

Block 6 Royal Elm Park

Overheating Report

BY: Cudd Bentley Consulting Ltd

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BLOCK 6 ROYAL ELM PARK
OVERHEATING ANALYSIS
ISSUED

RECORD OF REVISIONS

Date.	Revision.	Description of change.
09/10/2025	001	First Issue

BLOCK 6 ROYAL ELM PARK OVERHEATING ANALYSIS ISSUED

1. INTRODUCTION

Cudd Bentley Consulting have produced a thermal model for the proposed Block 6 Royal Elm Park in order to assess the modelling inputs to comply with TM59 overheating design criteria. Thermal modelling has been undertaken in line with CIBSE TM59 guide. The software used to carry out the modelling is IESVE 2025 which is approved software of CIBSE AM11.

The assigned thermal template for the overheating is shown in Figure 1.1 below.

Thermal Template
■ TM59 - 2 Bedroom - Living / Kitchen
■ TM59 - Circulation - in flats
■ TM59 - Double Bedroom 1
■ TM59 - Single Bedroom 1
■ Void

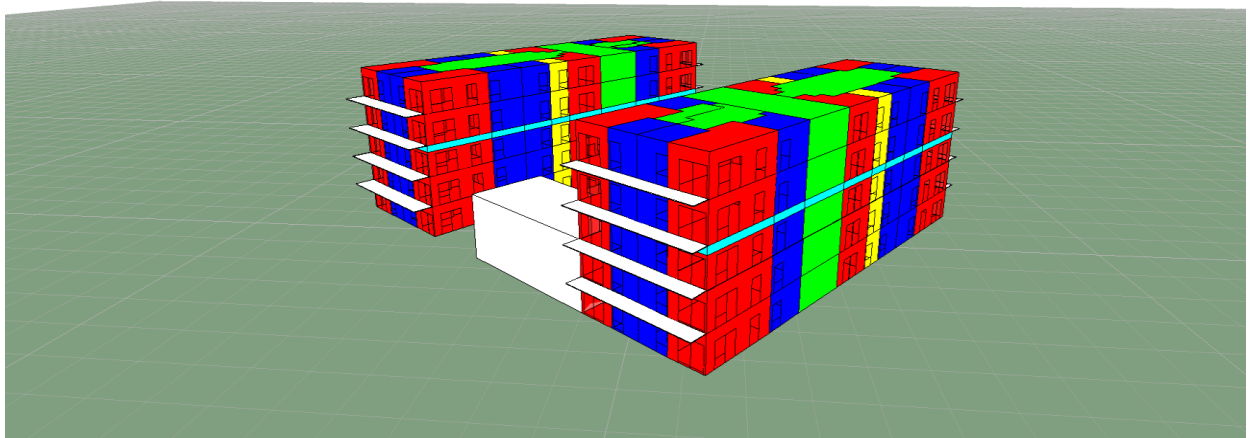


Figure 1.1 – Assigned thermal templates Model View

Opening Type
■ XTRN0000 (External window opening)
■ XTRN0001 (Long Wall Top Hung window opening)
■ XTRN0002 (Short Wall Top Hung window opening)
■ XTRN0006 (Fixed window opening)
■ XTRN0007 (Long Wall Side Hung window opening)
■ XTRN0008 (Lounge Side Hung window opening)

