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— MANAGEMENT —



MOSS LANE EAST – STUDENT ACCOM

CIBSE TM59 Overheating Analysis



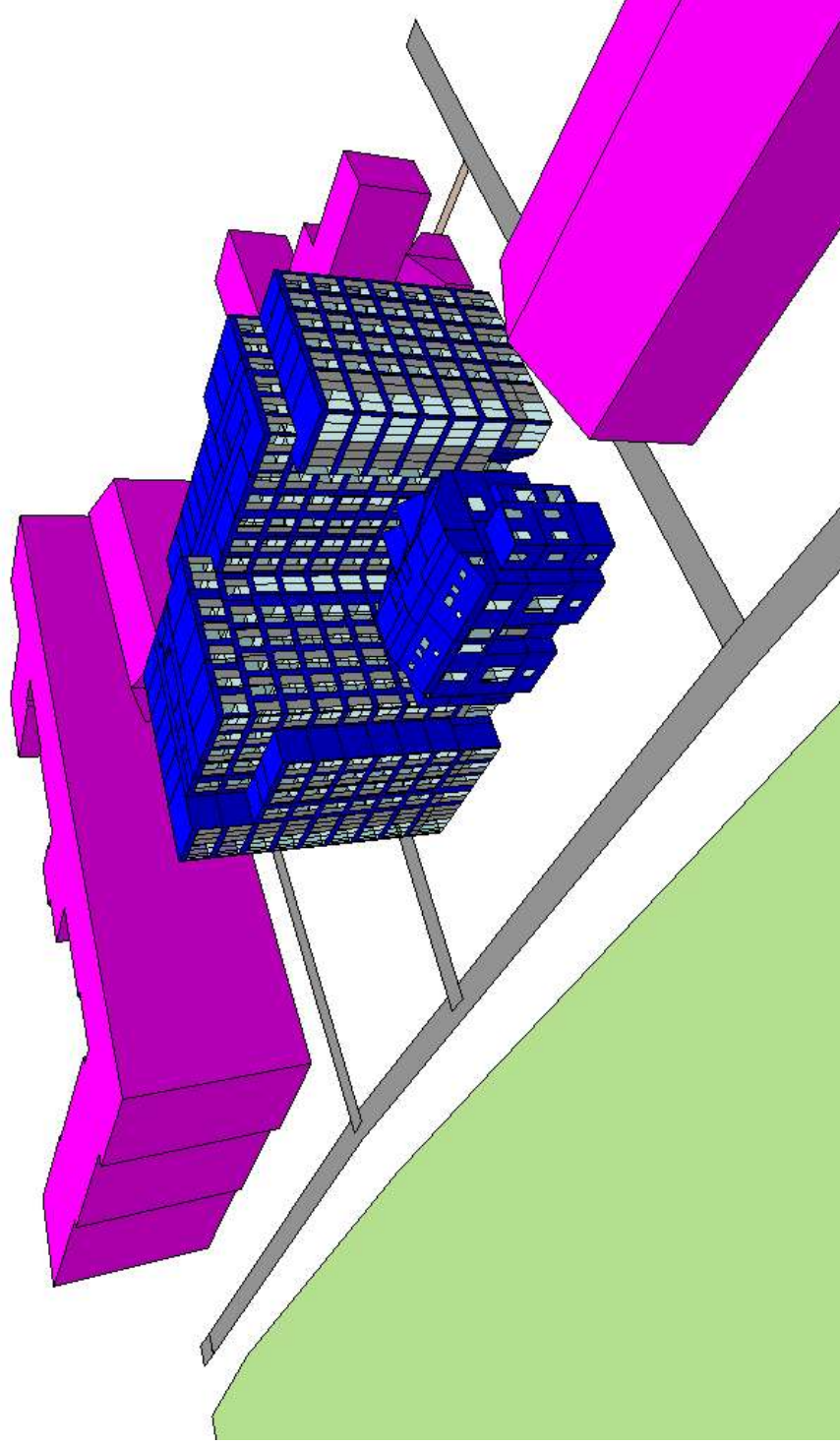
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Moss Lane East, Student Accommodation, Manchester

CIBSE TM59 Overheating Analysis

22668



PREPARED BY:
COMPLETE SUSTAINABILITY SOLUTIONS
76 KING STREET
MANCHESTER
M2 4NH



TM59 OVERHEATING REPORT OF MOSS LANE EAST, MANCHESTER
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Prepared by:	Signature	Date
Ben Dibb-Fuller	BDF	12.11.24

Revision Record			
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-	12.11.24	BDF	

1 EXECUTIVE SUMMARY

An overheating assessment has been undertaken for the proposed student accommodation scheme at Moss Lane East in Manchester. The assessment analyses both the proposed new nine-storey accommodation block and the refurbished existing building, to demonstrate the potential conditions and risk of overheating.

The overheating assessment has been carried out with the guidance set out in CIBSE TM59: *Design Methodology for the Assessment of Overheating in Homes*. The methodology aims to produce a test that encourages good design that is comfortable within sensible limits while prioritising passive measures to achieving compliance against the overheating assessment criteria. A TM59 results table for each of the assessed dwellings has been produced and can be seen in the appendices.

The residential spaces have been assessed against the DSY1 weather file to determine the likelihood of overheating to occur, with the proposed building created in the IES VE software modelled to a high level of detail and accuracy to stress-test the proposed overheating strategy.

Natural ventilation via unrestricted (openable beyond 100mm restrictors) opening windows forms the predominant overheating mitigation strategy, however due to the busy city centre location of the site, window openings are limited to a maximum of 4 hours per day in accordance with the latest acoustic report. The openings to communal cluster kitchen/dining/living spaces are modelled to open between the hours of 3pm and 7pm, whilst bedroom and studios between 7pm and 11pm (both when internal temperatures exceed 22°C as per TM59 guidance).

Mechanical ventilation by MEV (Mechanical Extract Ventilation) also forms the overheating strategy, which has been modelled to meet the Approved Document F minimum requirements for continuous extract ventilation (known as system 3). However, modelling has found that boosted overheating flow rates (manually or automatically controlled via boost switches) are required to help remove excess heat in both communal kitchen/dining/living (KLD) and bedroom spaces to ensure comfortable internal conditions are maintained, which is modelled to operate in line with the window opening temperature threshold of 22°C. The trickle flow and boosted overheating rates required are detailed within this report.

Glazing g values of 0.53 (North and East elevations) and 0.40 (South and West elevations) are proposed to prevent excessive solar gains. Internal blinds have not been considered in the modelling, however, they should be on the specification to allow for residents mitigate the effects of direct solar gains.



Figure 1: CGI Image of the proposed student accommodation scheme at Moss Lane East (Source: Stellan-Brand Architects)

Assessment findings

The assessment found the assessed dwellings are able to meet the TM59 overheating criteria and therefore achieve TM59 compliance with the building design described in this report. A summary of measures that form the overheating mitigating strategy include:

- Natural ventilation via window openings as per the architectural drawings
- Window openings to be opened to maximal permissible opening angles in accordance with Approved Document K (safeguarding measures required)
- Glazing solar performance (g value) of 0.53 (north and east) and 0.40 (south and west elevations)
- No Internal blinds considered during overheating assessment
- Continuous MEV to all assessed spaces, with overheating boost mode (required flow rates detailed within report)
- Studio apartments on floors 07 and 08 of main block require a higher boosted mechanical ventilation rate to those on lower floors.

The summary results table below details the overheating assessment findings of the assessed dwellings:

Space Type	Number of Spaces	Location	Overheating Strategy Summary	TM59 Compliance	Notes	Results
Cluster Bedroom	208	New Block	• Natural Ventilation via unrestricted window openings (openable beyond 100mm) • Window openings restricted to 4 hours per day as per acoustic report recommendations • Glazing g values of 0.53 (to North and East elevations) and 0.40 (to South and West elevations) • MEV with overheating boosted rate as detailed within report	☒	Proposed Overheating strategy sufficient	Appendix A
Studio Apartment	36			☒	Proposed Overheating strategy sufficient	Appendix B
Cluster Kitchen/Living/Dining	29			☒	Proposed Overheating strategy sufficient	Appendix C
Studio Apartment	18	Refurbished Block		☒	Proposed Overheating strategy sufficient	Appendix D
Studio Additional Bedrooms	4			☒	Proposed Overheating strategy sufficient	Appendix E

2 INTRODUCTION

2.1 PROJECT SCOPE

This report has been prepared in support of the planning application only for the proposed new nine-storey accommodation block containing 208 cluster bedrooms, 36 studio apartments and 29 cluster communal kitchen/dining/living spaces. The refurbishment of the listed building overlooking Whitworth Park, converting the building to contain 18 studio apartments, with an additional bedroom to four of these studio's, is also included in this report. Existing buildings surrounding the site have been modelled as accurately as possible as this may offer some advantageous shading to the main and refurbished blocks.

This report assesses the overheating risk of all TM59 related spaces within the building. The intention is that this study helps inform and verify the design proposals, thereby providing the basis for mitigating overheating risk and producing a building that provides comfortable environmental conditions for occupants.

It is important to note that with any modelling exercise there are assumptions and approximations that have to be made. As far as possible, details of all assumptions and approximations are supplied within the report. These were predominantly informed by information provided by design team and should be reviewed carefully.

All results are based on the output from computer modelling software and should be taken as an indication of the likely final situation, but these conditions cannot be guaranteed.

Moreover, this Overheating Assessment across the development supports the Planning Application and demonstrate that the proposed development complies with the relevant current guidance CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes (2017).

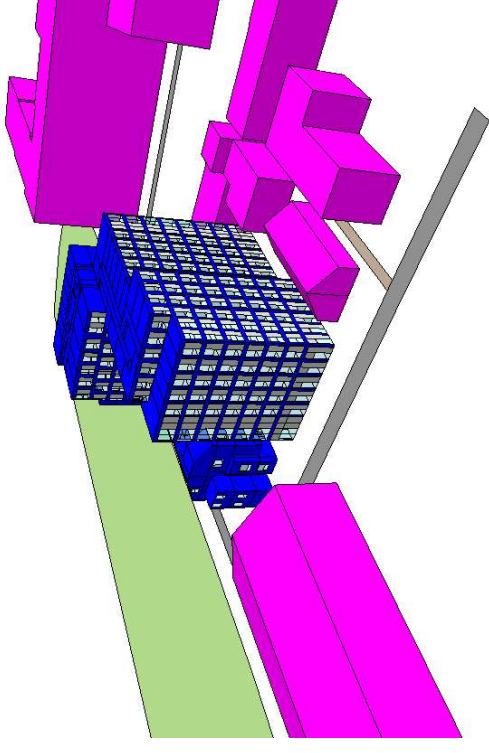


Figure 2: IES model image (top) and CGI Image (Bottom) of the proposed student accommodation scheme at Moss Lane East

