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Approved Document Part O & Thermal Comfort Report

Octagon House, Manchester

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OCTAGON HOUSE, MANCHESTER
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1. EXECUTIVE SUMMARY

An overheating analysis has been carried out on four residential apartment & PBSA buildings on the premises of Octagon Building to show compliance with the thermal comfort criteria as set out in Approved Document Part O Overheating of the Building Regulations.

Based on the modelling conducted, the results show that all habitable dwelling spaces comply with the thermal comfort criteria as set out in Approved Document Part O Overheating.

The proposed building design utilises predominantly mechanically ventilation with a summer bypass mechanical ventilation heat recovery (MVHR) system in each dwelling, as well as natural ventilation during the day. The MVHR system will operate if the room air temperature is greater than 21degC and the outside air temperature is less than the room air temperature.

The building thermal model estimates the buildings environmental conditions, and the calculation results are based on the modelling inputs and parameters as detailed herein this report in Section 3. Section 3.2 includes fabric U-values, internal heat gains, occupancy patterns, air permeability rate, ventilation strategy and natural ventilation openings used for the thermal model.

This analysis has been performed using IES software which provides full dynamic thermal analysis and is a CIBSE certified Level 5 approved Dynamic Simulation Modelling Software. This analysis has been carried out in accordance with user instructions set out in IES manuals and CIBSE AM11 Building Energy and Environmental Modelling.

In accordance with the Part O requirement to follow CIBSE TM59:2017 *"Design methodology for the assessment of overheating risk in homes"*, the most current CIBSE Design Summer Year (DSY) weather file for the relevant location was chosen for the simulation (Manchester CIBSE DSY 1 2020's high emissions 50th percentile range weather file).

The building occupancy profiles & parameters included within the IES Virtual Environment Part O Overheating Compliance module, based on the CIBSE TM59:2017 profiles and parameters, have been used.

The thermal comfort in the residential spaces has been assessed against the criteria for 'predominantly mechanically ventilated', with the mechanical ventilation meeting minimum Part F with assisting natural ventilation during the day in each dwelling.