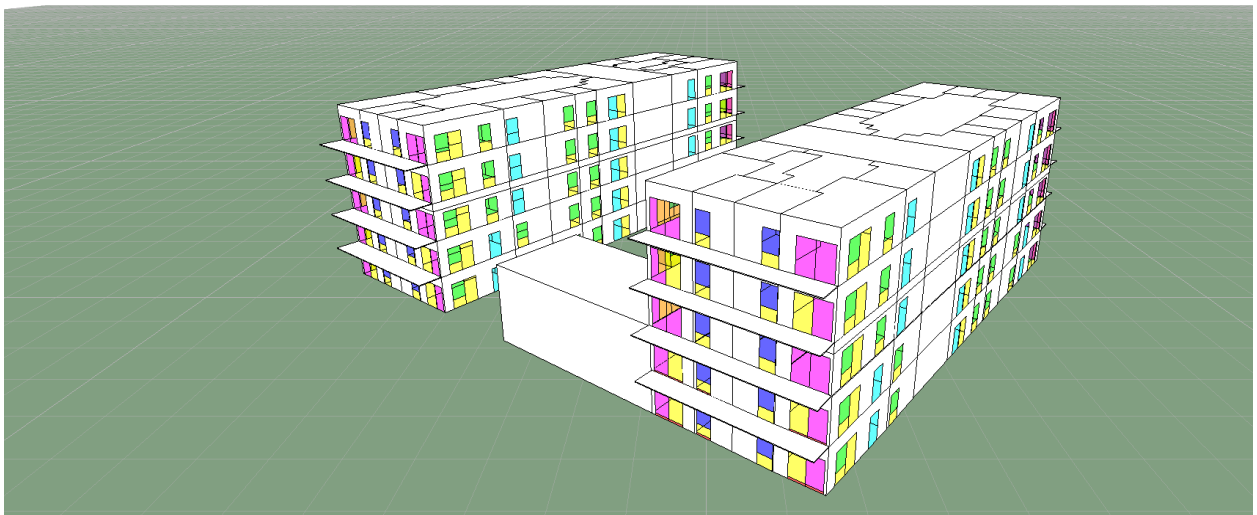


Figure 1.2 – Assigned Windows Openings Profiles View

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The simulation was conducted on sample 3rd floor of the development, but the results can be extended across all floors. Therefore, it can be concluded that through the use of the proposed ventilation strategy, all rooms will comply with the TM59 criteria



Figure 1.3 – Architectural Floor Plan

2. METHODOLOGY AND ASSESSMENT CRITERIA

Assessment Methodology

CIBSE TM59:2017 –

Design Methodology for Assessment of Overheating Risk in Homes, sets a standardised approach to predicting overheating risk for residential building designs (new-build or major refurbishment) using dynamic thermal analysis.

This document provides a set of profiles that represent reasonable usage patterns for a home suitable for evaluating overheating risk. Where possible the magnitude of gains is taken from CIBSE guidance. Profiles are developed to test the building design, not to cover all usage modes.

Where possible assumptions for heat and solar gains are taken from established CIBSE guidance. Profiles are developed to test the building design, not to cover all or unusual usage modes, albeit different profiles exist for different groups of occupants.

The TM59 methodology:

- allows different designs to be compared with a common approach, based on set assumptions for occupancy and internal gains
- supports design decisions that improve comfort without cooling
- provides consistency across the industry as all consultants will be using the same methodology for overheating risk prediction

This methodology will not:

- guarantee that people will always be comfortable in compliant spaces, however they act
- take into account unusual use.

Modelling Software

The Dynamic Simulation Modelling (DSM) software IES VE 2024 is utilised to carry out the overheating assessment. IES VE is a recommended design tool in accordance with CIBSE AM11: Building Energy and Environmental Modelling.

Assessment Criteria

TM59 sets overheating compliance criteria for homes that are predominantly naturally ventilated.

For homes that are predominantly naturally ventilated, two criteria's were assessed for overheating. The first criteria, applies to both living rooms/kitchens and bedrooms, whereas, the second overheating criteria only applies to bedrooms. Both criteria must be met for all spaces within a residential unit to demonstrate compliance with CIBSE TM59 guide.

The TM59 criteria for predominantly naturally ventilated homes is summarised in Table 2.1.

Assessment Criteria	Applicable Rooms	Predominantly Naturally Ventilated Homes (openable windows)
Criterion 1	Living rooms, kitchens and bedrooms	The number of hours during which external and internal temperature difference is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3% of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance)

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Criterion 2	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. 33 or more hours above 26°C will be a fail
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Table 2.1 – TM59 criteria for Overheating

Weather Data

The Proposed Development is located within the Reading therefore, London Heathrow (LHR) data has been used:

Table 2.2 - Weather Data Sets Used for the Overheating Analysis

Space	Weather File
Residential Areas	LHR DSY 1 2020s 50th percentile as per CIBSE TM 59.

Table 2.2 – Weather Data File

3. DESIGN PARAMETERS

The following design parameters have been utilised within the thermal model.