2.2 PROJECT SITE PLAN

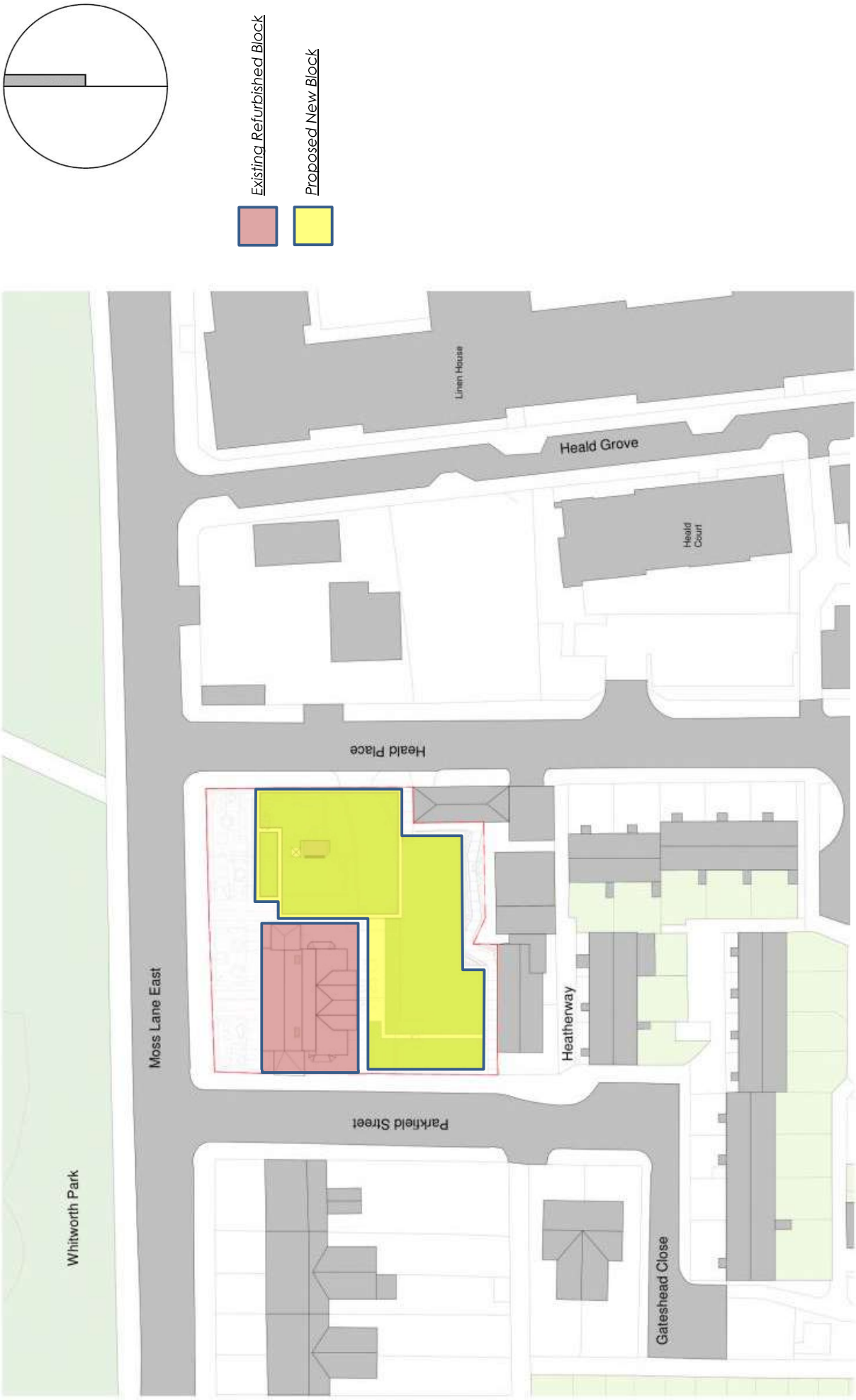


Figure 3: Site Block Plan of Proposed Development

3 OVERHEATING ASSESSMENT CRITERIA

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

For homes that are predominantly naturally ventilated, the method with two criteria should be used to assess overheating. The first overheating criteria, which applies to both living rooms/kitchens and bedrooms, is an adaptive criteria. The second overheating criterion is a fixed temperature criteria which applies only to bedrooms. Both criteria must be met for all spaces within a home to demonstrate compliance.

For mechanically ventilated homes, the fixed temperature method with a single criterion should be used to assess overheating. This single criterion must be met for all spaces (living rooms/kitchens and bedrooms) within a mechanically ventilated home to demonstrate compliance.

The TM59 criteria for naturally and mechanically ventilated homes are summarised in the following table. The dwellings in this assessment are assessed against 'predominantly naturally ventilated' criteria.

All criteria must be met for all spaces within a home to demonstrate full compliance.

Table 3: Overheating Assessment Categorisation

Assessment Type	Assessment Criteria	Applicable Rooms	Occupied Hours	Naturally Ventilated Homes (open windows)	Mechanically Ventilated Homes (closed windows)
Predominantly Natural Ventilation	Criterion 1	Living rooms, kitchens and bedrooms	Living / Kitchen / Dining rooms – 9am to 10pm (13 hours/day) Bedrooms – 24-hour occupancy	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.	Not Applicable
	Criterion 2	Bedrooms only	Bedrooms – 24-hour occupancy	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	Not Applicable
Predominantly Mechanical Ventilation	Criterion 3	Living rooms, kitchens and bedrooms	Living / Kitchen / Dining rooms – 9am to 10pm (13 hours/day) Bedrooms – 24-hour occupancy	Not applicable	The operative temperature in all occupied rooms should not exceed 26°C for more than 3% of the occupied annual hours. 143 or more hours above 26°C for living rooms and kitchens will be a fail. 263 or more hours above 26 °C for bedrooms will be a fail

4 DESIGN CRITERIA

The following general criteria have been used throughout the simulation:-

4.1 AIR PERMEABILITY

An air infiltration rate of 0.20ACH has been applied to the building based on Table 4.24 of CIBSE Guide A.

4.2 EXTERNAL ENVELOPE

The following U-values have been used:-

Element	Proposed U-value (W/m ² K)	Part L1A U-value (W/m ² K)
External Walls	0.15	0.18
Exposed floor	0.13	0.15
Roof	0.10	0.15
Glazing	As per glazing schedule	1.40
Doors	1.60	1.40

Building envelope U-values

4.3 GLAZING SPECIFICATION

The glazing is based on a G-value of 0.53 (to North and East elevations) and 0.40 (to South and West elevations).

4.4 INTERNAL WINDOW BLINDS

Internal blinds have **not** included in the calculations. However, they should be on the specification to allow for residents mitigate the effects of direct solar gains.

4.5 WEATHER

The building is to be located in Manchester. Weather file used in the calculation:- Manchester _DSY1_2020High50_.epw. The peak summer temperature is 30°C.

4.6 SITE & ORIENTATION

The building(s) has been modelled in its correct orientation as shown in Figure 5.

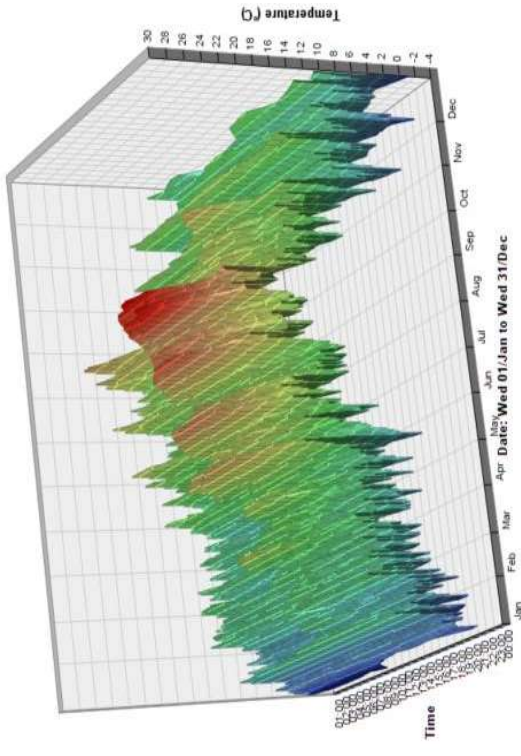


Figure 4: Annual dry-bulb temperature graph of modelled weather file

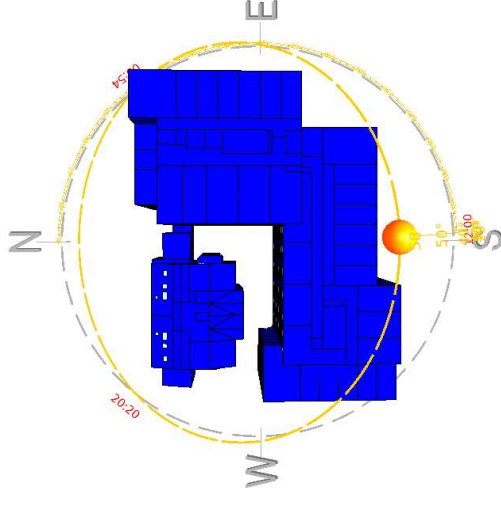


Figure 5: Site orientation of the proposed development

5 REFERENCE DATA

Architectural Drawings (Carson Sall Architects)

Floor Plans

1094-100 – Proposed Floor Plans

Elevations

1094-300 – Proposed Elevations

Sections

1094-200 – Proposed Sections

Site Plan

1094-005 – Proposed Site Plan

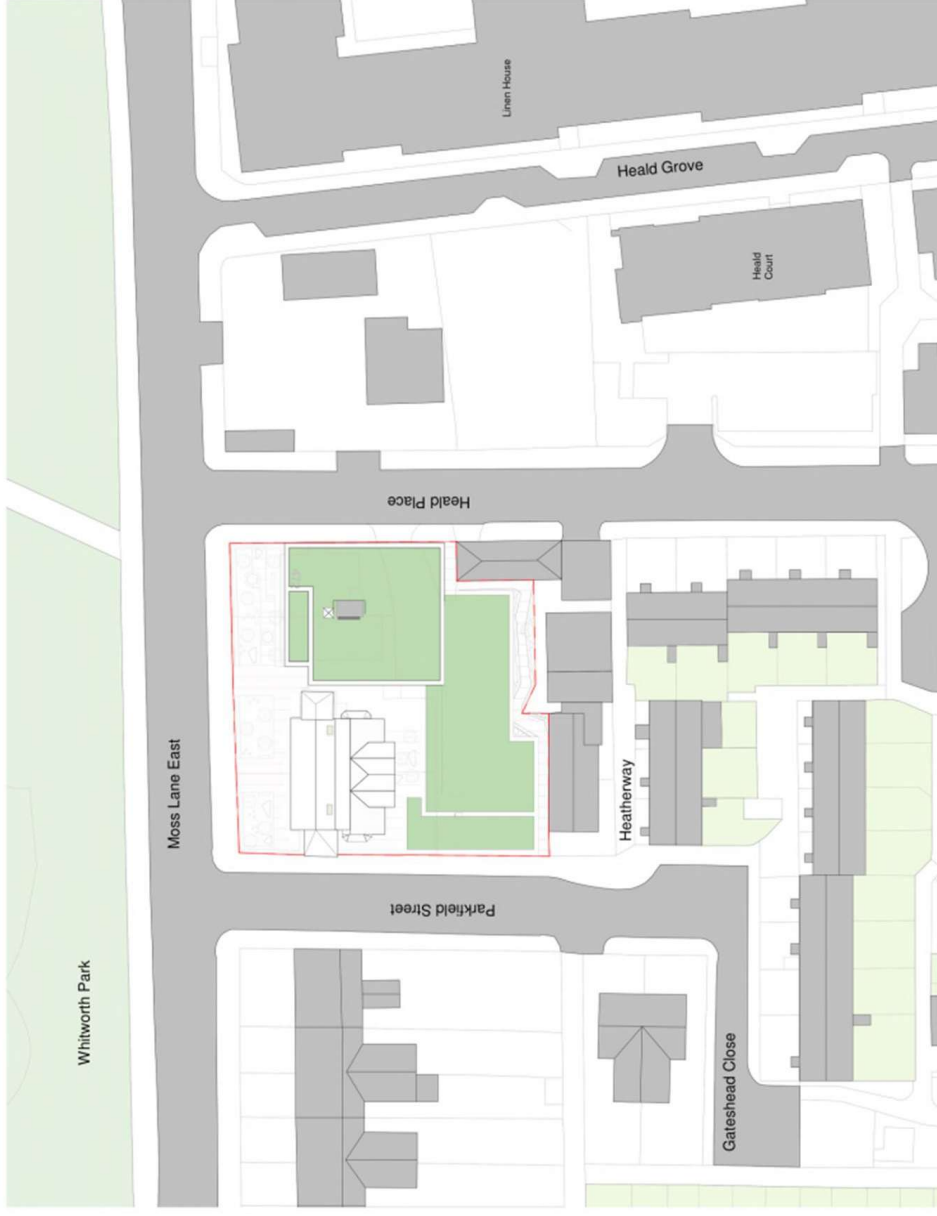


Figure 6: Architectural drawings (Site Plan)

