included in line with Architect's design intent.

Manchester 2020s DSY 1 Weather File – Bedrooms TM59 (no blinds)				
TM59 Results				
Room	Passing Criteria A	Passing Criteria B	Failing	% Passing
Bedrooms (QTY 299)	299	299	0	100%
Studios (QTY 62)	62	62	0	100%

Manchester 2020s DSY 1 Weather File – Bedrooms TM59 (with blinds)				
TM59 Results				
Room	Passing Criteria A	Passing Criteria B	Failing	% Passing
Bedrooms (QTY 299)	299	299	0	100%
Studios (QTY 62)	62	62	0	100%

8.2 All Other Occupied Spaces – CIBSE TM52 Results

The criteria to pass TM52 is as follows:

- Criteria 1 of TM2 requires that rooms do not exceed the maximum comfortable temperature by more than 1 degree Celsius for more than 3% of occupied hours. Above 3% on criteria 1 counts as a failure.
- Criteria 2 limits the amount of overheating allowed in a single day, with a weighted measure that accounts for degrees and hours of overheating. This value for Criteria 2 should not exceed 6 hours.
- Criteria 3 sets a hard limit for maximum operative temperature. No space can exceed the maximum comfortable temperature by more than 4°C.

Any room that **fails 2 out of the 3** criteria above fails the TM52 requirements and is therefore at risk of overheating.

The quantity of occupied rooms within the development which fail TM52 criteria based on the openable window areas and ventilation provision is summarised in the following table. These results are without the additional use of blinds:

North King Street – Overheating Rooms (no blinds) TM52				
TM52 Criterion (58 Rooms)	Criteria 1	Criteria 2	Criteria 3	Failing 2+ criterion
Qty of Occupied Rooms Failing	6	25	0	6

By introducing blinds to all kitchen/living spaces, in line with Architect design intent, results are as follows.

North King Street – Overheating Rooms (with blinds) TM52				
TM52 Criterion (58 Rooms)	Criteria 1	Criteria 2	Criteria 3	Failing 2+ criterion
Qty of Occupied Rooms Failing	0	10	0	0

The full results of the TM52 assessment both with and without blinds can be seen in Appendix B & C of this document.

With the openings and ventilation as defined in Section 4 & 5 assigned to spaces, as described, along with blinds where required, the results show all spaces passing TM52.

Appendix A – Full TM59 Bedroom Results

Room	Criteria A	Criteria B	Peak Operative Temp (°C)	Comment
00: Bedroom_01	0	0.37%	28.95	Pass
00: Bedroom_02	0	0.21%	28.54	Pass
00: Bedroom_03	0	0.24%	28.45	Pass
00: Bedroom_04	0	0.21%	28.35	Pass
00: Bedroom_05	0	0.12%	28.13	Pass
00: Bedroom_06	0	0.12%	28.01	Pass
00: Bedroom_07	0	0.12%	29.06	Pass
00: Bedroom_08	0	0.18%	29.17	Pass
00: Bedroom_09	0	0.18%	28.95	Pass
00: Bedroom_10	0	0.21%	29.07	Pass
00: Studio_01	0	0.21%	28.92	Pass
00: Studio_02	0.1	0.24%	29.04	Pass
00: Studio_03	0	0.24%	29.01	Pass
00: Studio_04	0	0.24%	28.96	Pass
00: Studio_05	0	0.24%	28.89	Pass
00: Studio_06	0	0.18%	28.73	Pass
01: Acc Bedroom 01	0	0.46%	28.11	Pass
01: Bedroom_01	0	0.12%	28.07	Pass
01: Bedroom_02	0	0.18%	28.28	Pass
01: Bedroom_03	0	0.21%	28.52	Pass
01: Bedroom_04	0.4	0.33%	29.71	Pass
01: Bedroom_05	0.2	0.33%	29.57	Pass
01: Bedroom_06	0.3	0.33%	29.66	Pass
01: Bedroom_07	0.4	0.37%	29.71	Pass
01: Bedroom_08	1.6	0.79%	31.37	Pass
01: Bedroom_09	1.6	0.85%	31.4	Pass
01: Bedroom_10	1.6	0.85%	31.37	Pass
01: Bedroom_11	1.3	0.76%	31	Pass
01: Bedroom_12	0.9	0.58%	30.63	Pass
01: Bedroom_13	0.6	0.37%	30.3	Pass
01: Bedroom_14	0.2	0.24%	29.61	Pass
01: Bedroom_15	0.1	0.15%	29.29	Pass
01: Bedroom_16	0.2	0.24%	29.47	Pass
01: Bedroom_17	0	0.03%	27.95	Pass
01: Bedroom_18	0	0.03%	27.64	Pass
01: Bedroom_19	0	0.06%	27.77	Pass
01: Bedroom_20	0	0.03%	27.71	Pass