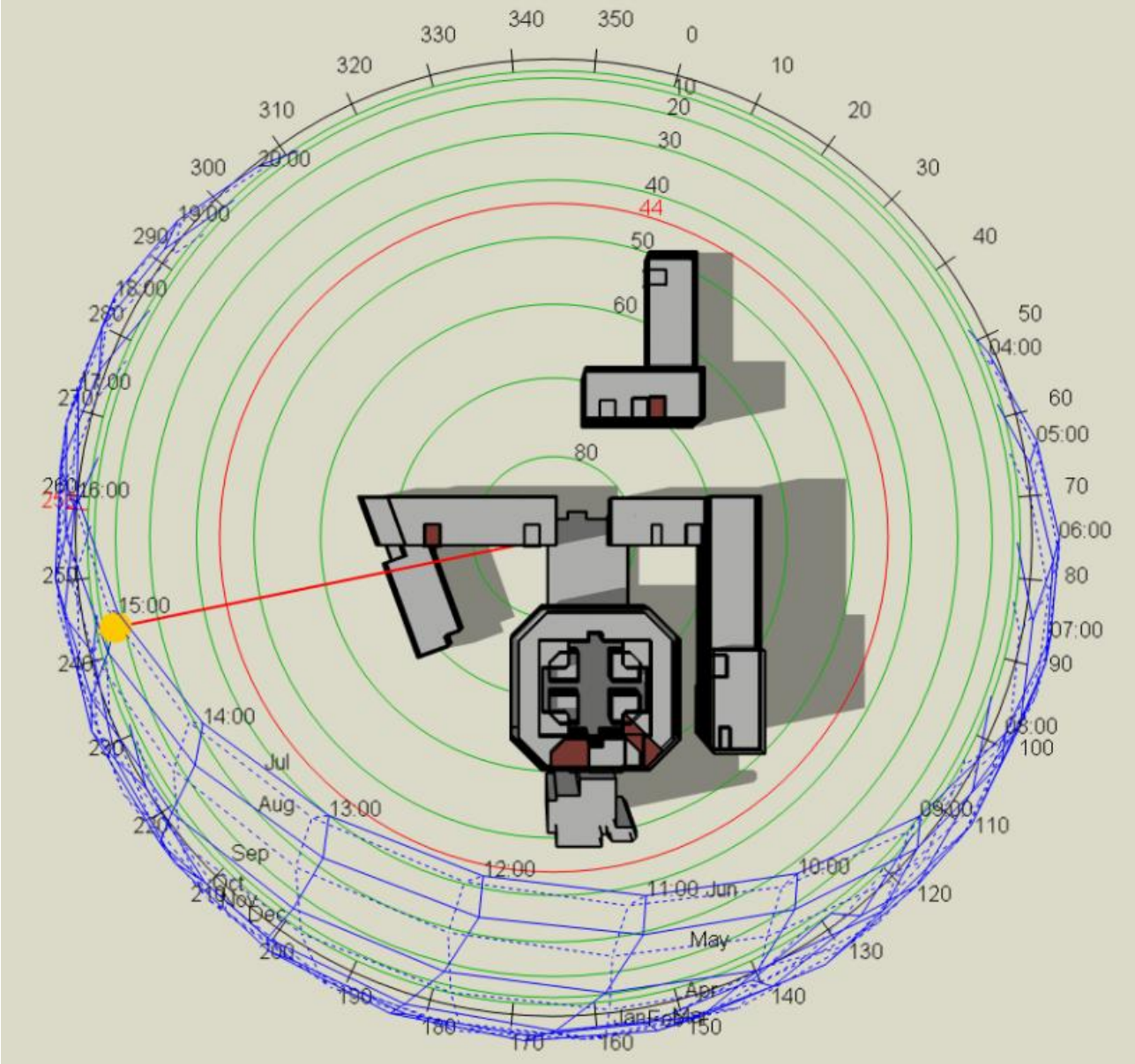


Figure 1: Image showing Plan view of thermal model.

2. DEVELOPMENT PLANS

2.1. Description of Development Site

The Site is currently occupied by the Octagon building with its ground floor being occupied by Fresenius Medical Care. The building comprises of approximately 1,429 sqm GIA floorspace which is approximately 6 stories in height with associated car parking on both sides. The remainder of the site south of Bax road is occupied by the X building. One story in height the building comprises of under 650 sqm GIA floorspace. North of Bax road the site is more associated car parking.

The existing Octagon building will be retained and refurbished as part of the project.



Figure 2 - View of the existing site and surrounding area

The proposed development has all major services (gas, water, telecoms and electricity) within the surrounding roads which will need to be either isolated and either diverted or disconnected to develop the project.

2.2. Project Development Plans

Full planning application for the refurbishment and extension of Octagon House and the erection of buildings of up to 11 storeys in height to accommodate a mix of uses comprising Purpose Built Student Accommodation bedrooms (205 studios and 35 apartments accommodating 255 bedrooms) (Sui Generis Use Class); Key Worker accommodation (Sui Generis Use Class) (211 units); Residential units (16 no) (Use Class C3); 2,568 sq m of healthcare use (including the retention of an existing healthcare facility on site) (Use Class Ee); and 394 sq m of commercial or community uses (Use Classes Ea, Eb, Eciii, Ee, Ef, F1e, F2b, F2c) with associated site access, car and cycle parking and landscaping.

In terms of the key measures I have set out below this is updated as follows:

Key measurables:

- Number of student bedrooms – 455 (205 studios, 255 in cluster form contained within 35 apartments)
- Key worker units – 141 studios, 70 one and two bedroom units
- Residential units – 16
- Commercial or community unit at ground and first floor of Octagon House – 394 sq m
- Central Manchester Dialysis Unit (existing plus expansion to first floor of Octagon House) – 2,568 sq m
- Cycle parking spaces:
    - PBSA – 34
    - Key worker – 50
- Car parking
    - 19 spaces in south east part of the site currently used by staff and visitors of the Central Manchester Dialysis Unit to be retained for use by its visitors only
    - 32 new spaces to be provided for use by Central Manchester Dialysis Unit staff
    - 0 car parking across the rest of the site
    - All remaining existing car parking within the site will be removed

3. COMPLIANCE REQUIREMENT

The apartments have been assessed following the Part O requirement to use the guidance contained within CIBSE TM59:2017 'Design methodology for the assessment of overheating risk in homes', as per Approved Document Part O section 2.3.