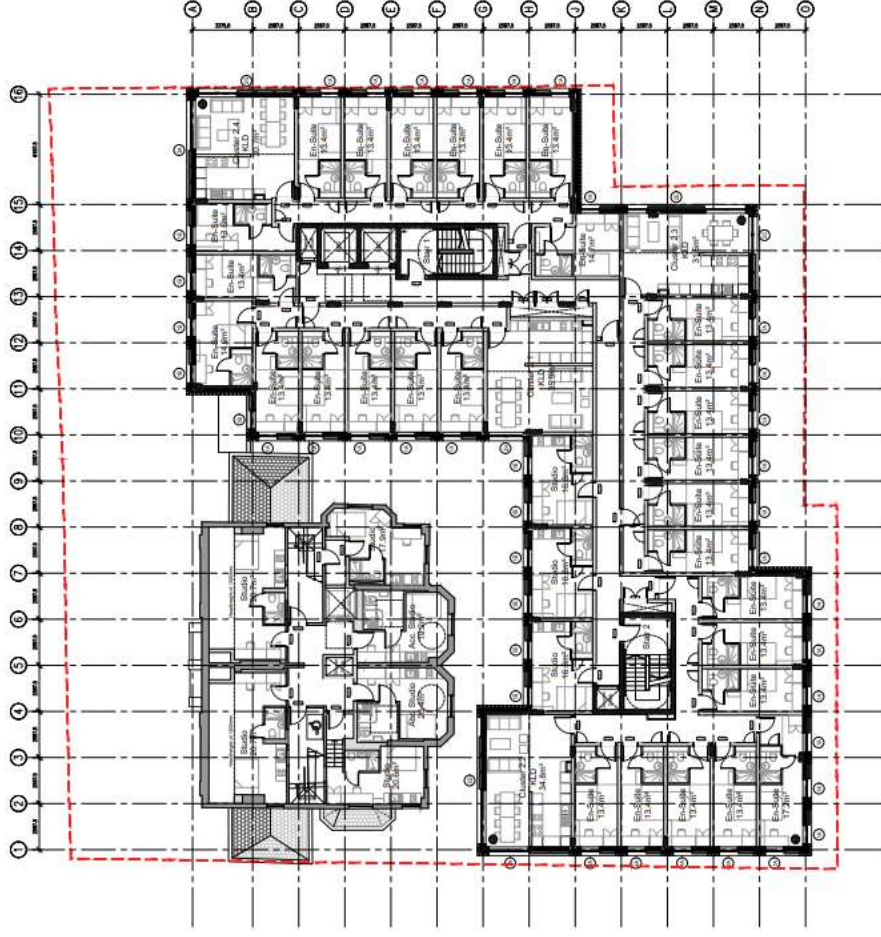
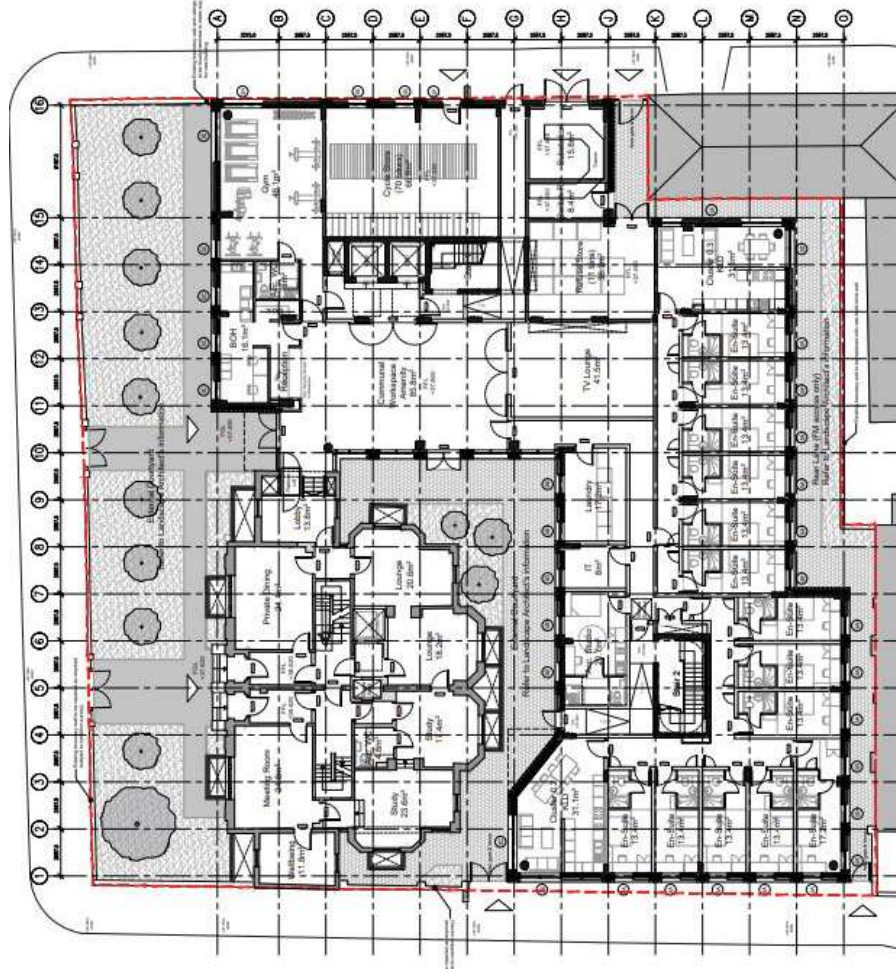


Figure 7: Architectural drawings (Ground Floor Plan left, Second Floor Plan (Typical)right).

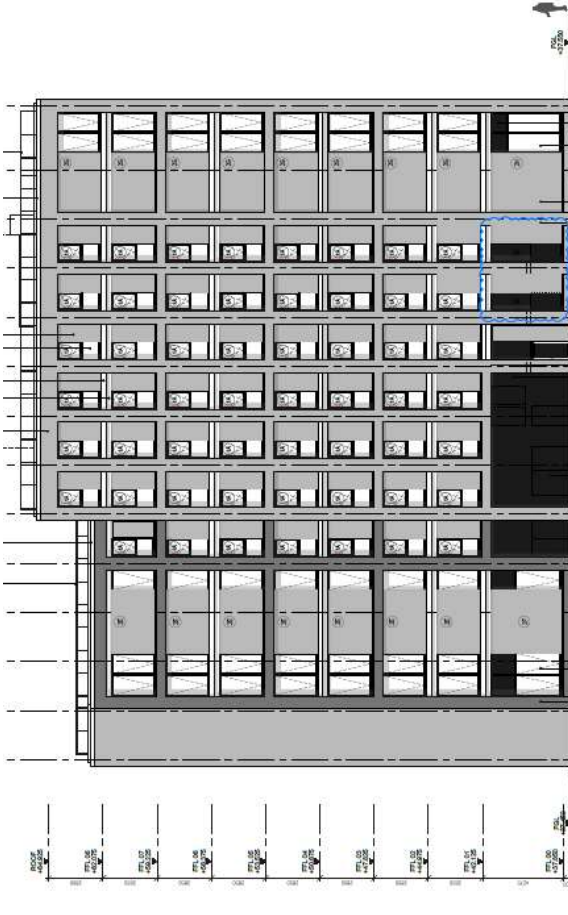
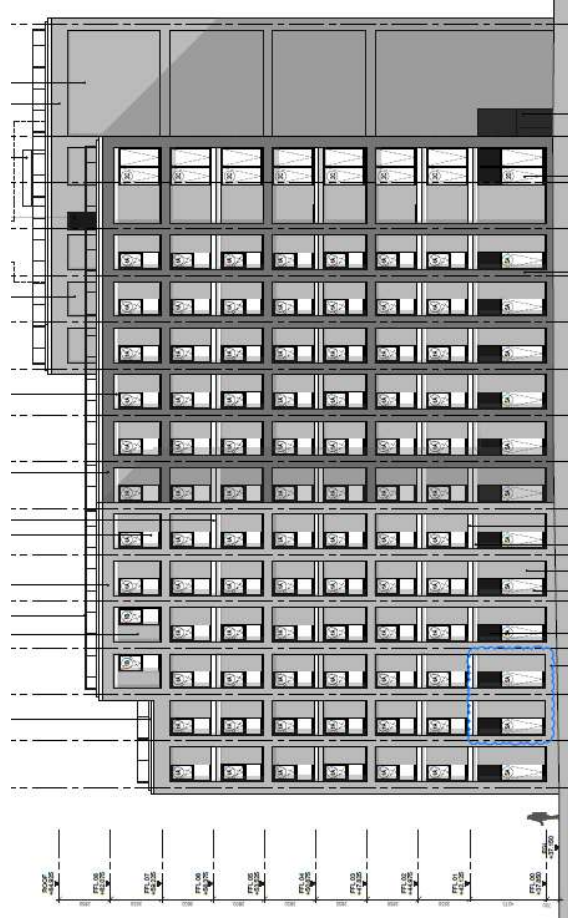
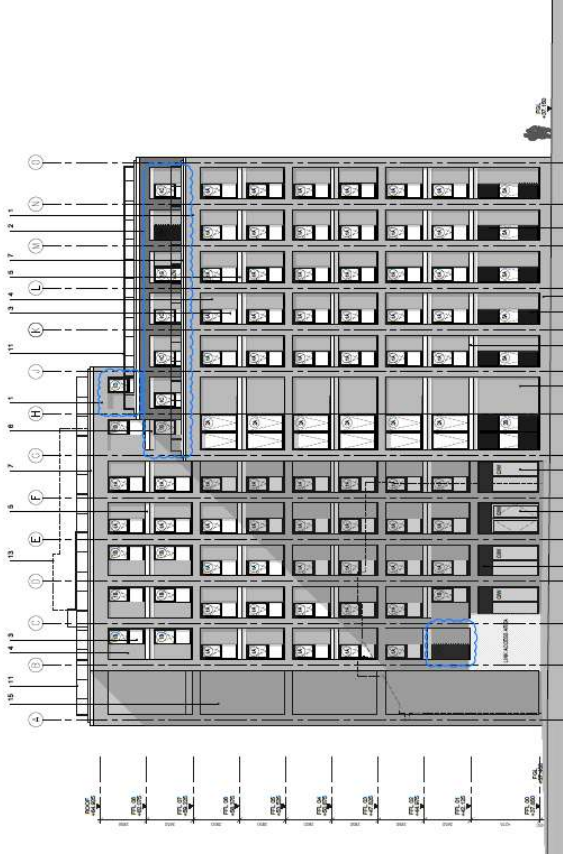


Figure 8: Architectural drawings (Elevations)