01: Bedroom_21	0	0.03%	27.43	Pass
01: Bedroom_22	0	0.03%	27.49	Pass
01: Bedroom_23	0.2	0.24%	29.56	Pass
01: Bedroom_24	0.2	0.15%	29.47	Pass
01: Bedroom_25	0.1	0.15%	29.35	Pass
01: Bedroom_26	0	0.03%	27.63	Pass
01: Bedroom_27	0	0.03%	27.56	Pass
01: Bedroom_28	0	0.03%	27.52	Pass
01: Bedroom_29	0	0.03%	27.97	Pass
01: Bedroom_30	0	0.06%	27.94	Pass
01: Bedroom_31	0	0.12%	28.31	Pass
01: Bedroom_32	0	0.12%	28.95	Pass
01: Bedroom_33	0	0.12%	28.83	Pass
01: Bedroom_34	0	0.03%	28.77	Pass
01: Bedroom_35	0	0.03%	28.74	Pass
01: Bedroom_36	0	0.03%	28.79	Pass
01: Bedroom_37	0	0.03%	28.74	Pass
01: Studio_01	0	0.03%	28.2	Pass
01: Studio_02	0	0.03%	28.41	Pass
01: Studio_03	0	0.03%	28.41	Pass
01: Studio_04	0	0.03%	28.37	Pass
01: Studio_05	0	0.03%	28.35	Pass
01: Studio_06	0	0.03%	28.01	Pass
01: Studio_07	0	0.00%	28.01	Pass
01: Studio_08	0	0.09%	29.01	Pass
01: Studio_09	0.3	0.21%	29.79	Pass
01: Studio_10	0.4	0.24%	30.02	Pass
01: Studio_11	0	0.43%	29.05	Pass
01: Studio_12	0	0.73%	28.42	Pass
01: Studio_13	0	0.49%	28.43	Pass
01: Studio_14	0	0.52%	28.55	Pass
01: Studio_15	0	0.85%	28.58	Pass
01: Studio_16	0	0.52%	28.54	Pass
01: Studio_17	0	0.97%	28.77	Pass
01: Studio_18	0	0.55%	28.91	Pass
01: Studio_19	0	0.94%	28.55	Pass
01: Studio_20	0	0.52%	28.6	Pass
01: Studio_21	0	0.97%	28.59	Pass
01: Studio_22	0	0.91%	28.53	Pass
01: Studio_23	0	0.18%	28.36	Pass
01: Studio_24	0	0.00%	28.6	Pass

