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Whitemoss Road, Charlestown:
30no. Residential Dwellings:
Part O, CIBSE TM59:
Overheating Calculations &
Building Regulations Compliance Report,
Revision A.



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Cost the Earth"*

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Whitemoss Road Charlestown 30no. Residential Dwellings



Part O, CIBSE TM59 Overheating Calculations & Building Regulations, Compliance Report, RevA

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Whitemoss Road, Radcliffe:
90no. Residential Dwellings:
Part O, CIBSE TM59:
Overheating Calculations:
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1.0 Introduction

Whitemoss Road is a proposed new-build 30no. development to be constructed within the suburban district of Charlestown. The site is located approximately 3 miles West of Oldham, and approximately 4 miles North of central Manchester. The A663 provides a primary access routes to and from the site with the M60 providing a nearby motorway link. The proposed development is to construct 30no. residential dwellings consisting of 2, 3 and 4 bedroom houses.

Whitemoss Road was thermally modelled to establish the risk of overheating against the requirements listed in Building Regulation 2021, Part O and the CIBSE TM59 technical documents using both natural and mechanical ventilation strategies. The outputs returned by the modelling confirm all rooms and zones within the development achieve full compliance with Part O/CIBSE TM59 overheating criteria, see Appendix A & B below, pg.17 & 22 for confirmation of all pass results.

Whitemoss Road , Site Location



2.0 Building Regulations, 2021, Part O Compliance Checklist & Modelling Details

Part O of the Building Regulations 2021, requires [reasonable] provisions to be made in respect of all new-build dwellings, institutions, or buildings used for residential purposes to mitigate the risk of overheating. The main purpose of Part O is to ensure the safety of residents during occupation with a focus on thermal comfort. This can be achieved by limiting solar gains [during summer periods], and providing adequate means of removing excessive heat gains from the interior of a dwelling.

3.0 Whitemoss Road, Part O, Building Regulations Compliance Checklist

Building & Site Details	
Building Name	n/a
Street	Whitemoss Road
Town	Charlestown
County	Manchester
Postcode	
Proposed Building Use/Type	30no. Houses
• Security Issues	At current, no security issues were reported as applicable to the overheating analysis at the Whitemoss Road development.
• Noise Issues	A noise impact report was completed by E3P Acoustics, dated Nov 2021. The noise report confirmed unit 19-24 must have windows closed at night due to noise, but the rest of the site can use openable windows to mitigate overheating.
• Pollution Issues	No pollution issues were reported by the Casey Construction project team.
Designer Details	
Designer's Name	Steven Johnson
Company	TWC Consulting, [Zero Carbon Consultants] Ltd
Address	Suite1, 1 st Floor Aintree Building, Aintree Retail & Business Park, Merseyside
Postcode	L9 5AQ
Tel:	07856 976511
Designer's declaration	

Has the building construction been modelled accurately?	Yes	No
Designer's name	Steven Johnson	
Designer's organisation	TWC Consulting, [Zero Carbon Consultants] Ltd	
Designer's signature		
Registration number	CIBSE LCEA-168467	
Date of design	21-03-2024	

3.1 Whitemoss Road, Part O, Modelling Details

Part O, Part 2b, Modelling Details		
Simplified Method Pass	Yes	No: The development failed to achieve full compliance using the simplified method of calculation. Therefore, CIBSE TM59 dynamic simulation, was used in line with the Part O criteria, see sections below for details.
Dynamic software name and version	IES 2023.0.0.0 compliant with CIBSE AM11: Building performance modelling (2015b).	
Weather file location used, including any additional, more extreme weather files	Manchester_DSY1_2020High50 was used for all simulations [thermal models]. Future weather files were not included. The possibility of assessing each dwelling under heatwave/future climate change scenarios were discussed with the client.	
The number of sample units modelled, including why size/selection was chosen	For confirmation, the model uses one of each house type, and was ran in the four main orientations to assess the affect of overheating based on orientation. All four tests passed Part O.	

4.0 Thermal Model Inputs

The following thermal model inputs were used within the dynamic calculations to confirm compliance with Part O and CIBSE TM59 overheating criteria. The inputs are in no particular order and have been listed here for the purpose of clarification only.