Because the apartments and kitchen / living spaces within the proposed development do not have any opening windows, Section 4.3 of CIBSE TM59:2017 applies, which requires the following criteria to be met:

4.3 Criteria for homes predominantly mechanically ventilated
For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26 ˚C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

THERMAL MODEL

The thermal modelling is based on the design information made available to Ridge & Partners LLP on the 19th June 2026.

3.1. Weather Files

The relevant most current CIBSE Design Summer Year (DSY) Weather File was chosen for the simulation (Manchester CIBSE DSY 1 2020's high emissions 50th percentile range weather file), in accordance with the Part O requirement to follow CIBSE TM59:2017 *"Design methodology for the assessment of overheating risk in homes"*.

Figures 6 and 7 below illustrate the summertime temperature range (May – September) for both the dry bulb and wet bulb temperature for Manchester DSY 1 from the weather file.

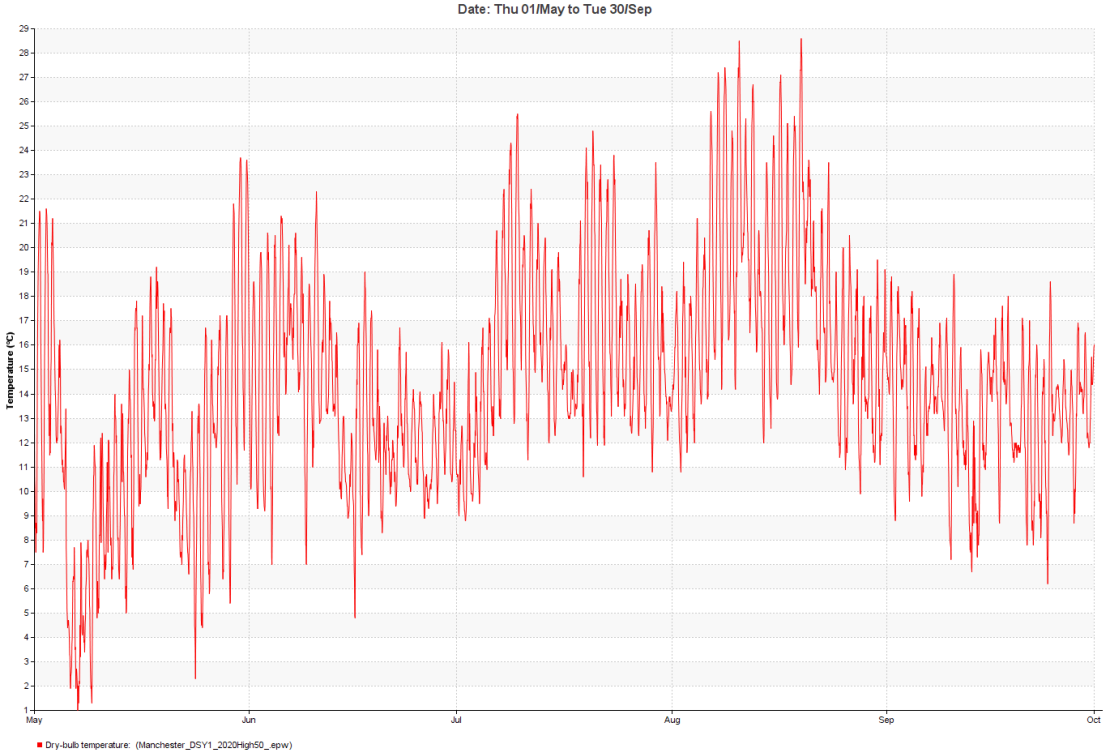


Figure 6: Graph showing summertime temperature range (May – September) for dry bulb temperature for Manchester DSY 1 from the weather file.