01: Studio_25	0	0.00%	28.71	Pass
01: Studio_26	0	0.00%	28.83	Pass
01: Studio_27	0.1	0.06%	29.2	Pass
01: Studio_28	0	0.49%	29.12	Pass
02: Acc Bedroom 01	0	0.00%	26.87	Pass
02: Bedroom_01	0	0.03%	27.65	Pass
02: Bedroom_02	0	0.03%	27.83	Pass
02: Bedroom_03	0	0.03%	28.01	Pass
02: Bedroom_04	0	0.15%	29.18	Pass
02: Bedroom_05	0	0.15%	29.11	Pass
02: Bedroom_06	0	0.15%	29.17	Pass
02: Bedroom_07	0	0.15%	29.15	Pass
02: Bedroom_08	0.5	0.27%	30.18	Pass
02: Bedroom_09	0.6	0.27%	30.14	Pass
02: Bedroom_10	0.5	0.27%	30.12	Pass
02: Bedroom_11	0.4	0.21%	29.92	Pass
02: Bedroom_12	0.4	0.27%	29.99	Pass
02: Bedroom_13	0.3	0.15%	29.75	Pass
02: Bedroom_14	0.3	0.15%	29.89	Pass
02: Bedroom_15	0.3	0.15%	29.78	Pass
02: Bedroom_16	0.4	0.24%	29.92	Pass
02: Bedroom_17	0	0.03%	28.13	Pass
02: Bedroom_18	0	0.03%	27.98	Pass
02: Bedroom_19	0	0.06%	28.09	Pass
02: Bedroom_20	0	0.06%	28.05	Pass
02: Bedroom_21	0	0.03%	27.8	Pass
02: Bedroom_22	0	0.03%	27.88	Pass
02: Bedroom_23	0.4	0.24%	30.05	Pass
02: Bedroom_24	0.4	0.15%	29.98	Pass
02: Bedroom_25	0.4	0.15%	29.86	Pass
02: Bedroom_26	0.3	0.21%	29.87	Pass
02: Bedroom_27	0.4	0.15%	29.94	Pass
02: Bedroom_28	0.1	0.03%	29.21	Pass
02: Bedroom_29	0	0.15%	28.28	Pass
02: Bedroom_30	0	0.06%	28.12	Pass
02: Bedroom_31	0	0.03%	28.08	Pass
02: Bedroom_32	0	0.03%	28.08	Pass
02: Bedroom_33	0	0.03%	28.08	Pass
02: Bedroom_34	0	0.03%	28.07	Pass
02: Bedroom_35	0	0.12%	28.21	Pass
02: Bedroom_36	0	0.12%	28.19	Pass

02: Bedroom_37	0	0.03%	28.07	Pass
02: Bedroom_38	0	0.03%	28.11	Pass
02: Bedroom_39	0	0.03%	28.12	Pass
02: Bedroom_40	0	0.03%	28.07	Pass
02: Bedroom_41	0	0.03%	28.01	Pass
02: Bedroom_42	0	0.15%	28.53	Pass
02: Bedroom_43	0	0.12%	28.5	Pass
02: Bedroom_44	0	0.12%	28.44	Pass
02: Bedroom_45	0	0.12%	28.46	Pass
02: Bedroom_46	0	0.15%	28.47	Pass
02: Bedroom_47	0	0.15%	28.51	Pass
02: Bedroom_48	0	0.12%	28.51	Pass
02: Bedroom_49	0	0.12%	28.48	Pass
02: Bedroom_50	0	0.12%	28.47	Pass
02: Bedroom_51	0	0.12%	28.48	Pass
02: Bedroom_52	0	0.15%	28.5	Pass
02: Bedroom_53	0	0.15%	28.65	Pass
02: Bedroom_54	0.2	0.15%	29.57	Pass
02: Bedroom_55	0.2	0.15%	29.58	Pass
02: Bedroom_56	0.2	0.15%	29.62	Pass
02: Bedroom_57	0.2	0.15%	29.62	Pass
02: Bedroom_58	0.2	0.15%	29.64	Pass
02: Bedroom_59	0.1	0.15%	29.57	Pass
02: Studio_01	0	0.03%	28.58	Pass
02: Studio_02	0	0.06%	28.75	Pass
02: Studio_03	0	0.03%	28.74	Pass
02: Studio_04	0	0.03%	28.61	Pass
02: Studio_05	0	0.03%	28.61	Pass
02: Studio_06	0	0.03%	28.33	Pass
02: Studio_07	0	0.00%	28.3	Pass
03: Acc Bedroom 01	0	0.00%	26.77	Pass
03: Bedroom_01	0	0.03%	27.67	Pass
03: Bedroom_02	0	0.03%	27.9	Pass
03: Bedroom_03	0	0.03%	28.06	Pass
03: Bedroom_04	0	0.15%	29.21	Pass
03: Bedroom_05	0	0.15%	29.13	Pass
03: Bedroom_06	0	0.15%	29.2	Pass
03: Bedroom_07	0	0.15%	29.16	Pass
03: Bedroom_08	0.5	0.21%	30.08	Pass
03: Bedroom_09	0.5	0.21%	30.08	Pass
03: Bedroom_10	0.4	0.21%	30.03	Pass