- IESVE, ApacheSim software, version 2023.0.0.0 was used to complete the analysis. This is the most up to date version of IES software;
- The simulation period covered 01st Jan – 31st Dec, inclusive;
- All living, kitchen and bedroom areas were included within the analyses;
- Internal heat gains were based occupancy profiles for residential dwellings, as listed within standard CIBSE TM59 templates;

4.1 Construction Material Specifications

The following construction material specifications were included within the analysis [thermal model];

Element	U-value	Remarks
Ground floor	0.11W/m2K	As per Stage3 SAP calculations.
External wall	0.19W/m2K	As per Stage3 SAP calculations.
Roof	0.09W/m2K	As per Stage3 SAP calculations.
Windows	0.8W/m2K	As per Stage3 SAP calculations.
Solid Doors	1.00W/m2K	As per Stage3 SAP calculations.

4.2 Shading strategy.

No external shading strategy was included within the calculations. However, shading from nearby buildings was included, see SunCast section below for full details.

4.3 Overheating strategy

An overheating strategy was completed for Whitemoss Road, which included the following;

- ✓ Low g-values/solar protection for all double glazing units;
- ✓ Timber construction between intermediate floors;
- ✓ Mechanical cooling was not included within the calculations.

4.4 Window Units, Free Areas

All window free areas were modelled as per the elevation drawings and window schedule issued by MCKThe following window profiles were included.

Type	Dimensions	Handing	Opening Profile	G Value
All openable patio doors	As per drawings issued by John McCall Architects	Side Hung	90 degree openable	0.5 – Site Wide
All openable windows	As per drawings issued by John McCall Architects	Side Hung Top Hung	30 degree openable	0.5 – Site Wide

4.5 Mechanical Flow rates and Infiltration

Mechanical flow rates included are indicative figures only. The following infiltration and flow rates were modelled, and will need to be confirmed via M&E subcontractor.

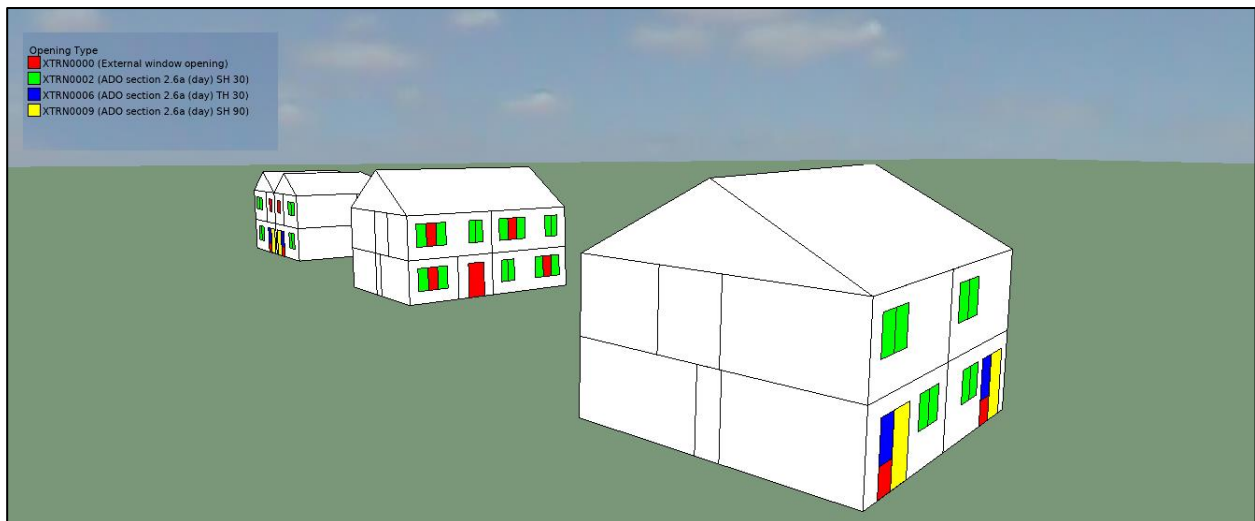
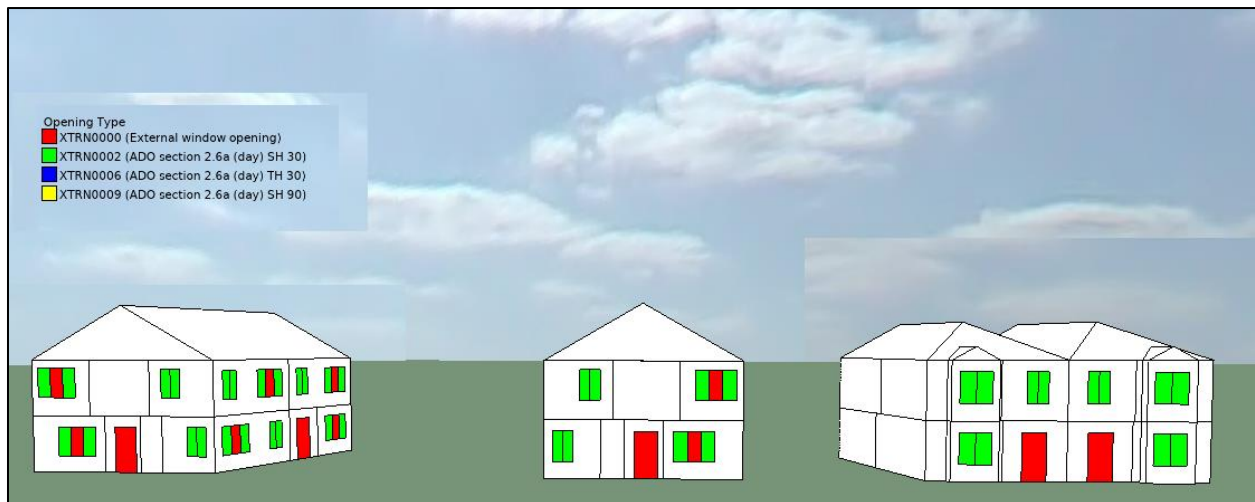
Room/zone	Ventilation Supply	Flow Rate	Description
Bedrooms	MVHR	10l/s	Nuaire, Eco2 mechanical ventilation unit with heat recovery.
Living/Kitchens	MVHR	10l/s	Nuaire, Eco2 mechanical ventilation unit with heat recovery.
Air permeability 5m3			