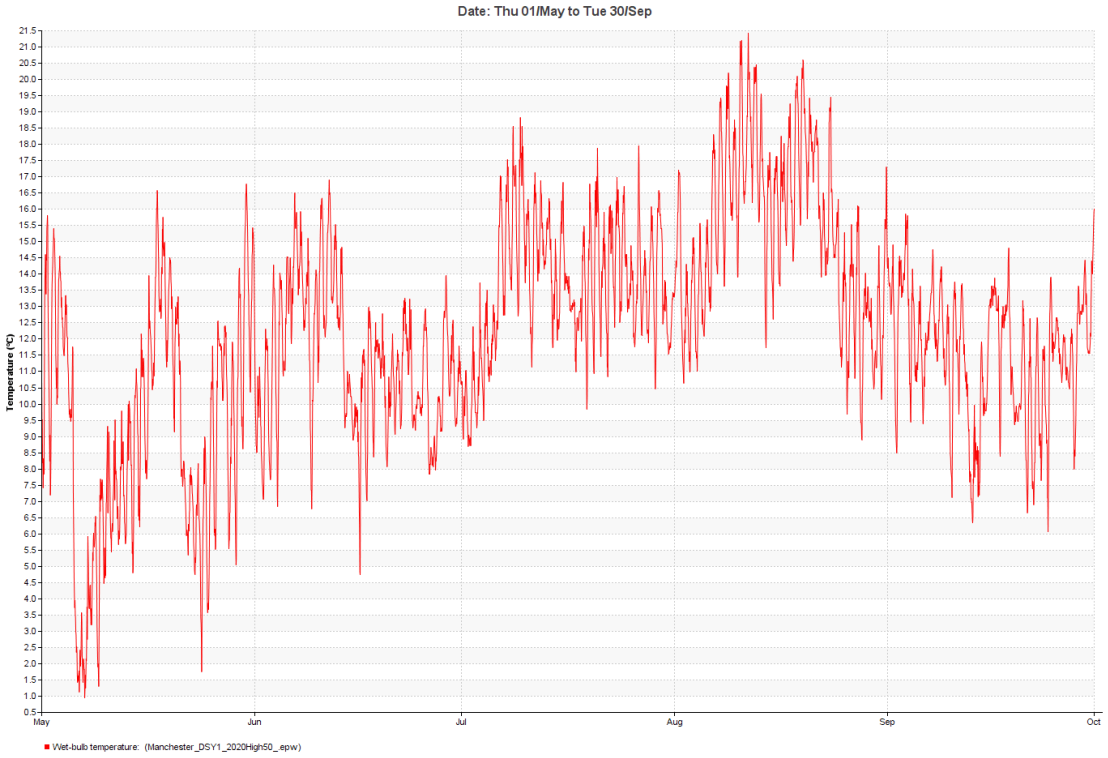


Figure 7: Graph showing summertime temperature range (May – September) for wet bulb temperature for Manchester DSY 1 from the weather file.

Table 1 below illustrates the maximum dry bulb and wet bulb temperature for Manchester DSY 1 from the weather file.

WEATHER FILE	MAX. DRY BULB TEMPERATURE	MAX. WET BULB TEMPERATURE
Manchester _DSY1_2020High50	28.60	21.42

Table 1: Table showing the maximum dry and wet bulb temperatures for Manchester DSY 1 from the weather file.

3.2. Building Fabric Parameters

Table 2 below shows a summary of fabric elements used in the thermal model for the proposed TIDE Boyds Walk development.

FABRIC ELEMENT	U-VALUE (W/M2.K)	G-VALUE
External Wall	0.16	-
Floors	0.10	-

FABRIC ELEMENT	U-VALUE (W/M2.K)	G-VALUE
Flat roof	*See Appendix A for U-values	-
Window	1.01	0.4
Air Permeability rate = 3 m3/h.m2		

Table 2: Table showing the fabric elements and U-values

3.3. Room Input Data

Table 3 below is a summary of room input data used for thermal modelling calculations. The building occupancy profiles & parameters published in CIBSE TM59:2017 "Design methodology for the assessment of overheating risk in homes" has been used as guidance, in accordance with the guidance given in Approved Document Part O.

ENVIRONMENTAL ROOM TYPE	GAIN TYPE	DETAILS
PBSA Studio	Lighting	2 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 1800-2300, this assumes good day light is available in the summer months where overheating is assessed.
	Occupancy	1 occupant, each generating 75W sensible, 55W latent heat gain with an occupancy profile of 75% between 0900 to 2200 and a 0% occupancy profile between 2200-0900.
	Equipment	Peak Sensible Gain of 450W between 1800 to 2000, 200W Sensible Gain between 2000 to 2200, 110W Sensible Gain between 0900 to 1800 and 2200 to 2400, with a base load of 85W for the rest of the day
	Ventilation	Mixed-mode ventilation (daytime natural ventilation + continuous MVHR
PBSA Cluster	Lighting	2 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 1800-2300, this assumes good day light is available in the summer months where overheating is assessed.
	Occupancy	1 occupant, each generating 75W sensible, 55W latent heat gain with an occupancy profile of 25% between 0900 to 2200 and a 0% occupancy profile between 2200-0900.