03: Bedroom_11	0.3	0.15%	29.84	Pass
03: Bedroom_12	0.4	0.15%	29.89	Pass
03: Bedroom_13	0.2	0.15%	29.65	Pass
03: Bedroom_14	0.3	0.15%	29.9	Pass
03: Bedroom_15	0.3	0.15%	29.78	Pass
03: Bedroom_16	0.4	0.24%	29.97	Pass
03: Bedroom_17	0	0.03%	28.13	Pass
03: Bedroom_18	0	0.03%	28.01	Pass
03: Bedroom_19	0	0.06%	28.12	Pass
03: Bedroom_20	0	0.06%	28.13	Pass
03: Bedroom_21	0	0.03%	27.9	Pass
03: Bedroom_22	0	0.03%	27.98	Pass
03: Bedroom_23	0.4	0.24%	30.04	Pass
03: Bedroom_24	0.4	0.15%	29.99	Pass
03: Bedroom_25	0.4	0.15%	29.88	Pass
03: Bedroom_26	0.3	0.15%	29.74	Pass
03: Bedroom_27	0.3	0.15%	29.93	Pass
03: Bedroom_28	0.1	0.03%	29.2	Pass
03: Bedroom_29	0	0.15%	28.28	Pass
03: Bedroom_30	0	0.03%	28.06	Pass
03: Bedroom_31	0	0.03%	28.01	Pass
03: Bedroom_32	0	0.03%	28.02	Pass
03: Bedroom_33	0	0.03%	28.04	Pass
03: Bedroom_34	0	0.03%	28.05	Pass
03: Bedroom_35	0	0.06%	28.14	Pass
03: Bedroom_36	0	0.06%	28.13	Pass
03: Bedroom_37	0	0.03%	28.05	Pass
03: Bedroom_38	0	0.03%	28.03	Pass
03: Bedroom_39	0	0.03%	28.04	Pass
03: Bedroom_40	0	0.03%	28.04	Pass
03: Bedroom_41	0	0.03%	27.97	Pass
03: Bedroom_42	0	0.15%	28.54	Pass
03: Bedroom_43	0	0.15%	28.53	Pass
03: Bedroom_44	0	0.12%	28.47	Pass
03: Bedroom_45	0	0.12%	28.52	Pass
03: Bedroom_46	0	0.15%	28.47	Pass
03: Bedroom_47	0	0.12%	28.51	Pass
03: Bedroom_48	0	0.12%	28.55	Pass
03: Bedroom_49	0	0.12%	28.52	Pass
03: Bedroom_50	0	0.12%	28.5	Pass
03: Bedroom_51	0	0.12%	28.5	Pass

03: Bedroom_52	0	0.15%	28.51	Pass
03: Bedroom_53	0	0.15%	28.67	Pass
03: Bedroom_54	0.3	0.15%	29.86	Pass
03: Bedroom_55	0.3	0.15%	29.75	Pass
03: Bedroom_56	0.3	0.15%	29.67	Pass
03: Bedroom_57	0.3	0.15%	29.66	Pass
03: Bedroom_58	0.2	0.15%	29.65	Pass
03: Bedroom_59	0.1	0.15%	29.56	Pass
03: Studio_01	0	0.03%	28.66	Pass
03: Studio_02	0	0.06%	28.83	Pass
03: Studio_03	0	0.06%	28.82	Pass
03: Studio_04	0	0.06%	28.67	Pass
03: Studio_05	0	0.03%	28.67	Pass
03: Studio_06	0	0.03%	28.37	Pass
03: Studio_07	0	0.03%	28.32	Pass
04: Acc Bedroom 01	0	0.00%	27.36	Pass
04: Bedroom_01	0	0.06%	28.32	Pass
04: Bedroom_02	0	0.12%	28.55	Pass
04: Bedroom_03	0	0.15%	28.74	Pass
04: Bedroom_04	0.4	0.15%	29.84	Pass
04: Bedroom_05	0.3	0.15%	29.77	Pass
04: Bedroom_06	0.4	0.15%	29.83	Pass
04: Bedroom_07	0.4	0.15%	29.8	Pass
04: Bedroom_08	1	0.24%	30.68	Pass
04: Bedroom_09	0.5	0.21%	30.11	Pass
04: Bedroom_10	0.4	0.21%	30.04	Pass
04: Bedroom_11	0.3	0.15%	29.84	Pass
04: Bedroom_12	0.4	0.21%	29.93	Pass
04: Bedroom_13	0.3	0.15%	29.72	Pass
04: Bedroom_14	0.3	0.15%	29.91	Pass
04: Bedroom_15	0.3	0.15%	29.84	Pass
04: Bedroom_16	0.4	0.21%	29.95	Pass
04: Bedroom_17	0	0.03%	28.2	Pass
04: Bedroom_18	0	0.03%	28.12	Pass
04: Bedroom_19	0	0.06%	28.2	Pass
04: Bedroom_20	0	0.06%	28.23	Pass
04: Bedroom_21	0	0.03%	28.03	Pass
04: Bedroom_22	0	0.03%	28.11	Pass
04: Bedroom_23	0.5	0.21%	30.07	Pass
04: Bedroom_24	0.4	0.15%	30	Pass
04: Bedroom_25	0.4	0.15%	29.88	Pass