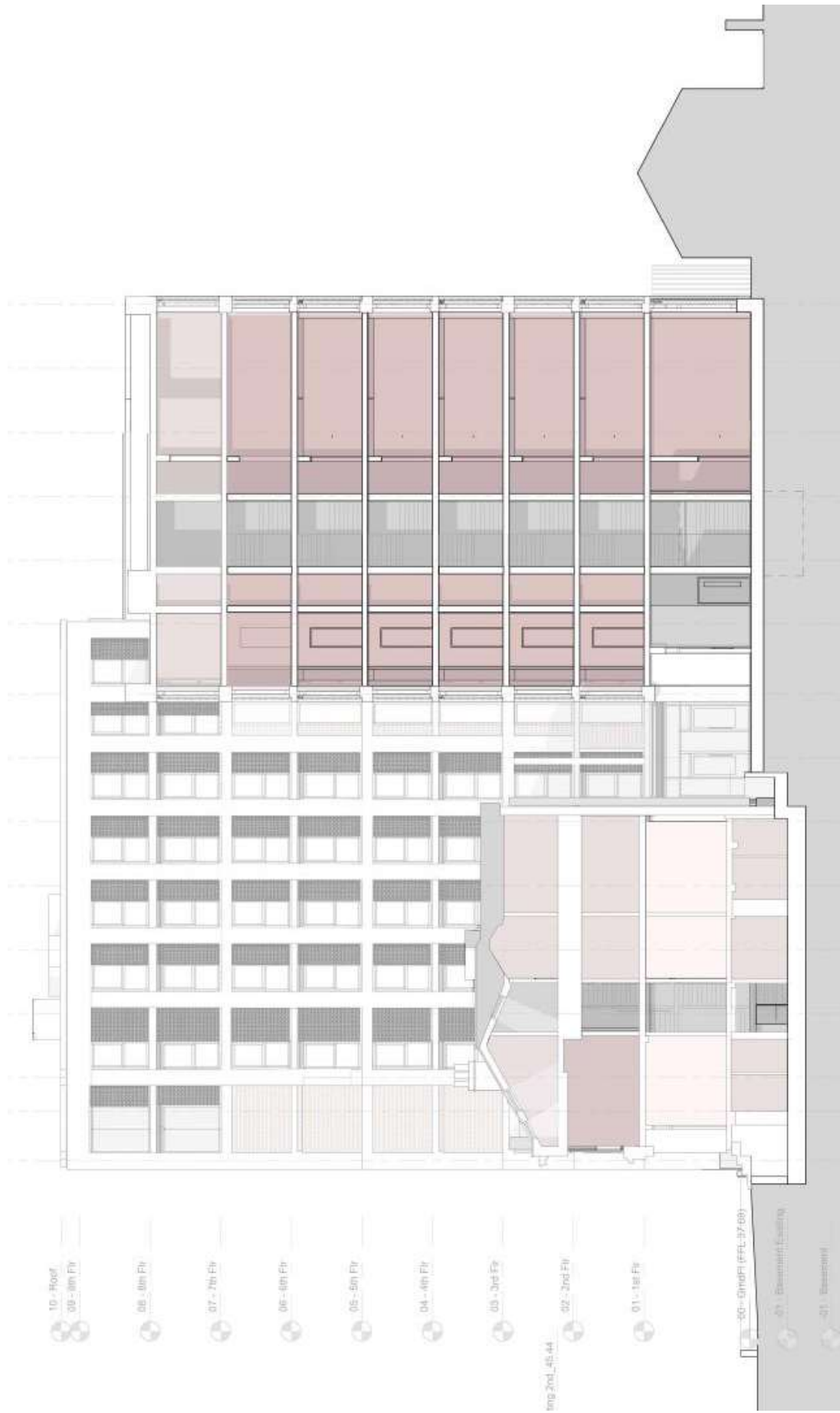


Figure 9: Architectural drawings (Section)

6 INTERNAL GAINS

The internal gains used throughout the simulations are detailed below. No differences between weekdays and weekends are considered. Bedrooms are set with a 24 hour occupancy profile which means that one person is always considered in each bedroom during the daytime and two people in each double bedroom at night. Kitchen/living rooms are unoccupied during sleeping hours and occupied during the rest of the day. Occupied periods are totalled as 3672 hours per year for bedrooms (24/7 May to September) and 1989 hours for living areas (13 hours per day May to September).

See Appendix C for a detailed CIBSE TM59 internal gain schedule.

6.1 OCCUPANCY

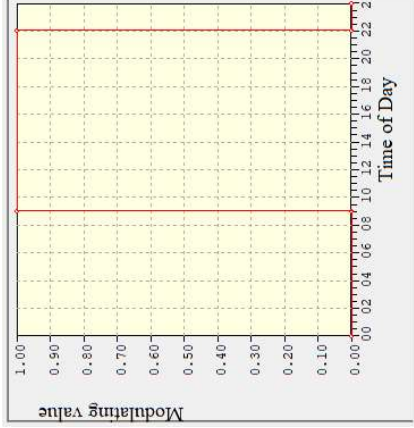
Based on CIBSE Guide A (2015a), a maximum sensible heat gain of 75W/person is assumed in the living spaces. An allowance for 30% reduced gain during sleeping is based on Addendum g to ANSI/ASHRAE Standard 55-2010.

Activity	Sensible heat gain per person (W)
Standard Sleeping	75 55

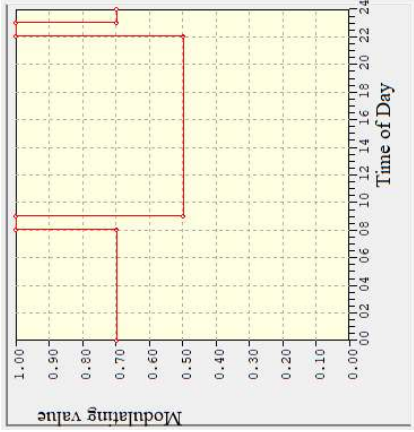
Occupant Gains

Unit/room type	Occupancy
1 bed living/kitchen	1 person from 9am to 10pm room is unoccupied for the rest of the day
2 bed living/kitchen	2 people from 9am to 10pm room is unoccupied for the rest of the day
3 bed living/kitchen	3 people from 9am to 10pm room is unoccupied for the rest of the day
Double bedroom	2 people at 70% gain from 11pm to 8am 2 people at full gain from 8am to 9am and from 10pm to 11pm 1 person at full gain from 9am to 10pm
Single bedroom	1 person at 70% gain from 11pm to 8am 1 person at full gain from 8am to 11pm

Occupancy



Typical living/kitchen occupancy profile



Typical double bedroom occupancy profile

6.2 LIGHTING

Lighting energy is assumed to be proportional to floor area. A default value of 2W/m² is applied to all occupied areas from 6pm to 11 pm.

Zone Type	Gain (W/m ²)
living/kitchen/dining areas, bedrooms	2
	0

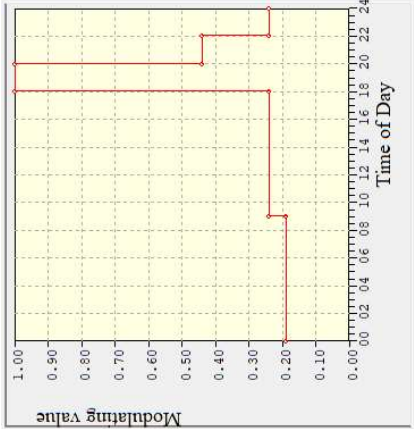
Lighting gains

6.3 EQUIPMENT

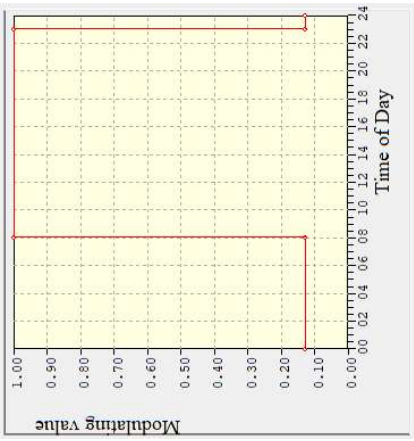
Equipment gains per room type are listed in the table below.

Unit/room type	Load
1 bed living/kitchen	Peak load of 450W from 6pm to 8pm
	200W from 8pm to 10pm
	110W from 9am to 6pm and 10pm to 12pm
2 bed living/kitchen	Base load of 85W for the rest of the day
	Peak load of 450W from 6pm to 8pm
	200W from 8pm to 10pm
3 bed living/kitchen	110W from 9am to 6pm and 10pm to 12pm
	Base load of 85W for the rest of the day
	Peak load of 450W from 6pm to 8pm
Double bedroom	200W from 8pm to 10pm
	110W from 9am to 6pm and 10pm to 12pm
	Base load of 85W for the rest of the day
Single bedroom	Peak load of 80W from 8am to 11pm
	Base load of 10W during sleeping hours
	Peak load of 80W from 8am to 11pm
Communal corridors	Base load of 10W during sleeping hours
	Assumed to be zero

Equipment gains



Typical living/kitchen equipment profile



Typical double bedroom equipment profile

7 VENTILATION

7.1 NATURAL VENTILATION

The windows have been modelled using an opening profile that simulates the occupants within the rooms opening the windows when the internal air temperature reaches 22°C. The same procedure operates in reverse as the air temperature cools.

The free area is a way of measuring what the equivalent completely open area is for a glazing assembly. Sufficient free area to the opening windows in a dwelling is vital to the overheating mitigation strategy and can be calculated using the combined areas of A+B (in m²).

Opening angle is the degree of opening of area B. Windows have been modelled to be either top or side hung as shown on the architectural drawings.

An acoustic report has found window openings should be limited to 4 hours per day due to the location of the site. To ensure the best chance of passing the overheating assessment (and coinciding with the typical room usage schedules), the following times have been modelled where the windows can be opened between:

- Cluster Bedroom and Studio Apartments: 7pm to 11pm
- Cluster Kitchen/Dining/Living: 3pm to 7pm