Whitemoss Road , Example Floor Plans & Dwelling Types

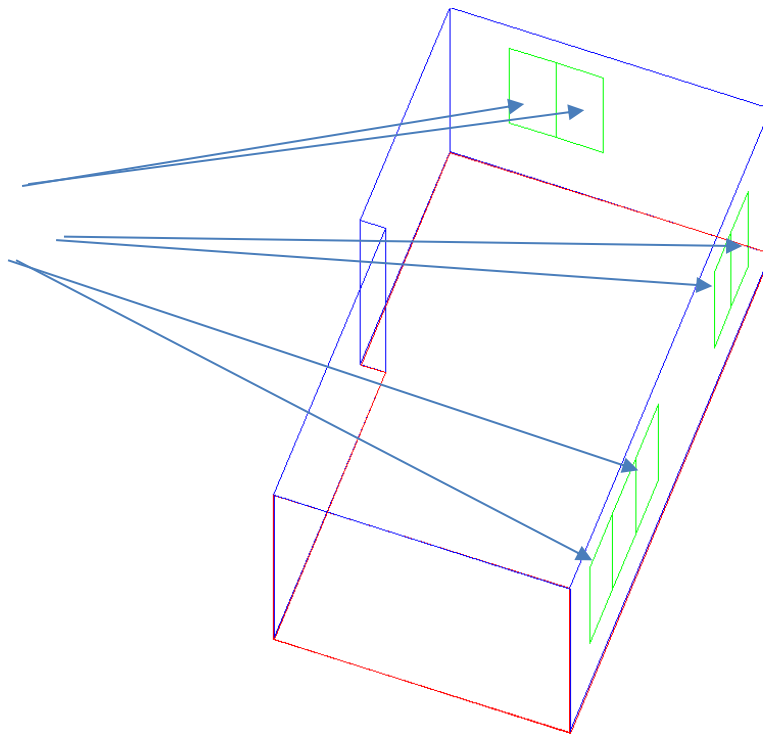


5.0 Elevations

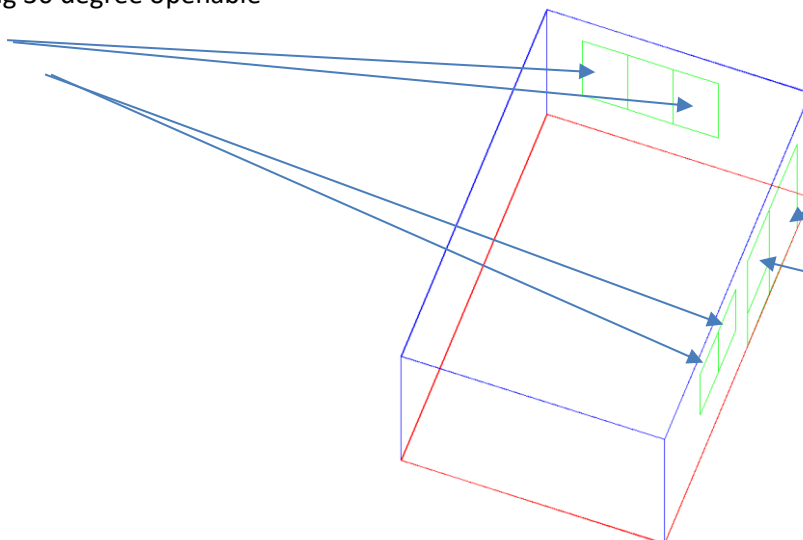
Examples below of the front/rear elevations that suffer from noise issues at night. Colour code in top left confirms these are modelled as per the noise report, and windows are to be closed at night time.



Side Hung 30 degree
openable window
Day only



Side Hung 30 degree openable
window
Day only