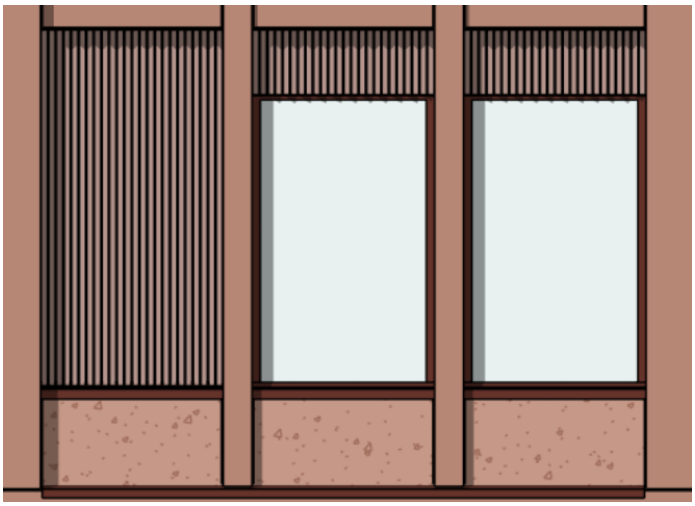
ENVIRONMENTAL ROOM TYPE	GAIN TYPE	DETAILS
	Equipment	Peak Sensible Gain of 450W between 1800 to 2000, 200W Sensible Gain between 2000 to 2200, 110W Sensible Gain between 0900 to 1800 and 2200 to 2400, with a base load of 85W for the rest of the day
	Ventilation	Mixed-mode ventilation (daytime natural ventilation + continuous MVHR
Studio	Lighting	2 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 1800-2300, this assumes good day light is available in the summer months where overheating is assessed.
	Occupancy	2 occupants, each generating 75W sensible, 55W latent heat gain with an occupancy profile of 75% between 0900 to 2200 and a 0% occupancy profile between 2200-0900.
	Equipment	Peak Sensible Gain of 450W between 1800 to 2000, 200W Sensible Gain between 2000 to 2200, 110W Sensible Gain between 0900 to 1800 and 2200 to 2400, with a base load of 85W for the rest of the day
	Ventilation	Mixed-mode ventilation (daytime natural ventilation + continuous MVHR
1 Bed	Lighting	2 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 1800-2300, this assumes good day light is available in the summer months where overheating is assessed.
	Occupancy	2 occupants, each generating 75W sensible, 55W latent heat gain with an occupancy profile of 25% between 0900 to 2200 and a 0% occupancy profile between 2200-0900.
	Equipment	Peak Sensible Gain of 450W between 1800 to 2000, 200W Sensible Gain between 2000 to 2200, 110W Sensible Gain between 0900 to 1800 and 2200 to 2400, with a base load of 85W for the rest of the day
	Ventilation	Mixed-mode ventilation (daytime natural ventilation + continuous MVHR
2 Bed	Lighting	2 W/m² Sensible Heat Gain with a 0.45 Radiant fraction has been applied between the hours of 1800-2300, this

ENVIRONMENTAL ROOM TYPE	GAIN TYPE	DETAILS
		assumes good day light is available in the summer months where overheating is assessed.
	Occupancy	4 occupants, each generating 75W sensible, 55W latent heat gain with an occupancy profile of 25% between 0900 to 2200 and a 0% occupancy profile between 2200-0900.
	Equipment	Peak Sensible Gain of 450W between 1800 to 2000, 200W Sensible Gain between 2000 to 2200, 110W Sensible Gain between 0900 to 1800 and 2200 to 2400, with a base load of 85W for the rest of the day
	Ventilation	Mixed-mode ventilation (daytime natural ventilation + continuous MVHR