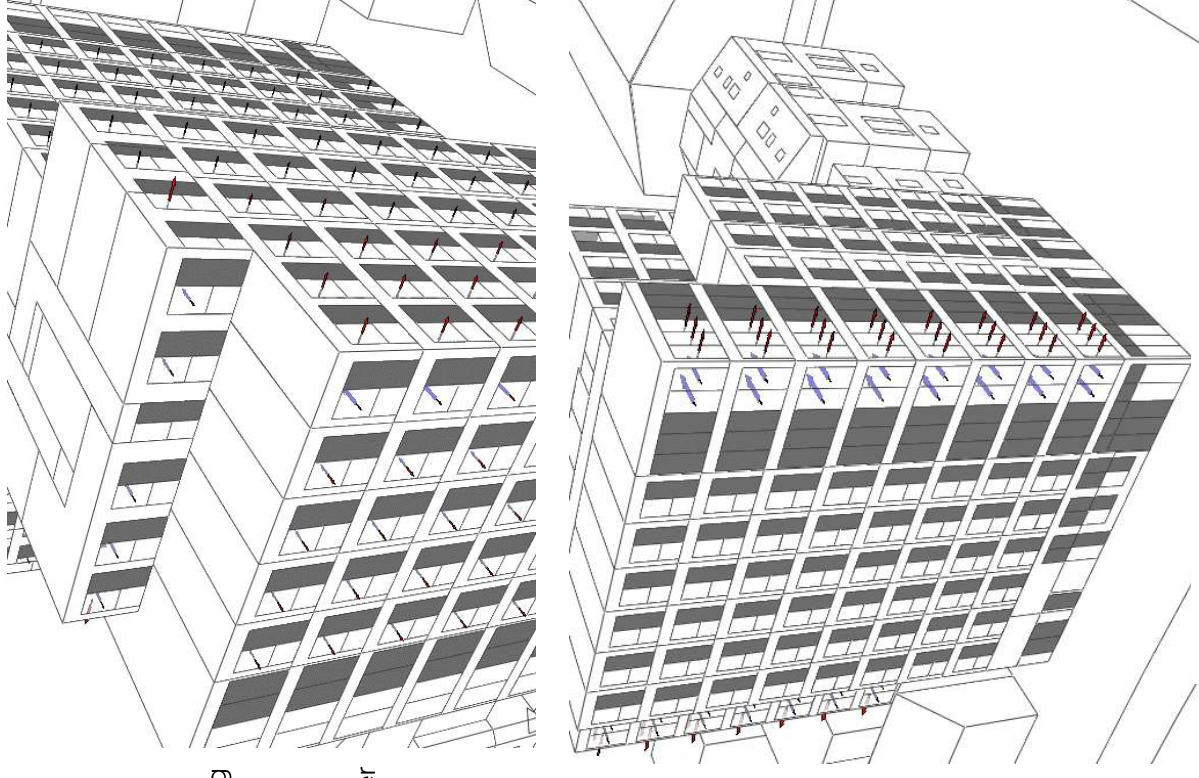
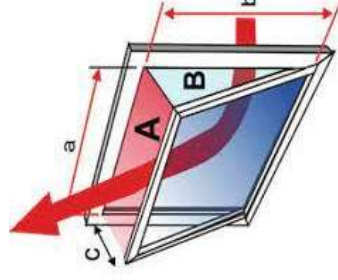


Figure 10: Airflow depiction of the

7.2 WINDOW OPENING SCHEDULE

Opening Schedule Description:

- **Window/Door Closed/Fixed:** Fixed pane, unopenable.
- **Openable Window (Apartment):** Openable between 7pm and 11pm only
- **Openable Window (Kitchen/Dining/Living):** Openable between 3pm and 7pm only

Opening Type	
	XTRN0000 (Closed / Fixed)
	XTRN0001 (Openable Window (apartments) - 7pm-11pm)
	XTRN0002 (Openable Window (KLD) - 3pm-7pm)

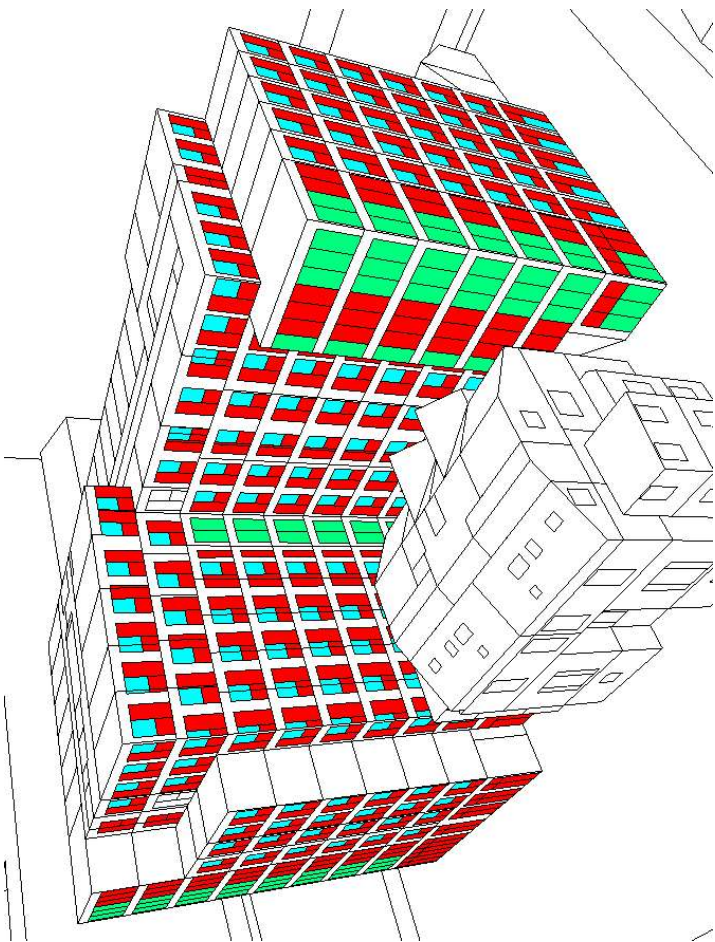
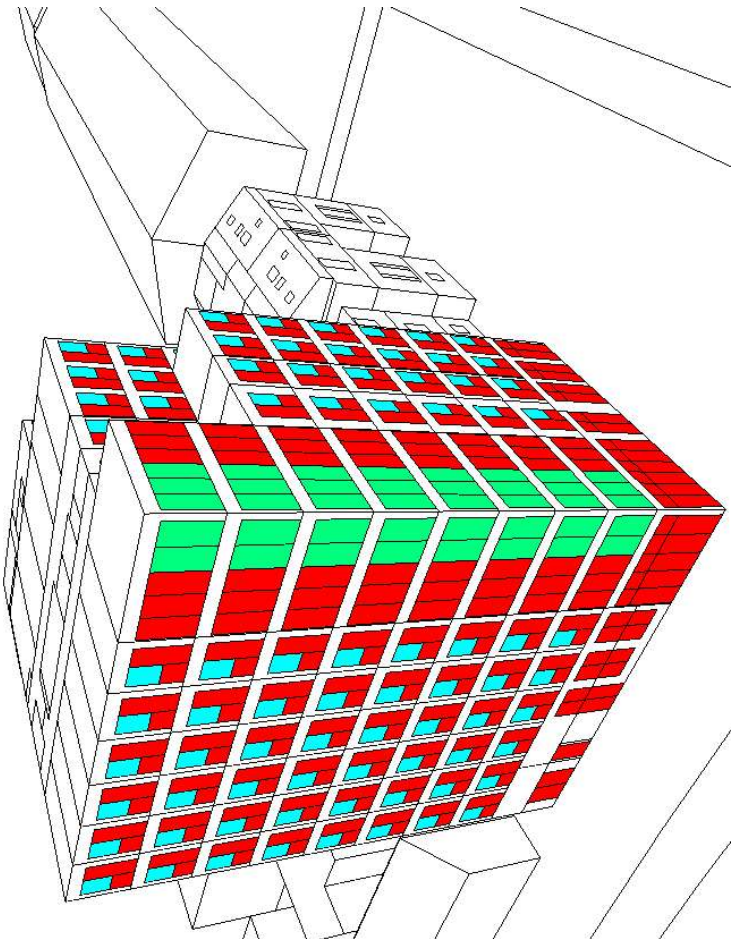


Figure 1.1: Window opening schedule key of the

7.3 MECHANICAL VENTILATION

Mechanical ventilation in the form of MEV (Mechanical Extract Ventilation) is proposed for the dwellings, known as system 3.

This is a low energy, continuous mechanical ventilation system designed to replace conventional extract ventilation systems (such as intermittent systems) by drawing moisture laden air out of the kitchen and wet rooms (bathrooms / ensuites), creating a negative pressure balance within the space to help facilitate the drawing in of external air through window openings and trickle ventilators.

This forms an air pathway, drawing warm air out of habitable spaces and evacuated from the building, with the makeup air being provided by any windows in habitable spaces (when opened) or via trickle ventilators above/below these openings.

The minimum whole house ventilation rates can be seen in table 1.3 – these have been taken from Approved Document F.

For more information, please refer to Approved Document F, Volume 1: Dwellings.

The following required supply rates for TM59 compliance in habitable rooms are as follows:

- **Cluster Bedrooms (all floors):** 13l/s trickle + 12l/s of overheating boost (25l/s peak)
- **Studio Apartments (ground to sixth floors):** 13l/s trickle + 17l/s of overheating boost (30l/s peak)
- **Studio Apartments (seventh and eighth floors only):** 13l/s trickle + 37l/s of overheating boost (50l/s peak)
- **KLD (all floors):** 13 l/s trickle + 50l/s of overheating boost (63l/s peak)

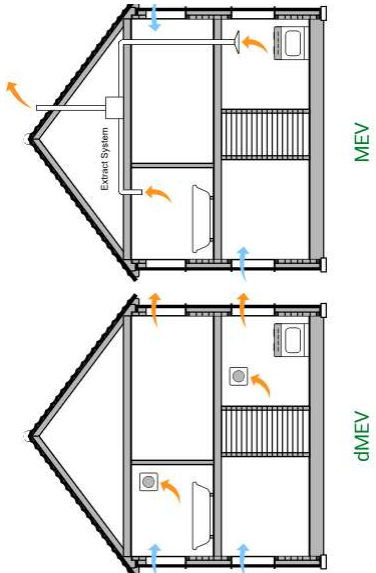
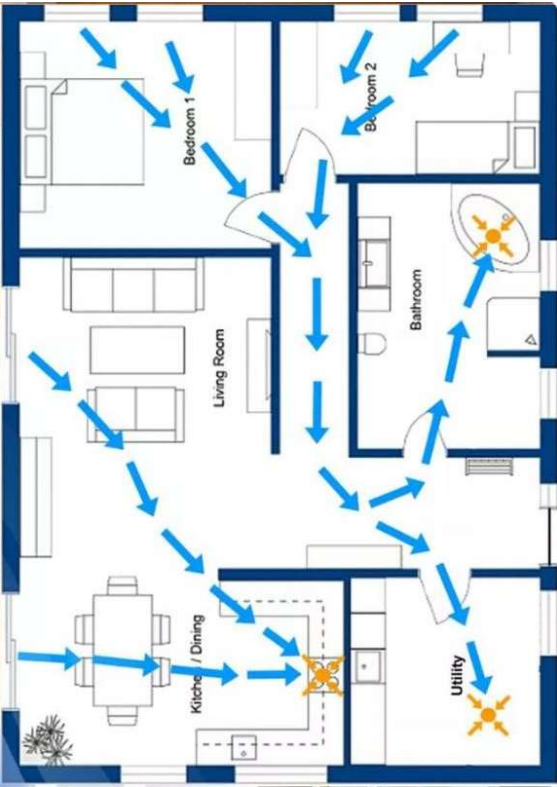


Figure 12: Depiction of air paths within a dwelling using an MEV system

Table 1.2. Minimum extract ventilation rates for continuous extract systems ⁽¹⁾		
Room	High rate (l/s)	Continuous rate
Kitchen	13	The sum of all extract ventilation in the dwelling on its continuous rate should be at least the whole dwelling ventilation rate given in Table 1.3
Utility room	8	
Bathroom	8	
Sanitary accommodation	6	
NOTE:		
1. If the continuous rate of ventilation provided in a room is equal to or higher than the minimum high rate specified in the table, no extra ventilation is needed.		

▲ Minimum High (Boost) extract rates for continuous mechanical extract for each wet room.

8 RESULTS SUMMARY

The summary results table below details the overheating assessment findings of the assessed spaces:

Space Type	Number of Spaces	Location	Overheating Strategy Summary	TM59 Compliance	Notes	Results
Cluster Bedroom	208	New Block	- Natural Ventilation via unrestricted window openings (openable beyond 100mm) - Window openings restricted to 4 hours per day as per acoustic report recommendations - Glazing g values of 0.53 (to North and East elevations) and 0.40 (to South and West elevations) - MEV with overheating boosted rate as detailed within report	☑	Proposed Overheating strategy sufficient	Appendix A
Studio Apartment	36					
Cluster Kitchen/Living/Dining	29					
Studio Apartment	18	Refurbished Block		☑	Proposed Overheating strategy sufficient	Appendix D
Studio Additional Bedrooms	4					

9 ASSESSMENT SUMMARY

The assessment has shown that the proposed student accommodation scheme at the Moss Lane East site presents a medium chance of overheating – with the detailed dynamic thermal modelling showing where the risks are likely to occur.