04: Bedroom_26	0.3	0.21%	29.86	Pass
04: Bedroom_27	0.3	0.15%	29.94	Pass
04: Bedroom_28	0.1	0.03%	29.21	Pass
04: Bedroom_29	0	0.15%	28.3	Pass
04: Bedroom_30	0	0.03%	28.09	Pass
04: Bedroom_31	0	0.03%	28.07	Pass
04: Bedroom_32	0	0.03%	28.05	Pass
04: Bedroom_33	0	0.03%	28.05	Pass
04: Bedroom_34	0	0.03%	28.06	Pass
04: Bedroom_35	0	0.06%	28.16	Pass
04: Bedroom_36	0	0.06%	28.18	Pass
04: Bedroom_37	0	0.03%	28.05	Pass
04: Bedroom_38	0	0.03%	28.05	Pass
04: Bedroom_39	0	0.03%	28.06	Pass
04: Bedroom_40	0	0.03%	28.07	Pass
04: Bedroom_41	0	0.03%	28	Pass
04: Bedroom_42	0	0.15%	28.57	Pass
04: Bedroom_43	0	0.15%	28.54	Pass
04: Bedroom_44	0	0.12%	28.49	Pass
04: Bedroom_45	0	0.12%	28.52	Pass
04: Bedroom_46	0	0.12%	28.49	Pass
04: Bedroom_47	0	0.12%	28.52	Pass
04: Bedroom_48	0	0.15%	28.56	Pass
04: Bedroom_49	0	0.12%	28.52	Pass
04: Bedroom_50	0	0.12%	28.5	Pass
04: Bedroom_51	0	0.12%	28.5	Pass
04: Bedroom_52	0	0.15%	28.52	Pass
04: Bedroom_53	0	0.15%	28.68	Pass
04: Bedroom_54	0.4	0.15%	29.94	Pass
04: Bedroom_55	0.4	0.15%	29.83	Pass
04: Bedroom_56	0.3	0.15%	29.76	Pass
04: Bedroom_57	0.4	0.15%	29.73	Pass
04: Bedroom_58	0.3	0.15%	29.72	Pass
04: Bedroom_59	0.2	0.15%	29.59	Pass
04: Studio_01	0	0.03%	28.74	Pass
04: Studio_02	0	0.06%	28.91	Pass
04: Studio_03	0	0.06%	28.89	Pass
04: Studio_04	0	0.06%	28.76	Pass
04: Studio_05	0	0.06%	28.75	Pass
04: Studio_06	0	0.03%	28.45	Pass
04: Studio_07	0	0.03%	28.38	Pass