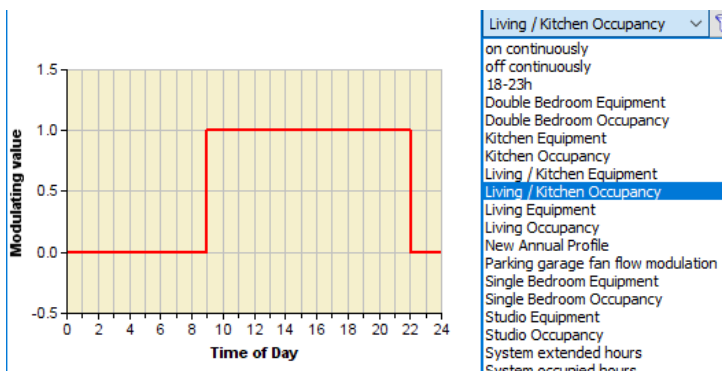


Side hung patio doors
90 degree openable
Day only

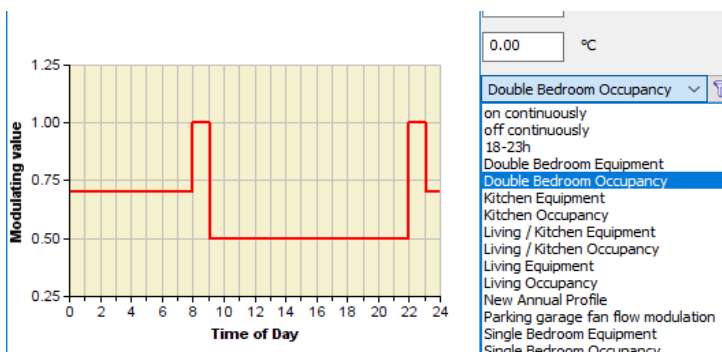
Top hung patio doors
30 degree openable
Day only

6.0 CIBSE TM59 Modelling Occupancy Profiles

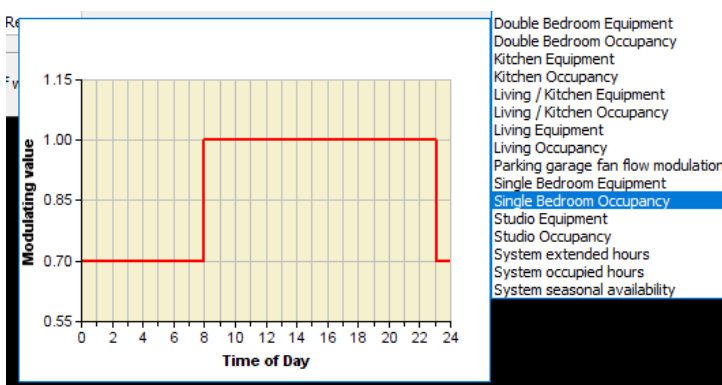
CIBSE TM59 occupancy profiles were used to assess the risk of overheating within each dwelling. The profiles included all living, kitchen and bedrooms. Occupancy profiles are listed as follows;