Due to the window opening restrictions imposed on the site as per the acoustic report recommendation (4 hours of openable windows per day), the natural ventilation strategy proposed is hindered on maintaining comfortable internal conditions of space users. To counter this, MEV (mechanical extract ventilation) with boosted overheating rates, low glazing g values and unrestricted (openable beyond 100mm restrictors) opening windows are proposed to ensure the overheating risk posed to the site is mitigated.

MEV ventilation, with boosted overheating rates as described in this report, plays a critical role in ensuring TM59 compliance is achieved. The boosted overheating rates allow for high volumes of warm air evacuation, which is particularly important in bedrooms overnight due to the nature of the assessment criteria for these spaces. Without achieving the rates detailed within this report could lead to a heightened overheating risk.

Glazing g values of 0.53 to glazing on North and East elevations, whilst a 0.40 g value to glazing on the more problematic South and West elevations is considered to reduce unwanted solar gains during summer months. Although not modelled, user controlled internal blinds should also be considered to allow space users to control solar gains further. If it's cooler inside than outside, it is advised that occupants should keep their windows closed, to prevent bringing warm air in. If it reaches a point where the temperature inside the house is equal to that outside, then you should open the windows, keeping the curtains closed.

Finally, with windows across the site being restricted to 4 hours of being openable per day, it is imperative that natural ventilation is maximised when and where possible. By removing any opening restrictors to the windows, this should allow for large amounts of fresh air to enter the buildings, purging built-up warm air in the process.

With the above measures implemented, the modelling found all spaces in the assessed dwellings to pass the overheating criteria and comply with TM59.

10 MODELLING DISCLAIMER

The calculations produced by Complete Sustainability have been carried out with the information provided by others to determine whether the thermal model of the proposed building can achieve compliance, at design stage, with the stated criteria within this report.

It should be noted that the data generated by this work is obtained using computer simulations. These simulations are the best means of predicting the performance of the building at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

The actual operative temperatures within the building once occupied may vary from the calculated values within this report. These differences will occur due to a number of variable parameters between the modelled building and the actual building. Such differences will include the hours, levels of occupancy, equipment, how the windows are used etc.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, Complete Sustainability can take no responsibility for differences between the computer simulations and the actual performance of the completed development due to the inherent complexity and variability of the physics in a building and its environment.

For this TM59 Overheating Analysis Assessment, Complete Sustainability Solutions Ltd shall hold no responsibility for the design of the building, houses, or dwellings referenced. The term "designer" in this context refers solely to our role as a consultant interpreting drawings and details provided by the architect, client, or contractor. Our responsibility is limited to constructing and simulating the overheating model within the IES software based on this information.