05: Bedroom_10	1.1	0.24%	30.84	Pass
05: Bedroom_11	0.9	0.24%	30.61	Pass
05: Bedroom_12	0.9	0.24%	30.62	Pass
05: Bedroom_13	0.8	0.24%	30.48	Pass
05: Bedroom_14	1.1	0.24%	30.75	Pass
05: Bedroom_15	0.9	0.21%	30.58	Pass
05: Bedroom_16	1	0.27%	30.74	Pass
05: Bedroom_17	0	0.12%	28.83	Pass
05: Bedroom_18	0	0.15%	28.75	Pass
05: Bedroom_19	0	0.15%	28.9	Pass
05: Bedroom_20	0	0.15%	28.93	Pass
05: Bedroom_21	0	0.15%	28.7	Pass
05: Bedroom_22	0	0.15%	28.75	Pass
05: Bedroom_23	1	0.27%	30.81	Pass
05: Bedroom_24	1	0.24%	30.75	Pass
05: Bedroom_25	0.9	0.24%	30.62	Pass
05: Bedroom_26	0.7	0.21%	30.43	Pass
05: Bedroom_27	0.9	0.18%	30.64	Pass
05: Bedroom_28	0.4	0.06%	29.84	Pass
05: Bedroom_29	0	0.15%	28.91	Pass
05: Bedroom_30	0	0.15%	28.74	Pass
05: Bedroom_31	0	0.15%	28.7	Pass
05: Bedroom_32	0	0.15%	28.7	Pass
05: Bedroom_33	0	0.15%	28.71	Pass
05: Bedroom_34	0	0.15%	28.72	Pass
05: Bedroom_35	0	0.15%	28.81	Pass
05: Bedroom_36	0	0.15%	28.82	Pass
05: Bedroom_37	0	0.15%	28.68	Pass
05: Bedroom_38	0	0.15%	28.66	Pass
05: Bedroom_39	0	0.15%	28.66	Pass
05: Bedroom_40	0	0.15%	28.67	Pass
05: Bedroom_41	0	0.12%	28.56	Pass
05: Bedroom_42	0	0.15%	29.07	Pass
05: Bedroom_43	0	0.15%	28.78	Pass
05: Bedroom_44	0	0.12%	28.52	Pass
05: Bedroom_45	0	0.12%	28.56	Pass
05: Bedroom_46	0	0.12%	28.51	Pass
05: Bedroom_47	0	0.12%	28.56	Pass
05: Bedroom_48	0	0.12%	28.6	Pass
05: Bedroom_49	0	0.12%	28.57	Pass
05: Bedroom_50	0	0.12%	28.54	Pass

05: Bedroom_51	0	0.12%	28.53	Pass
05: Bedroom_52	0	0.15%	28.56	Pass
05: Bedroom_53	0	0.15%	28.72	Pass
05: Bedroom_54	0.4	0.15%	29.97	Pass
05: Bedroom_55	0.4	0.15%	29.86	Pass
05: Bedroom_56	0.3	0.15%	29.78	Pass
05: Bedroom_57	0.3	0.15%	29.76	Pass
05: Bedroom_58	0.3	0.15%	29.74	Pass
05: Bedroom_59	0.2	0.15%	29.63	Pass
05: Studio_01	0.1	0.12%	29.39	Pass
05: Studio_02	0.1	0.15%	29.43	Pass
05: Studio_03	0	0.12%	29.02	Pass
05: Studio_04	0	0.06%	28.82	Pass
05: Studio_05	0	0.06%	28.81	Pass
05: Studio_06	0	0.03%	28.53	Pass
05: Studio_07	0	0.03%	28.43	Pass
06: Bedroom_01	0	0.15%	28.84	Pass
06: Bedroom_02	0	0.09%	28.44	Pass
06: Bedroom_03	0	0.15%	28.52	Pass
06: Bedroom_04	0	0.15%	28.52	Pass
06: Bedroom_05	0	0.15%	28.55	Pass
06: Bedroom_06	0	0.15%	28.59	Pass
06: Bedroom_07	0	0.15%	29.11	Pass
06: Bedroom_08	0	0.15%	29.08	Pass
06: Bedroom_09	0	0.15%	29.1	Pass
06: Bedroom_10	0	0.15%	29.13	Pass
06: Bedroom_11	0	0.15%	29.11	Pass
06: Bedroom_12	0	0.15%	29.1	Pass
06: Bedroom_13	0	0.15%	29.1	Pass
06: Bedroom_14	0	0.15%	29.14	Pass
06: Bedroom_15	0.1	0.15%	29.39	Pass
06: Bedroom_16	1	0.24%	30.8	Pass
06: Bedroom_17	0.9	0.18%	30.64	Pass
06: Bedroom_18	0.9	0.18%	30.57	Pass
06: Bedroom_19	0.8	0.18%	30.55	Pass
06: Bedroom_20	0.8	0.18%	30.56	Pass
06: Bedroom_21	0.7	0.18%	30.46	Pass