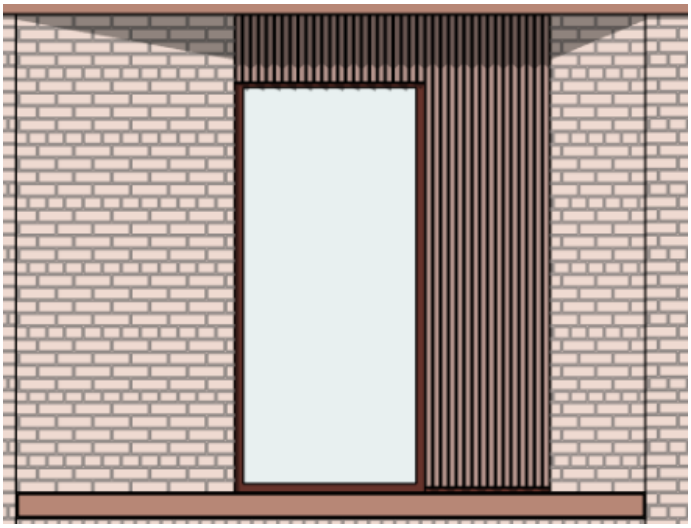
Table 3: Table showing the internal gains to different room types.

3.4. Openings

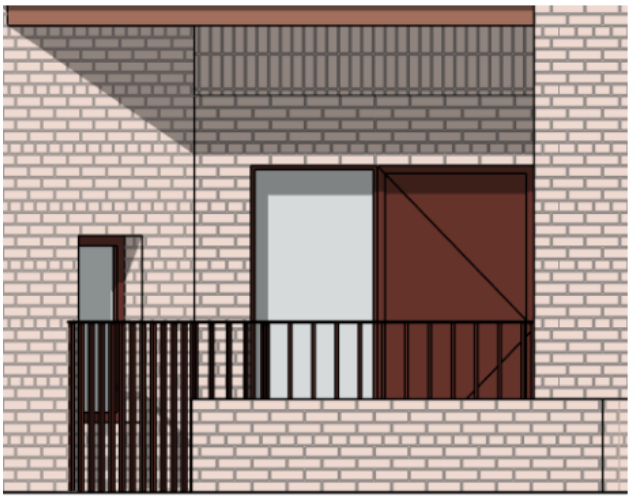
The images below show the window details as seen on the elevation drawing, made available to Ridge & Partners LLP on the 19th June 2026.



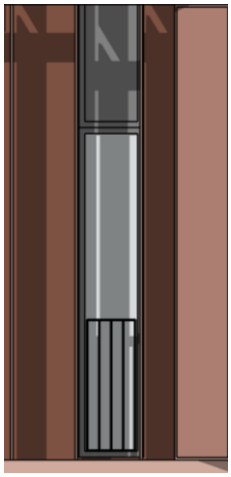
Opening 1 – Block A, Block B, Block C window



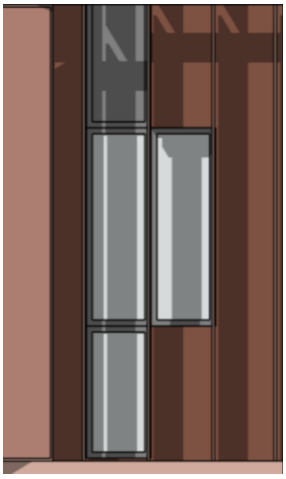
Opening 2 – Block A, Block B, Block C window



Opening 3 – Block B townhouse window



Opening 4 – Block D window



Opening 5 – Block D window

Table 4 below is a summary of openings and profiles used for thermal modelling calculations.

OPENING	WINDOW DIMENSIONS	WINDOW AREA (M^2)	EQUIVALENT ORIFICE AREA (M^2)	OPENING PROFILE
1	1.0m x 1.7m	1.7	0.85	Between 0800-2300, start to open when the internal temperature exceeds 22°C, be fully open at 26°C and start to close when the internal temperature falls below 26°C and fully closed below 22°C. The windows are closed from 2300-0800 regardless of the internal temperature.
2	0.70m x 2.3m	1.495	0.7475	Between 0800-2300, start to open when the internal temperature exceeds 22°C, be fully open at 26°C and start to close when the internal temperature falls below 26°C and fully closed below 22°C. The windows are closed from 2300-0800 regardless of the internal temperature.
3	0.55m x 1.2m	0.66	0.66	Between 0800-2300, start to open when the internal temperature exceeds 22°C, be fully open at 26°C and start to close when the internal temperature falls below 26°C and fully closed below 22°C. The windows are closed from 2300-0800 regardless of the internal temperature.