11 APPENDIX A – DETAILED RESULTS – PROPOSED NEW BLOCK – CLUSTER BEDROOMS

TM59 Criteria – Cluster Bedrooms

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
00-0.2-Cluster Bedroom 1	0.6%	PASS	4	1	5	0.2%	PASS	PASS
00-0.2-Cluster Bedroom 2	0.7%	PASS	5	1	6	0.2%	PASS	PASS
00-0.2-Cluster Bedroom 3	0.9%	PASS	5	1	6	0.2%	PASS	PASS
00-0.2-Cluster Bedroom 4	1.2%	PASS	5	2	7	0.2%	PASS	PASS
00-0.2-Cluster Bedroom 5	2.9%	PASS	2	7	9	0.3%	PASS	PASS
00-0.2-Cluster Bedroom 6	0.3%	PASS	3	1	4	0.1%	PASS	PASS
00-0.2-Cluster Bedroom 7	0.2%	PASS	4	1	5	0.2%	PASS	PASS
00-0.2-Cluster Bedroom 8	0.0%	PASS	3	1	4	0.1%	PASS	PASS
00-0.3-Cluster Bedroom 4	0.3%	PASS	3	1	4	0.1%	PASS	PASS
00-0.3-Cluster Bedroom 1	0.4%	PASS	4	1	5	0.2%	PASS	PASS
00-0.3-Cluster Bedroom 2	0.4%	PASS	4	1	5	0.2%	PASS	PASS
00-0.3-Cluster Bedroom 3	0.4%	PASS	4	1	5	0.2%	PASS	PASS
00-0.3-Cluster Bedroom 5	0.1%	PASS	3	0	3	0.1%	PASS	PASS
00-0.3-Cluster Bedroom 6	0.0%	PASS	2	0	2	0.1%	PASS	PASS
01-1.1-Cluster Bedroom 1	0.0%	PASS	4	0	4	0.1%	PASS	PASS
01-1.1-Cluster Bedroom 2	0.0%	PASS	6	0	6	0.2%	PASS	PASS
01-1.1-Cluster Bedroom 3	0.0%	PASS	2	0	2	0.1%	PASS	PASS
01-1.1-Cluster Bedroom 4	0.0%	PASS	2	0	2	0.1%	PASS	PASS
01-1.1-Cluster Bedroom 5	0.0%	PASS	0	0	0	0.0%	PASS	PASS
01-1.1-Cluster Bedroom 6	0.0%	PASS	2	0	2	0.1%	PASS	PASS
01-1.1-Cluster Bedroom 7	0.0%	PASS	5	0	5	0.2%	PASS	PASS
01-1.2-Cluster Bedroom 1	0.9%	PASS	10	6	16	0.5%	PASS	PASS
01-1.2-Cluster Bedroom 2	1.2%	PASS	9	6	15	0.5%	PASS	PASS
01-1.2-Cluster Bedroom 3	1.3%	PASS	10	8	18	0.5%	PASS	PASS
01-1.2-Cluster Bedroom 4	1.7%	PASS	11	12	23	0.7%	PASS	PASS
01-1.2-Cluster Bedroom 5	2.5%	PASS	7	25	32	1.0%	PASS	PASS
01-1.2-Cluster Bedroom 6	0.5%	PASS	7	5	12	0.4%	PASS	PASS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
01-1.2-Cluster Bedroom 7	0.5%	PASS	8	5	13	0.4%	PASS	PASS
01-1.2-Cluster Bedroom 8	0.1%	PASS	9	7	16	0.5%	PASS	PASS
01-1.3-Cluster Bedroom 4	0.5%	PASS	8	5	13	0.4%	PASS	PASS
01-1.3-Cluster Bedroom 1	0.7%	PASS	10	6	16	0.5%	PASS	PASS
01-1.3-Cluster Bedroom 2	0.6%	PASS	9	5	14	0.4%	PASS	PASS
01-1.3-Cluster Bedroom 3	0.5%	PASS	8	5	13	0.4%	PASS	PASS
01-1.3-Cluster Bedroom 5	0.2%	PASS	7	3	10	0.3%	PASS	PASS
01-1.3-Cluster Bedroom 6	0.0%	PASS	5	1	6	0.2%	PASS	PASS
01-1.4-Cluster Bedroom 1	0.0%	PASS	6	0	6	0.2%	PASS	PASS
01-1.4-Cluster Bedroom 2	0.0%	PASS	6	2	8	0.2%	PASS	PASS
01-1.4-Cluster Bedroom 3	0.0%	PASS	5	0	5	0.2%	PASS	PASS
01-1.4-Cluster Bedroom 4	0.0%	PASS	5	0	5	0.2%	PASS	PASS
01-1.4-Cluster Bedroom 5	0.0%	PASS	5	0	5	0.2%	PASS	PASS
01-1.4-Cluster Bedroom 6	0.0%	PASS	4	0	4	0.1%	PASS	PASS
01-1.4-Cluster Bedroom 7	0.0%	PASS	3	0	3	0.1%	PASS	PASS
01-1.4-Cluster Bedroom 8	0.0%	PASS	1	0	1	0.0%	PASS	PASS
02-2.1-Cluster Bedroom 1	0.0%	PASS	4	0	4	0.1%	PASS	PASS
02-2.1-Cluster Bedroom 2	0.0%	PASS	8	0	8	0.2%	PASS	PASS
02-2.1-Cluster Bedroom 3	0.0%	PASS	4	0	4	0.1%	PASS	PASS
02-2.1-Cluster Bedroom 4	0.0%	PASS	4	0	4	0.1%	PASS	PASS
02-2.1-Cluster Bedroom 5	0.0%	PASS	0	0	0	0.0%	PASS	PASS
02-2.1-Cluster Bedroom 6	0.0%	PASS	2	0	2	0.1%	PASS	PASS
02-2.1-Cluster Bedroom 7	0.0%	PASS	4	0	4	0.1%	PASS	PASS
02-2.2-Cluster Bedroom 1	1.2%	PASS	15	10	25	0.8%	PASS	PASS
02-2.2-Cluster Bedroom 2	1.3%	PASS	12	11	23	0.7%	PASS	PASS
02-2.2-Cluster Bedroom 3	1.4%	PASS	14	11	25	0.8%	PASS	PASS
02-2.2-Cluster Bedroom 4	1.9%	PASS	14	17	31	0.9%	PASS	PASS
02-2.2-Cluster Bedroom 5	2.8%	PASS	8	24	32	1.0%	PASS	PASS
02-2.2-Cluster Bedroom 6	0.6%	PASS	9	9	18	0.5%	PASS	PASS
02-2.2-Cluster Bedroom 7	0.6%	PASS	11	9	20	0.6%	PASS	PASS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
02-2.2-Cluster Bedroom 8	0.3%	PASS	12	9	21	0.6%	PASS	PASS
02-2.3-Cluster Bedroom 4	0.6%	PASS	9	7	16	0.5%	PASS	PASS
02-2.3-Cluster Bedroom 1	1.0%	PASS	14	11	25	0.8%	PASS	PASS
02-2.3-Cluster Bedroom 2	0.7%	PASS	11	9	20	0.6%	PASS	PASS
02-2.3-Cluster Bedroom 3	0.7%	PASS	10	7	17	0.5%	PASS	PASS
02-2.3-Cluster Bedroom 5	0.4%	PASS	8	5	13	0.4%	PASS	PASS
02-2.3-Cluster Bedroom 6	0.0%	PASS	6	2	8	0.2%	PASS	PASS
02-2.4-Cluster Bedroom 1	0.0%	PASS	6	1	7	0.2%	PASS	PASS
02-2.4-Cluster Bedroom 2	0.0%	PASS	10	6	16	0.5%	PASS	PASS
02-2.4-Cluster Bedroom 3	0.0%	PASS	8	4	12	0.4%	PASS	PASS
02-2.4-Cluster Bedroom 4	0.0%	PASS	8	3	11	0.3%	PASS	PASS
02-2.4-Cluster Bedroom 5	0.0%	PASS	6	3	9	0.3%	PASS	PASS
02-2.4-Cluster Bedroom 6	0.0%	PASS	6	3	9	0.3%	PASS	PASS
02-2.4-Cluster Bedroom 7	0.0%	PASS	6	6	12	0.4%	PASS	PASS
02-2.4-Cluster Bedroom 8	0.0%	PASS	4	0	4	0.1%	PASS	PASS
03-3.1-Cluster Bedroom 1	0.2%	PASS	6	1	7	0.2%	PASS	PASS
03-3.1-Cluster Bedroom 2	0.1%	PASS	11	1	12	0.4%	PASS	PASS
03-3.1-Cluster Bedroom 3	0.1%	PASS	6	1	7	0.2%	PASS	PASS
03-3.1-Cluster Bedroom 4	0.1%	PASS	5	1	6	0.2%	PASS	PASS
03-3.1-Cluster Bedroom 5	0.2%	PASS	2	1	3	0.1%	PASS	PASS
03-3.1-Cluster Bedroom 6	0.0%	PASS	2	1	3	0.1%	PASS	PASS
03-3.1-Cluster Bedroom 7	0.0%	PASS	4	0	4	0.1%	PASS	PASS
03-3.2-Cluster Bedroom 1	1.4%	PASS	15	11	26	0.8%	PASS	PASS
03-3.2-Cluster Bedroom 2	1.4%	PASS	15	11	26	0.8%	PASS	PASS
03-3.2-Cluster Bedroom 3	1.5%	PASS	15	13	28	0.9%	PASS	PASS
03-3.2-Cluster Bedroom 4	2.0%	PASS	15	17	32	1.0%	PASS	PASS
03-3.2-Cluster Bedroom 5	2.8%	PASS	8	23	31	0.9%	PASS	PASS
03-3.2-Cluster Bedroom 6	0.6%	PASS	9	9	18	0.5%	PASS	PASS
03-3.2-Cluster Bedroom 7	0.6%	PASS	11	9	20	0.6%	PASS	PASS
03-3.2-Cluster Bedroom 8	0.3%	PASS	12	10	22	0.7%	PASS	PASS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
03-3.3-Cluster Bedroom 4	0.7%	PASS	10	7	17	0.5%	PASS	PASS
03-3.3-Cluster Bedroom 1	1.1%	PASS	14	11	25	0.8%	PASS	PASS
03-3.3-Cluster Bedroom 2	0.7%	PASS	12	9	21	0.6%	PASS	PASS
03-3.3-Cluster Bedroom 3	0.7%	PASS	11	9	20	0.6%	PASS	PASS
03-3.3-Cluster Bedroom 5	0.4%	PASS	8	5	13	0.4%	PASS	PASS
03-3.3-Cluster Bedroom 6	0.0%	PASS	7	3	10	0.3%	PASS	PASS
03-3.4-Cluster Bedroom 1	0.0%	PASS	6	1	7	0.2%	PASS	PASS
03-3.4-Cluster Bedroom 2	0.1%	PASS	12	6	18	0.5%	PASS	PASS
03-3.4-Cluster Bedroom 3	0.0%	PASS	9	6	15	0.5%	PASS	PASS
03-3.4-Cluster Bedroom 4	0.0%	PASS	8	6	14	0.4%	PASS	PASS
03-3.4-Cluster Bedroom 5	0.0%	PASS	8	5	13	0.4%	PASS	PASS
03-3.4-Cluster Bedroom 6	0.0%	PASS	7	5	12	0.4%	PASS	PASS
03-3.4-Cluster Bedroom 7	0.0%	PASS	7	6	13	0.4%	PASS	PASS
03-3.4-Cluster Bedroom 8	0.0%	PASS	4	1	5	0.2%	PASS	PASS
04-4.1-Cluster Bedroom 1	0.5%	PASS	9	2	11	0.3%	PASS	PASS
04-4.1-Cluster Bedroom 2	0.3%	PASS	13	3	16	0.5%	PASS	PASS
04-4.1-Cluster Bedroom 3	0.3%	PASS	8	2	10	0.3%	PASS	PASS
04-4.1-Cluster Bedroom 4	0.3%	PASS	6	1	7	0.2%	PASS	PASS
04-4.1-Cluster Bedroom 5	0.3%	PASS	2	1	3	0.1%	PASS	PASS
04-4.1-Cluster Bedroom 6	0.0%	PASS	2	1	3	0.1%	PASS	PASS
04-4.1-Cluster Bedroom 7	0.0%	PASS	4	0	4	0.1%	PASS	PASS
04-4.2-Cluster Bedroom 1	1.4%	PASS	15	11	26	0.8%	PASS	PASS
04-4.2-Cluster Bedroom 2	1.4%	PASS	15	11	26	0.8%	PASS	PASS
04-4.2-Cluster Bedroom 3	1.5%	PASS	15	13	28	0.9%	PASS	PASS
04-4.2-Cluster Bedroom 4	2.1%	PASS	15	17	32	1.0%	PASS	PASS
04-4.2-Cluster Bedroom 5	3.0%	PASS	8	22	30	0.9%	PASS	PASS
04-4.2-Cluster Bedroom 6	0.6%	PASS	9	9	18	0.5%	PASS	PASS
04-4.2-Cluster Bedroom 7	0.6%	PASS	11	9	20	0.6%	PASS	PASS
04-4.2-Cluster Bedroom 8	0.3%	PASS	12	10	22	0.7%	PASS	PASS
04-4.3-Cluster Bedroom 4	0.7%	PASS	10	7	17	0.5%	PASS	PASS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
04-4.3-Cluster Bedroom 1	1.1%	PASS	14	13	27	0.8%	PASS	PASS
04-4.3-Cluster Bedroom 2	0.8%	PASS	12	10	22	0.7%	PASS	PASS
04-4.3-Cluster Bedroom 3	0.7%	PASS	11	9	20	0.6%	PASS	PASS
04-4.3-Cluster Bedroom 5	0.4%	PASS	8	5	13	0.4%	PASS	PASS
04-4.3-Cluster Bedroom 6	0.0%	PASS	6	3	9	0.3%	PASS	PASS
04-4.4-Cluster Bedroom 1	0.0%	PASS	6	1	7	0.2%	PASS	PASS
04-4.4-Cluster Bedroom 2	0.1%	PASS	12	6	18	0.5%	PASS	PASS
04-4.4-Cluster Bedroom 3	0.0%	PASS	9	6	15	0.5%	PASS	PASS
04-4.4-Cluster Bedroom 4	0.0%	PASS	9	6	15	0.5%	PASS	PASS
04-4.4-Cluster Bedroom 5	0.0%	PASS	9	6	15	0.5%	PASS	PASS
04-4.4-Cluster Bedroom 6	0.0%	PASS	8	6	14	0.4%	PASS	PASS
04-4.4-Cluster Bedroom 7	0.0%	PASS	7	6	13	0.4%	PASS	PASS
04-4.4-Cluster Bedroom 8	0.0%	PASS	4	1	5	0.2%	PASS	PASS
05-5.1-Cluster Bedroom 1	0.9%	PASS	10	5	15	0.5%	PASS	PASS
05-5.1-Cluster Bedroom 2	0.6%	PASS	15	7	22	0.7%	PASS	PASS
05-5.1-Cluster Bedroom 3	0.4%	PASS	8	4	12	0.4%	PASS	PASS
05-5.1-Cluster Bedroom 4	0.4%	PASS	6	4	10	0.3%	PASS	PASS
05-5.1-Cluster Bedroom 5	0.3%	PASS	2	1	3	0.1%	PASS	PASS
05-5.1-Cluster Bedroom 6	0.0%	PASS	2	1	3	0.1%	PASS	PASS
05-5.1-Cluster Bedroom 7	0.0%	PASS	4	0	4	0.1%	PASS	PASS
05-5.2-Cluster Bedroom 1	1.4%	PASS	15	11	26	0.8%	PASS	PASS
05-5.2-Cluster Bedroom 2	1.4%	PASS	14	11	25	0.8%	PASS	PASS
05-5.2-Cluster Bedroom 3	1.5%	PASS	15	13	28	0.9%	PASS	PASS
05-5.2-Cluster Bedroom 4	2.0%	PASS	14	17	31	0.9%	PASS	PASS
05-5.2-Cluster Bedroom 5	3.0%	PASS	8	20	28	0.9%	PASS	PASS
05-5.2-Cluster Bedroom 6	0.7%	PASS	9	9	18	0.5%	PASS	PASS
05-5.2-Cluster Bedroom 7	0.6%	PASS	11	10	21	0.6%	PASS	PASS
05-5.2-Cluster Bedroom 8	0.3%	PASS	12	12	24	0.7%	PASS	PASS
05-5.3-Cluster Bedroom 4	0.7%	PASS	8	7	15	0.5%	PASS	PASS
05-5.3-Cluster Bedroom 1	1.1%	PASS	14	13	27	0.8%	PASS	PASS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
05-5.3-Cluster Bedroom 2	0.8%	PASS	12	10	22	0.7%	PASS	PASS
05-5.3-Cluster Bedroom 3	0.7%	PASS	11	9	20	0.6%	PASS	PASS
05-5.3-Cluster Bedroom 5	0.5%	PASS	8	5	13	0.4%	PASS	PASS
05-5.3-Cluster Bedroom 6	0.0%	PASS	6	3	9	0.3%	PASS	PASS
05-5.4-Cluster Bedroom 1	0.0%	PASS	6	1	7	0.2%	PASS	PASS
05-5.4-Cluster Bedroom 2	0.1%	PASS	12	7	19	0.6%	PASS	PASS
05-5.4-Cluster Bedroom 3	0.0%	PASS	9	6	15	0.5%	PASS	PASS
05-5.4-Cluster Bedroom 4	0.0%	PASS	9	6	15	0.5%	PASS	PASS
05-5.4-Cluster Bedroom 5	0.0%	PASS	9	6	15	0.5%	PASS	PASS
05-5.4-Cluster Bedroom 6	0.0%	PASS	9	6	15	0.5%	PASS	PASS
05-5.4-Cluster Bedroom 7	0.0%	PASS	10	10	20	0.6%	PASS	PASS
05-5.4-Cluster Bedroom 8	0.0%	PASS	4	1	5	0.2%	PASS	PASS
06-6.1-Cluster Bedroom 1	1.2%	PASS	15	7	22	0.7%	PASS	PASS
06-6.1-Cluster Bedroom 2	0.8%	PASS	16	11	27	0.8%	PASS	PASS
06-6.1-Cluster Bedroom 3	0.5%	PASS	12	7	19	0.6%	PASS	PASS
06-6.1-Cluster Bedroom 4	0.5%	PASS	8	6	14	0.4%	PASS	PASS
06-6.1-Cluster Bedroom 5	0.5%	PASS	2	5	7	0.2%	PASS	PASS
06-6.1-Cluster Bedroom 6	0.0%	PASS	2	0	2	0.1%	PASS	PASS
06-6.1-Cluster Bedroom 7	0.0%	PASS	4	0	4	0.1%	PASS	PASS
06-6.2-Cluster Bedroom 1	1.3%	PASS	15	11	26	0.8%	PASS	PASS
06-6.2-Cluster Bedroom 2	1.3%	PASS	13	10	23	0.7%	PASS	PASS
06-6.2-Cluster Bedroom 3	1.4%	PASS	13	10	23	0.7%	PASS	PASS
06-6.2-Cluster Bedroom 4	1.9%	PASS	13	18	31	0.9%	PASS	PASS
06-6.2-Cluster Bedroom 5	2.7%	PASS	8	22	30	0.9%	PASS	PASS
06-6.2-Cluster Bedroom 6	0.8%	PASS	13	13	26	0.8%	PASS	PASS
06-6.2-Cluster Bedroom 7	0.7%	PASS	14	12	26	0.8%	PASS	PASS
06-6.2-Cluster Bedroom 8	0.4%	PASS	14	14	28	0.9%	PASS	PASS
06-6.3-Cluster Bedroom 4	0.7%	PASS	8	7	15	0.5%	PASS	PASS
06-6.3-Cluster Bedroom 1	1.1%	PASS	14	13	27	0.8%	PASS	PASS
06-6.3-Cluster Bedroom 2	0.8%	PASS	12	10	22	0.7%	PASS	PASS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
06-6.3-Cluster Bedroom 3	0.7%	PASS	10	9	19	0.6%	PASS	PASS
06-6.3-Cluster Bedroom 5	0.5%	PASS	8	6	14	0.4%	PASS	PASS
06-6.3-Cluster Bedroom 6	0.0%	PASS	7	4	11	0.3%	PASS	PASS
06-6.4-Cluster Bedroom 1	0.0%	PASS	5	0	5	0.2%	PASS	PASS
06-6.4-Cluster Bedroom 2	0.2%	PASS	12	7	19	0.6%	PASS	PASS
06-6.4-Cluster Bedroom 3	0.1%	PASS	9	6	15	0.5%	PASS	PASS
06-6.4-Cluster Bedroom 4	0.0%	PASS	9	6	15	0.5%	PASS	PASS
06-6.4-Cluster Bedroom 5	0.0%	PASS	9	6	15	0.5%	PASS	PASS
06-6.4-Cluster Bedroom 6	0.0%	PASS	9	6	15	0.5%	PASS	PASS
06-6.4-Cluster Bedroom 7	0.0%	PASS	11	10	21	0.6%	PASS	PASS
06-6.4-Cluster Bedroom 8	0.0%	PASS	4	1	5	0.2%	PASS	PASS
07-7.3-Cluster Bedroom 4	0.6%	PASS	8	7	15	0.5%	PASS	PASS
07-7.3-Cluster Bedroom 1	0.9%	PASS	14	13	27	0.8%	PASS	PASS
07-7.3-Cluster Bedroom 2	0.7%	PASS	10	9	19	0.6%	PASS	PASS
07-7.3-Cluster Bedroom 3	0.6%	PASS	9	8	17	0.5%	PASS	PASS
07-7.3-Cluster Bedroom 5	0.5%	PASS	8	7	15	0.5%	PASS	PASS
07-7.3-Cluster Bedroom 6	0.1%	PASS	7	5	12	0.4%	PASS	PASS
07-7.4-Cluster Bedroom 2	0.1%	PASS	12	8	20	0.6%	PASS	PASS
07-7.4-Cluster Bedroom 3	0.0%	PASS	9	6	15	0.5%	PASS	PASS
07-7.4-Cluster Bedroom 4	0.0%	PASS	9	6	15	0.5%	PASS	PASS
07-7.4-Cluster Bedroom 5	0.0%	PASS	9	6	15	0.5%	PASS	PASS
07-7.4-Cluster Bedroom 6	0.0%	PASS	9	6	15	0.5%	PASS	PASS
07-7.4-Cluster Bedroom 7	0.0%	PASS	11	10	21	0.6%	PASS	PASS
07-7.4-Cluster Bedroom 8	0.0%	PASS	4	1	5	0.2%	PASS	PASS
08-7.4-Cluster Bedroom 8	0.0%	PASS	12	0	12	0.4%	PASS	PASS
08-8.4-Cluster Bedroom 2	0.0%	PASS	10	6	16	0.5%	PASS	PASS
08-8.4-Cluster Bedroom 3	0.0%	PASS	7	6	13	0.4%	PASS	PASS
08-8.4-Cluster Bedroom 4	0.0%	PASS	7	6	13	0.4%	PASS	PASS
08-8.4-Cluster Bedroom 5	0.0%	PASS	7	6	13	0.4%	PASS	PASS
08-8.4-Cluster Bedroom 6	0.0%	PASS	7	6	13	0.4%	PASS	PASS
08-8.4-Cluster Bedroom 7	0.0%	PASS	8	9	17	0.5%	PASS	PASS