3.1. CONSTRUCTION ELEMENTS

The following U- values and construction detailed have been used within the thermal model:

- *External Walls - $U = 0.15 \text{ W/m}^2.\text{K}$;*
- *Exposed Floors - $U = 0.18 \text{ W/m}^2.\text{K}$;*
- *Exposed Roofs - $U = 0.18 \text{ W/m}^2.\text{K}$;*
- *Glazing - $U = 1.4 \text{ W/m}^2.\text{K}$; G value of 0.36; Light transmission = 65%; Shading Coefficient = 41%*
- *Air Permeability - $3 \text{ m}^3/\text{hr}/\text{m}^2 @ 50 \text{ Pa}$; .*

Below and in Figure 3.1, room and glazing dimensions modelled are summarised, based on architectural design:

- *Glazing height: 2200mm*
- • *Fixed Part of the Window*

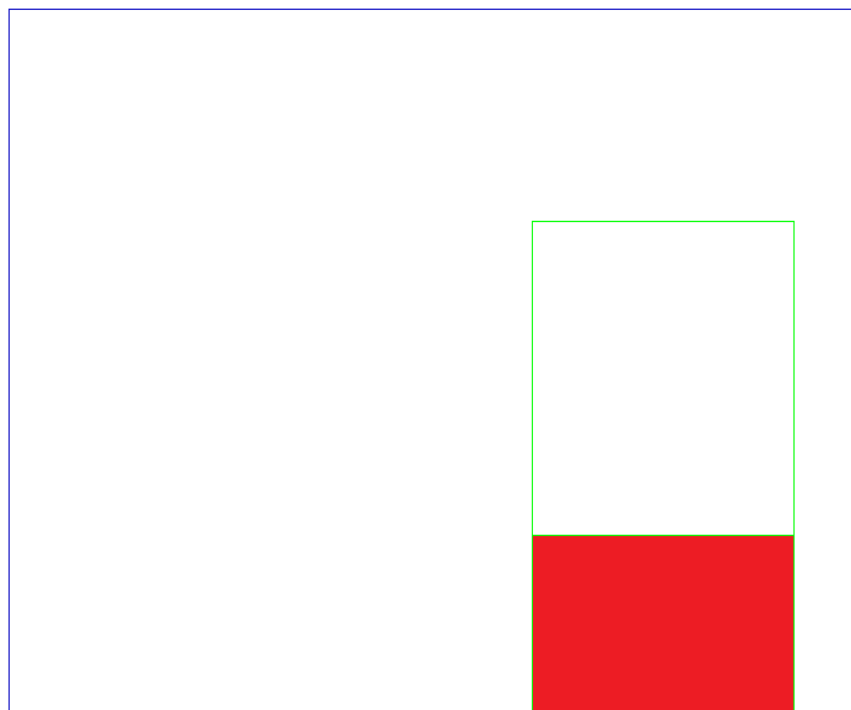


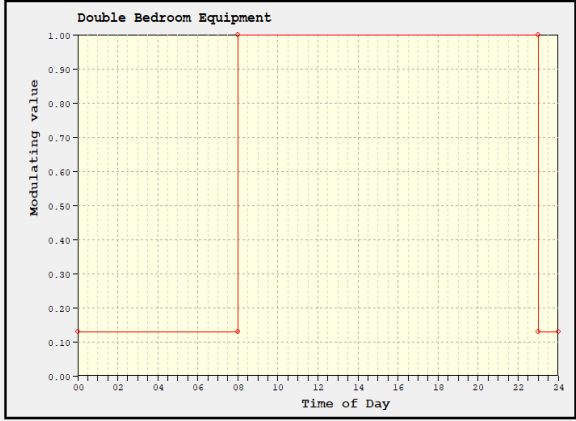
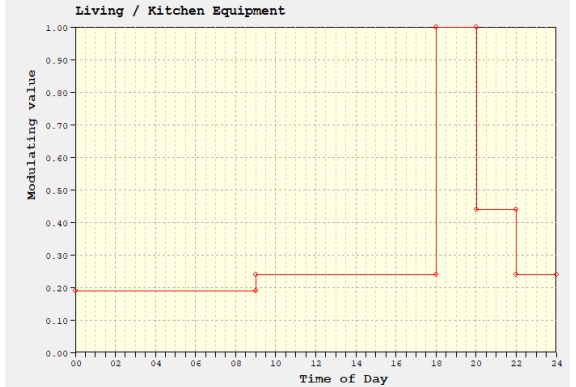
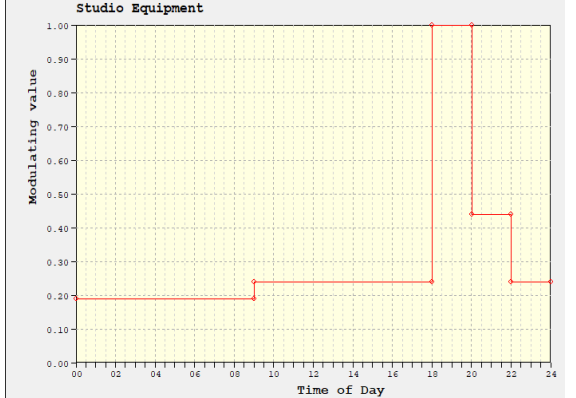
Figure 3.1 – Top hung Windows