OPENING	WINDOW DIMENSIONS	WINDOW AREA (M^2)	EQUIVALENT ORIFICE AREA (M^2)	OPENING PROFILE
4	0.4m x 2.2m	1.04	1.04	Between 0800-2300, start to open when the internal temperature exceeds 22°C, be fully open at 26°C and start to close when the internal temperature falls below 26°C and fully closed below 22°C. The windows are closed from 2300-0800 regardless of the internal temperature.
5	1.0m x 1.1m	1.1m	1.10	Between 0800-2300, start to open when the internal temperature exceeds 22°C, be fully open at 26°C and start to close when the internal temperature falls below 26°C and fully closed below 22°C. The windows are closed from 2300-0800 regardless of the internal temperature.

Table 4: Table showing the window openings and profiles.

4. RESULTS AND CONCLUSIONS

As detailed within Section 2 of this report, for the cluster bedrooms, studios & apartments to achieve compliance with Approved Document Part O, the criteria given within CIBSE TM59:2017 must be achieved.

Because the cluster bedrooms, studios & apartments within the proposed development require windows be closed at night, Section 4.3 of CIBSE TM59:2017 applies, which requires the following criteria to be met:

4.3 Criteria for homes predominantly mechanically ventilated
For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26 ˚C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

The table below shows the predicted thermal comfort results against the mechanical ventilation criteria for each of the assessed rooms within the proposed development using the Manchester CIBSE DSY 1 2020's high emissions 50th percentile range weather file.

4.1. Approved Document Part O - Criteria

BLOCK - LEVEL	ROOM NAME	% HOURS EXCEEDED	PASS/FAIL
Block A – GF	Studio	0.95	Pass
Block A – Level 1	Studio	0.35	Pass
Block A – Level 5	Studio	1.41	Pass
Block A – Level 7	Studio	0.58	Pass
Block A – Level 8	Studio	1.95	Pass
Block B - GF	Studio	0.24	Pass
Block B – Level 3	Studio	1.14	Pass
Block B – Level 5	Studio	1.17	Pass
Block C - GF	Studio	0.57	Pass
Block C - GF	Bedroom	0.56	Pass
Block C – Level 1	Studio	0.38	Pass
Block C – Level 1	Bedroom	1.25	Pass

BLOCK - LEVEL	ROOM NAME	% HOURS EXCEEDED	PASS/FAIL
Block C – Level 2	Studio	0.30	Pass
Block C – Level 2	Bedroom	0.56	Pass
Block C – Level 3	Studio	0.16	Pass
Block C – Level 3	Bedroom	1.06	Pass
Block C – Level 4	Studio	0.29	Pass
Block C – Level 4	Bedroom	0.90	Pass
Block C – Level 9	Studio	2.04	Pass
Block C – Level 9	Bedroom	1.05	Pass
Block D – Level 2	2 Bed	0.57	Pass
Block D – Level 2	KLD	1.43	Pass
Block D – Level 3	2 Bed	0.88	Pass
Block D – Level 3	KLD	2.05	Pass
Block D – Level 5	Studio	0.95	Pass
Block D – Level 5	2 Bed	0.64	Pass
Block D – Level 5	2 Bed	0.82	Pass

5. LIMITATIONS OF THIS REPORT

The parameters used in this calculation are provided within Section 3 of this report and are deemed to be approved by the Client unless advised to the contrary. The equivalent orifice area for each opening type to mitigate overheating has been included in this report in addition to the required Mechanical Extract Ventilation rate to the rooms which require it.

It should be noted that as occupancy and building use is based on set parameters outlined in Approved Document Part O and CIBSE TM59:2017, there is no guarantee the temperatures estimated will match the actual building temperatures as the 'real' building may have differing operations and heat gain patterns with external weather conditions not normal to the historical data provided by the standard CIBSE weather files. It therefore should be noted that there is no guarantee that the thermal comfort assessment will match the occupied building.

6. APPENDIX A

Appendix A shows the roof u-values over the four.