Appendix B – Full TM52 Results with Blinds

Room Name	Criteria 1 %Hrs Top-Tmax>=1K	Criteria 2 Max. Daily Deg.Hrs	Criteria 3 Max. DeltaT	Criteria failing	Status
00: Gym	0	0	0	-	Pass
00: Kitchen/Living_01	0.8	5	2	-	Pass
00: Kitchen/Living_02	0.1	1	1	-	Pass
00: Laundry/Amenity	0	0	0	-	Pass
00: Library	0	0	0	-	Pass
00: Management Offices	0	0	0	-	Pass
00: Reception	0	0	0	-	Pass
00: Retail	0	0	0	-	Pass
00: Yoga Studio	0	0	0	-	Pass
01: Kitchen/Living_01	0.4	3	1	-	Pass
01: Kitchen/Living_02	1.5	9	2	2	Pass
01: Kitchen/Living_03	0.2	2	1	-	Pass
01: Kitchen/Living_04	0.9	4	2	-	Pass
01: Kitchen/Living_05	0.8	5	1	-	Pass
01: Kitchen/Living_06	1	6	2	-	Pass
02: Kitchen/Living_01	0.1	1	1	-	Pass
02: Kitchen/Living_02	0.4	3	1	-	Pass
02: Kitchen/Living_03	0.3	2	1	-	Pass
02: Kitchen/Living_04	1.3	6	2	-	Pass
02: Kitchen/Living_05	1.8	7	2	2	Pass
02: Kitchen/Living_06	0.1	1	1	-	Pass
02: Kitchen/Living_07	0.2	2	1	-	Pass
02: Kitchen/Living_08	0.2	1	1	-	Pass
02: Kitchen/Living_09	0.5	5	1	-	Pass
02: Kitchen/Living_10	0.7	4	2	-	Pass
03: Kitchen/Living_01	0.1	1	1	-	Pass
03: Kitchen/Living_02	0.4	3	1	-	Pass
03: Kitchen/Living_03	0.3	2	1	-	Pass
03: Kitchen/Living_04	1.3	6	2	-	Pass
03: Kitchen/Living_05	1.9	8	3	2	Pass
03: Kitchen/Living_06	0.1	1	1	-	Pass
03: Kitchen/Living_07	0.2	2	1	-	Pass
03: Kitchen/Living_08	0.2	2	1	-	Pass
03: Kitchen/Living_09	0.5	5	1	-	Pass
03: Kitchen/Living_10	0.8	5	2	-	Pass
04: Kitchen/Living_01	0.5	3	1	-	Pass

04: Kitchen/Living_02	1	6	2	-	Pass
04: Kitchen/Living_03	0.3	2	1	-	Pass
04: Kitchen/Living_04	1.3	6	2	-	Pass
04: Kitchen/Living_05	1.8	7	2	2	Pass
04: Kitchen/Living_06	0.1	1	1	-	Pass
04: Kitchen/Living_07	0.4	2	1	-	Pass
04: Kitchen/Living_08	0.2	2	1	-	Pass
04: Kitchen/Living_09	0.5	5	1	-	Pass
04: Kitchen/Living_10	0.8	5	2	-	Pass
05: Kitchen/Living_01	0.9	6	2	-	Pass
05: Kitchen/Living_03	1.3	8	2	2	Pass
05: Kitchen/Living_04	2.7	13	3	2	Pass
05: Kitchen/Living_05	1.4	8	2	2	Pass
05: Kitchen/Living_06	0.4	2	1	-	Pass
05: Kitchen/Living_07	1.4	6	2	-	Pass
05: Kitchen/Living_08	0.7	4	1	-	Pass
05: Kitchen/Living_09	0.5	5	1	-	Pass
05: Kitchen/Living_10	0.8	5	2	-	Pass
06: Kitchen/Living_01	1.9	12	3	2	Pass
06: Kitchen/Living_02	0.3	2	1	-	Pass
06: Kitchen/Living_03	2.1	15	2	2	Pass
06: Kitchen/Living_04	2.2	11	3	2	Pass