3.2. TM59 PROFILES

The internal gains and occupancy gains have been assigned as shown in Table 3.1 and 3.2. It should be noted that the internal gains used for this assessment are based on the guidance provided in CIBSE TM59 (2017). The following heat gains have been implemented within the thermal model as defined in CIBSE guide TM59:

- *Equipment – 80 Watts (Bedrooms) 450 Watts (Lounge / Kitchen).*
- *Lighting - 2 W/m^2 .*

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Internal Gains	Relevant Spaces	Sensible Gain	IES Profile
Equipment's	Double Bedroom	80W	 Double Bedroom Equipment
Equipment's	Living and Kitchen area	450W	 Living / Kitchen Equipment
Equipment's	Studio	450W	 Studio Equipment

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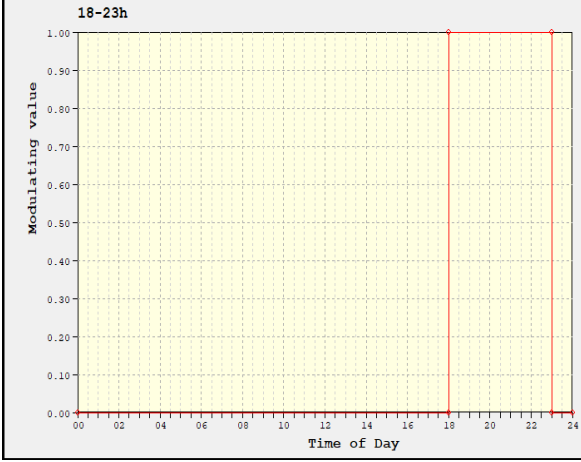
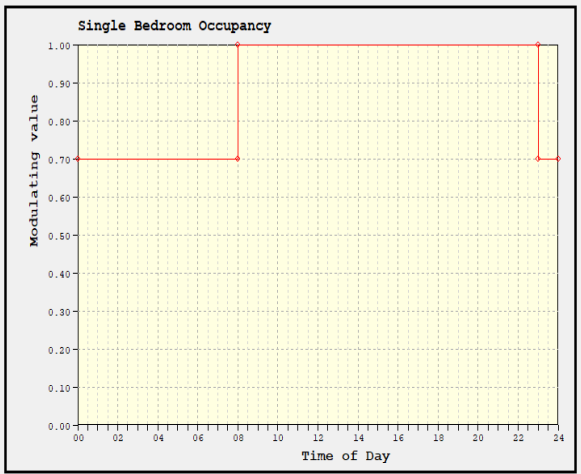
Lighting	Bedroom/living/kitchen and Studio	2W/m2	
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Table 3.1 – Internal Gains assigned within the thermal model

Room Reference	People	Sensible Gain and Laten Gains	Occupancy Profile
Single Bedroom	1	75 W/person, 55 W/person	