Living/Kitchen: Occupancy Profile



Double Bedroom: Occupancy Profile

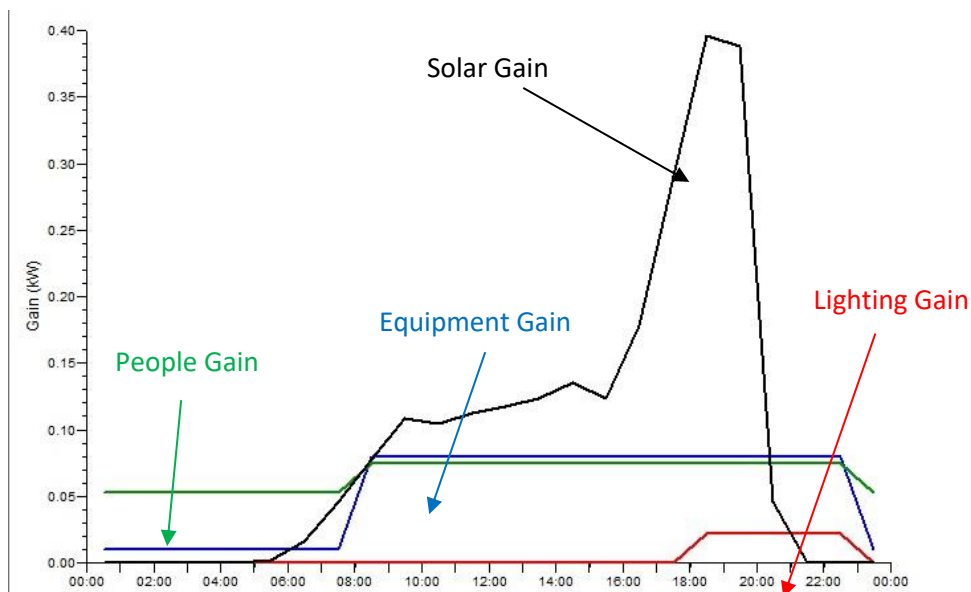


Single Bedroom: Occupancy Profile

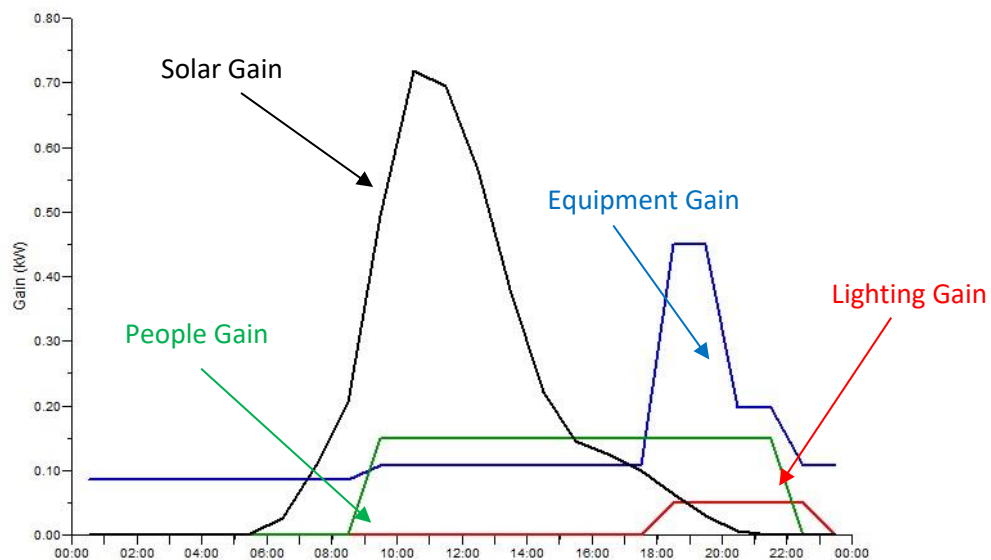
7.0 Internal Heat Gains & Equipment Profiles

CIBSE TM59 internal heat gains and equipment profiles were included in the thermal model. All sources of internal heat gains are shown on the following graphs.