12 APPENDIX B – DETAILED RESULTS – PROPOSED NEW BLOCK – STUDIO APARTMENTS

TM59 Criteria – Studio Apartments

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
00-Acc Studio	0%	PASS	1	0	1	0.0%	PASS	PASS
01-Studio 1	0.2%	PASS	9	9	18	0.5%	PASS	PASS
01-Studio 2	0.1%	PASS	8	9	17	0.5%	PASS	PASS
01-Studio 3	0.1%	PASS	7	6	13	0.4%	PASS	PASS
02-Studio 1	0.3%	PASS	11	16	27	0.8%	PASS	PASS
02-Studio 2	0.2%	PASS	11	15	26	0.8%	PASS	PASS
02-Studio 3	0.2%	PASS	9	11	20	0.6%	PASS	PASS
03-Studio 1	0.3%	PASS	11	19	30	0.9%	PASS	PASS
03-Studio 2	0.3%	PASS	11	19	30	0.9%	PASS	PASS
03-Studio 3	0.3%	PASS	11	15	26	0.8%	PASS	PASS
04-Studio 1	0.4%	PASS	11	20	31	0.9%	PASS	PASS
04-Studio 2	0.3%	PASS	11	20	31	0.9%	PASS	PASS
04-Studio 3	0.4%	PASS	11	16	27	0.8%	PASS	PASS
05-Studio 1	0.4%	PASS	11	21	32	1.0%	PASS	PASS
05-Studio 2	0.3%	PASS	11	21	32	1.0%	PASS	PASS
05-Studio 3	0.4%	PASS	11	16	27	0.8%	PASS	PASS
06-Studio 1	0.5%	PASS	11	21	32	1.0%	PASS	PASS
06-Studio 2	0.4%	PASS	11	21	32	1.0%	PASS	PASS
06-Studio 3	0.4%	PASS	11	16	27	0.8%	PASS	PASS
07-Studio 1	0.9%	PASS	15	16	31	0.9%	PASS	PASS
07-Studio 2	1.7%	PASS	15	14	29	0.9%	PASS	PASS
07-Studio 3	2.9%	PASS	9	17	26	0.8%	PASS	PASS
07-Studio 4	2.3%	PASS	3	20	23	0.7%	PASS	PASS
07-Studio 5	0.4%	PASS	12	12	24	0.7%	PASS	PASS
07-Studio 6	0.3%	PASS	8	9	17	0.5%	PASS	PASS
07-Studio 7	0.1%	PASS	14	11	25	0.8%	PASS	PASS
07-Studio 8	0.7%	PASS	15	11	26	0.8%	PASS	PASS

07-Studio 9	1.3%	PASS	16	14	30	0.9%	PASS	PASS
07-Studio 10	1.6%	PASS	16	14	30	0.9%	PASS	PASS
07-Studio 11	1.7%	PASS	15	12	27	0.8%	PASS	PASS
07-Studio 12	2%	PASS	6	20	26	0.8%	PASS	PASS
08-Studio 1	1.1%	PASS	15	17	32	1.0%	PASS	PASS
08-Studio 2	0.8%	PASS	16	15	31	0.9%	PASS	PASS
08-Studio 3	1.5%	PASS	15	13	28	0.9%	PASS	PASS
08-Studio 4	1.9%	PASS	15	13	28	0.9%	PASS	PASS
08-Studio 5	1.7%	PASS	7	23	30	0.9%	PASS	PASS

13 APPENDIX C – DETAILED RESULTS – PROPOSED NEW BLOCK – CLUSTER KITCHEN/DINING/LIVING

TM59 Criteria – Cluster Kitchen/Dining/Living

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status
00-0.2-Cluster KLD	0.6%	PASS
00-0.3-Cluster KLD	0.9%	PASS
01-1.1-Cluster KLD	0%	PASS
01-1.2-Cluster KLD	1%	PASS
01-1.3-Cluster KLD	2.4%	PASS
01-1.4-Cluster KLD	0.9%	PASS
02-2.1-Cluster KLD	0.1%	PASS
02-2.2-Cluster KLD	1.9%	PASS
02-2.3-Cluster KLD	2.4%	PASS
02-2.4-Cluster KLD	1.3%	PASS
03-3.1-Cluster KLD	0.3%	PASS
03-3.2-Cluster KLD	2.5%	PASS
03-3.3-Cluster KLD	2.5%	PASS
03-3.4-Cluster KLD	1.4%	PASS
04-4.1-Cluster KLD	0.6%	PASS
04-4.2-Cluster KLD	2.6%	PASS
04-4.3-Cluster KLD	2.4%	PASS
04-4.4-Cluster KLD	1.4%	PASS
05-5.1-Cluster KLD	0.7%	PASS
05-5.2-Cluster KLD	2.6%	PASS
05-5.3-Cluster KLD	2.6%	PASS
05-5.4-Cluster KLD	1.5%	PASS
06-6.1-Cluster KLD	1%	PASS
06-6.2-Cluster KLD	2.4%	PASS
06-6.3-Cluster KLD	2.7%	PASS
06-6.4-Cluster KLD	1.5%	PASS
07-7.3-Cluster KLD	2.5%	PASS
07-7.4-Cluster KLD	1.1%	PASS
08-8.4-Cluster KLD	0.8%	PASS

14 APPENDIX D - DETAILED RESULTS – REFURBISHED BLOCK – STUDIO APARTMENTS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
00B-Studio 1	0%	PASS	8	14	22	0.7%	PASS	PASS
00B-Studio 2	0%	PASS	2	7	9	0.3%	PASS	PASS
00B-Studio 3	0%	PASS	1	8	9	0.3%	PASS	PASS
00B-Studio 4	0%	PASS	3	5	8	0.2%	PASS	PASS
00B-Studio 5	0%	PASS	8	4	12	0.4%	PASS	PASS
00B-Studio 6	0%	PASS	12	9	21	0.6%	PASS	PASS
01-Studio 4	0.1%	PASS	3	16	19	0.6%	PASS	PASS
01-Studio 5	0.1%	PASS	13	18	31	0.9%	PASS	PASS
01-Studio 6	0.1%	PASS	13	18	31	0.9%	PASS	PASS
01-Studio 7	0%	PASS	0	4	4	0.1%	PASS	PASS
01-Studio 8	0%	PASS	5	19	24	0.7%	PASS	PASS
01-Studio 9	0.1%	PASS	6	25	31	0.9%	PASS	PASS
02-Studio 4	0.1%	PASS	16	15	31	0.9%	PASS	PASS
02-Studio 5	0.2%	PASS	16	15	31	0.9%	PASS	PASS
02-Studio 6	0.2%	PASS	16	15	31	0.9%	PASS	PASS
02-Studio 7	0%	PASS	14	15	29	0.9%	PASS	PASS
02-Studio 8	0.4%	PASS	12	15	27	0.8%	PASS	PASS
02-Studio 9	0.8%	PASS	13	17	30	0.9%	PASS	PASS

15 APPENDIX F - DETAILED RESULTS – REFURBISHED BLOCK – STUDIO APARTMENT ADDITIONAL BEDROOMS

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 1 Status	Sleeping hours 22:00 - 24:00	Sleeping hours 24:00 - 07:00	Hours above threshold temp. of 26 C	% of time room is above threshold temperature	Results based on over all % of time over threshold temperature	Overall Results
00B-Studio 1 Bed 2	0%	PASS	14	0	14	0.4%	PASS	PASS
00B-Studio 4 Bed 2	0%	PASS	12	0	12	0.4%	PASS	PASS
01-Studio 4 Bed 2	0.2%	PASS	13	9	22	0.7%	PASS	PASS
01-Studio 4 Bed 2	0%	PASS	12	0	12	0.4%	PASS	PASS

16 APPENDIX F - DETAILED OCCUPANCY SCHEDULES – CIBSE TM59 HEAT GAIN PROFILE

Number of People	Description /Occupancy	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	Single Bedroom	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
2	Double Bedroom	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	Studio	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	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	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	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	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	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	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	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	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	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