BLOCK 6 ROYAL ELM PARK OVERHEATING ANALYSIS ISSUED

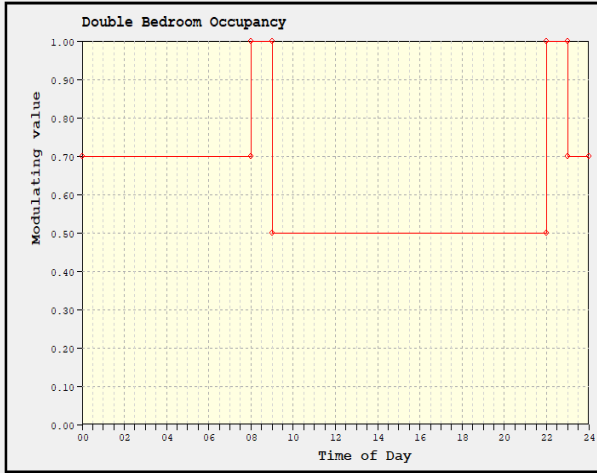
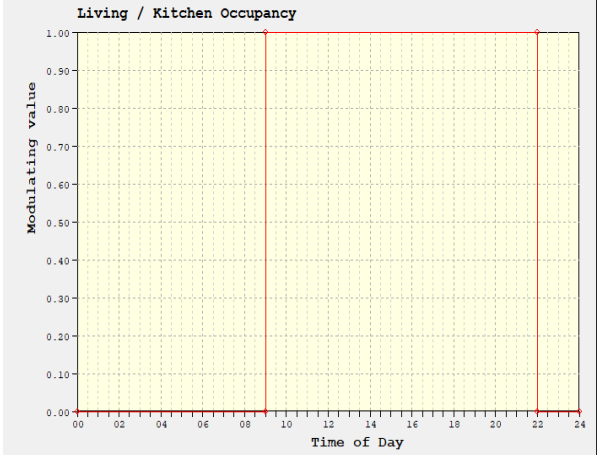
Double Bedroom	2	75 W/person, 55 W/person	
2 Bed - Living / Kitchen	2	75 W/person, 55 W/person	

Table 3.2 –Occupancy Gains assigned within the thermal model

3.3. WINDOWS OPENING

The windows into the model have been constructed as per architectural drawings. The windows are assumed openable if the room inside temperature exceeds 22C and relevant space is occupied as per CIBSE TM59.

Room	Opening Windows
Living Room/ Kitchen	Openable Balcony windows
Bedroom	Openable windows – top hung with 30° opening angle

Table 3.3 - window opening strategy

3.3.1. WINDOW OPENABILITY HOURS

The number of hours for windows to remain open if inside room temperature exceeds 22C from May to September (22.00 to 7.00) is an average of 286 hours. Please refer to the table below for a breakdown of window opening hours per room.

	No. Hours Window to be opened		No. Hours Window to be opened
3F-A1-BED1	306.1	3F-B1-BED1	301.1
3F-A1-BED2	251.2	3F-B1-BED2	233.2
3F-A1-L/K	205.3	3F-B1-L/K	182.3
3F-A2-BED1	386.9	3F-B2-BED1	380.9
3F-A2-BED2	242.2	3F-B2-BED2	257.2
3F-A2-L/K	199.3	3F-B2-L/K	215.2
3F-A3-BED1	262.2	3F-B3-BED1	274.2
3F-A3-BED2	375.9	3F-B3-BED2	401.9
3F-A3-L/K	310	3F-B3-L/K	337.9
3F-A4-BED1	301.1	3F-B4-BED1	302.1
3F-A4-BED2	276.2	3F-B4-BED2	294.1
3F-A4-L/K	184.3	3F-B4-L/K	207.3
3F-A5-BED1	384.9	3F-B5-BED1	385.9
3F-A5-BED2	261.2	3F-B5-BED2	251.2
3F-A5-L/K	203.2	3F-B5-L/K	196.3
3F-A6-BED1	275.2	3F-B6-BED1	254.2
3F-A6-BED2	405.2	3F-B6-BED2	397.9
3F-A6-L/K	322.9	3F-B6-L/K	284.1

Table 3.4 – Number of hours window to remain open

3.3.2. EXTERNAL SHADING

Balconies are included in the architectural design of the development. Balconies to each apartment are connected to the living rooms, providing shading at different times of the day to reduce heat gains.

3.4. VENTILATION STRATEGY

3.4.1. PASSIVE VENTILATION

Natural ventilation can be provided via openable windows and balcony doors. It is proposed that each apartment will have a dedicated mechanical ventilation system. The proposed mechanical ventilation systems have been modelled to supply the ventilation rates required for compliance with TM59. Windows and balcony doors are assumed to be open when the internal temperatures exceed 22°C and the external temperature is lower than the internal temperature.

Internal doors of bedrooms are assumed to be left open during the daytime and closed at night as per TM59 requirements. The living rooms are proposed to be left open during occupied hours to allow air movement and reduce overheating risks.

3.4.2. MECHANICAL VENTILATION

Mechanical ventilation has been utilized in the development. The control used for mechanical ventilation assumes it always on.