Appendix C – Full TM52 Results without Blinds

Room Name	Criteria 1 %Hrs Top-Tmax>=1K	Criteria 2 Max. Daily Deg.Hrs	Criteria 3 Max. DeltaT	Criteria failing	Status
00: Gym	0	0	0	-	Pass
00: Kitchen/Living_01	0.9	5	2	-	Pass
00: Kitchen/Living_02	0.2	2	1	-	Pass
00: Laundry/Amenity	0	0	0	-	Pass
00: Library	0	0	0	-	Pass
00: Management Offices	0	0	0	-	Pass
00: Reception	0	0	0	-	Pass
00: Retail	0	0	0	-	Pass
00: Yoga Studio	0	0	0	-	Pass
01: Kitchen/Living_01	0.7	5	1	-	Pass
01: Kitchen/Living_02	2.7	15	3	2	Pass
01: Kitchen/Living_03	0.3	2	1	-	Pass
01: Kitchen/Living_04	1.3	6	2	-	Pass
01: Kitchen/Living_05	1.3	10	2	2	Pass
01: Kitchen/Living_06	1.2	8	2	2	Pass
02: Kitchen/Living_01	0.2	3	1	-	Pass
02: Kitchen/Living_02	0.9	6	2	-	Pass
02: Kitchen/Living_03	0.3	2	1	-	Pass
02: Kitchen/Living_04	1.8	8	2	2	Pass
02: Kitchen/Living_05	3.7	13	4	1 & 2	Fail
02: Kitchen/Living_06	0.2	2	1	-	Pass
02: Kitchen/Living_07	0.4	2	1	-	Pass
02: Kitchen/Living_08	0.4	3	1	-	Pass
02: Kitchen/Living_09	1.2	8	1	2	Pass
02: Kitchen/Living_10	1.1	6	2	-	Pass
03: Kitchen/Living_01	0.2	3	1	-	Pass
03: Kitchen/Living_02	0.8	6	2	-	Pass
03: Kitchen/Living_03	0.3	2	1	-	Pass
03: Kitchen/Living_04	1.8	8	2	2	Pass
03: Kitchen/Living_05	3.7	14	4	1 & 2	Fail
03: Kitchen/Living_06	0.2	2	1	-	Pass
03: Kitchen/Living_07	0.5	2	1	-	Pass
03: Kitchen/Living_08	0.4	3	1	-	Pass
03: Kitchen/Living_09	1.2	8	1	2	Pass
03: Kitchen/Living_10	1.2	8	2	2	Pass
04: Kitchen/Living_01	0.7	4	1	-	Pass

04: Kitchen/Living_02	1.8	9	2	2	Pass
04: Kitchen/Living_03	0.4	3	1	-	Pass
04: Kitchen/Living_04	1.8	8	2	2	Pass
04: Kitchen/Living_05	3.6	13	4	1 & 2	Fail
04: Kitchen/Living_06	0.2	2	1	-	Pass
04: Kitchen/Living_07	0.7	3	1	-	Pass
04: Kitchen/Living_08	0.4	3	1	-	Pass
04: Kitchen/Living_09	1.2	8	1	2	Pass
04: Kitchen/Living_10	1.3	9	2	2	Pass
05: Kitchen/Living_01	1.6	9	2	2	Pass
05: Kitchen/Living_03	1.5	8	2	2	Pass
05: Kitchen/Living_04	3.5	14	3	1 & 2	Fail
05: Kitchen/Living_05	1.9	12	3	2	Pass
05: Kitchen/Living_06	0.7	4	1	-	Pass
05: Kitchen/Living_07	2.4	10	3	2	Pass
05: Kitchen/Living_08	1.1	5	1	-	Pass
05: Kitchen/Living_09	1.2	8	1	2	Pass
05: Kitchen/Living_10	1.3	9	2	2	Pass
06: Kitchen/Living_01	2.9	17	4	2	Pass
06: Kitchen/Living_02	0.4	3	1	-	Pass
06: Kitchen/Living_03	3.8	22	3	1 & 2	Fail
06: Kitchen/Living_04	3.8	18	4	1 & 2	Fail