4. RESULTS

Table 4.1 shows the results from the dynamic simulation of the model against Criteria A and B with the required air changes.

- Criterion A is testing for the hours of exceedance for all bedrooms, kitchens, kitchen/dining rooms and living rooms. All rooms pass this criterion.
- Criterion B only applies to bedrooms and tests the hours that the temperature exceeds 26°C between 22:00 and 07:00 during the year. All bedrooms pass this criterion.

Bedrooms with 3ach & Lounges/Kitchens with 2ach

	Predominantly Natural Ventilated			
	Criterion A Target $\leq 3\%$	Pass/Fail	Criterion B Target < 33 hours	Pass/Fail
3F-A1-BED1	1.9	Pass	30	Pass
3F-A1-BED2	2.1	Pass	22	Pass
3F-A1-L/K	2.6	Pass	N/A	Pass
3F-A2-BED1	0.8	Pass	31	Pass
3F-A2-BED2	1.3	Pass	21	Pass
3F-A2-L/K	2.4	Pass	N/A	Pass
3F-A3-BED1	2.5	Pass	22	Pass
3F-A3-BED2	0.8	Pass	29	Pass
3F-A3-L/K	2.8	Pass	N/A	Pass
3F-A4-BED1	2.3	Pass	30	Pass
3F-A4-BED2	0.7	Pass	22	Pass
3F-A4-L/K	2.6	Pass	N/A	Pass
3F-A5-BED1	0.9	Pass	31	Pass
3F-A5-BED2	2.2	Pass	22	Pass
3F-A5-L/K	2.4	Pass	N/A	Pass
3F-A6-BED1	2.1	Pass	26	Pass
3F-A6-BED2	0.8	Pass	32	Pass
3F-A6-L/K	2.3	Pass	N/A	Pass
3F-B1-BED1	2.3	Pass	30	Pass
3F-B1-BED2	1.2	Pass	21	Pass
3F-B1-L/K	2.6	Pass	N/A	Pass
3F-B2-BED1	1.0	Pass	32	Pass

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3F-B2-BED2	2.2	Pass	22	Pass
3F-B2-L/K	2.6	Pass	N/A	Pass
3F-B3-BED1	2.3	Pass	26	Pass
3F-B3-BED2	1.7	Pass	32	Pass
3F-B3-L/K	2.6	Pass	N/A	Pass
3F-B4-BED1	1.9	Pass	30	Pass
3F-B4-BED2	1.4	Pass	24	Pass
3F-B4-L/K	2.8	Pass	N/A	Pass
3F-B5-BED1	0.7	Pass	30	Pass
3F-B5-BED2	1.4	Pass	22	Pass
3F-B5-L/K	2.4	Pass	N/A	Pass
3F-B6-BED1	2.5	Pass	22	Pass
3F-B6-BED2	0.5	Pass	30	Pass
3F-B6-L/K	2.7	Pass	N/A	Pass

Table 4.1 –Criteria A and B overheating results

5. CONCLUSION

The TM59 assessment, carried out by Cudd Bentley Consulting, has confirmed that the proposed design of Block 6 Royal Elm Park development complies with the CIBSE TM59 guide. The assessment has been undertaken using predominantly naturally ventilated scenario, ensuring that the design utilises passive ventilation strategies as well as mechanical ventilation to maintain comfortable indoor conditions in line with CIBSE TM59 criteria. The analysis verified that the building design meets the TM59 overheating standard using design criteria listed in section 3 above.

After running TM59 thermal model, it can be confirmed that the following ventilation rates are required for CIBSE TM59 compliance:

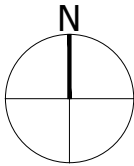
- *2 air change in all Lounges/Kitchens across*
- *3.0 air changes in all bedrooms*

APPENDIX A – ACH MARKUP



The scaling of this drawing cannot be assured

Revision	Date	Drm	Ckd
P1 - Semi Design Freeze	30.06.25	CB	MK
P2 - Design Freeze	05.09.25	CB	MK



Project
Royal Elm Park
Block 6

Drawing Title
Proposed 3rd Floor Plan

Date
20.05.25

Scale
1:200 @A1
1:xx @A3

Drawn by
mk

Check by
pj

Project No
333101170

Drawing No
LN-A-SK104

Revision
P2





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