Unit 10, Bedroom 1, Internal Heat Gain Profile, 15th August

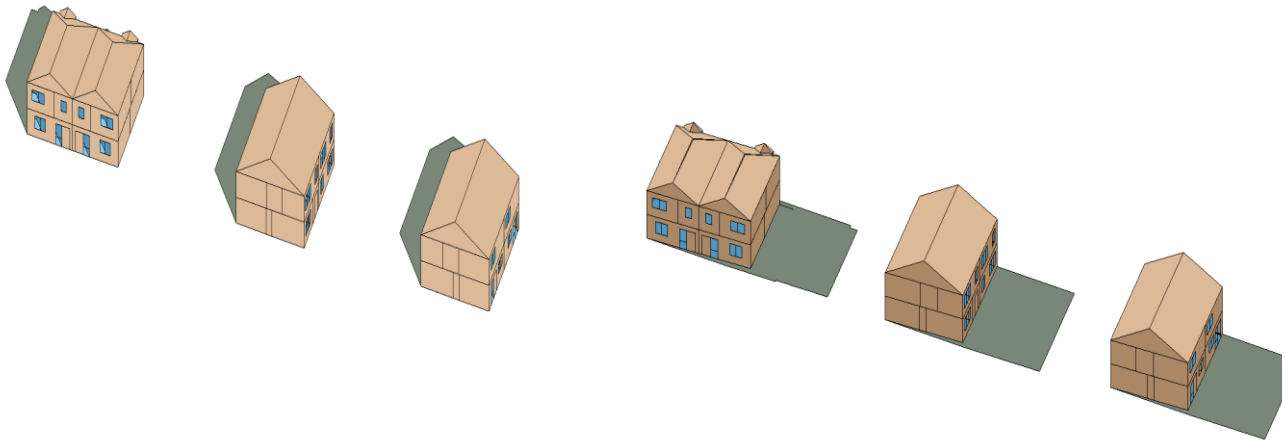


Unit 9, Bedroom 2, Internal Heat Gain Profile, 15th August



8.0 SunCast Simulation

Prior to completing the thermal model calculations, SunCast analysis was used to highlight levels of solar gain at each elevation, and the associated impacts on internal temperature gradients. The simulations were based on the geometry of the building, the amount of glazing specified for each room and zone, site orientation and the shading offered by nearby buildings¹.



Whitemoss Road , SunCast Shading
Profile, 15th August, 11:00

Whitemoss Road , SunCast Shading
Profile, 15th August, 18:00

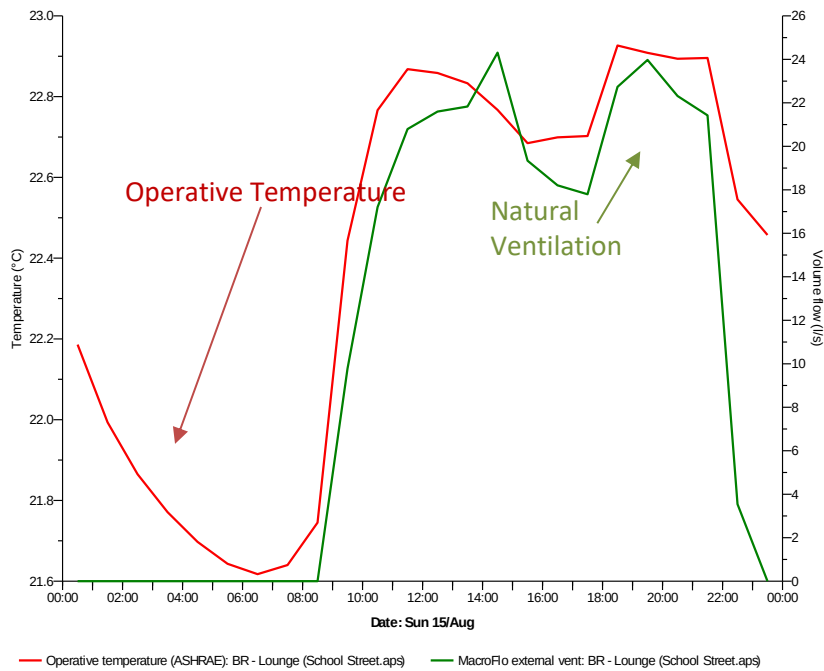
9.0 Macroflo Simulation

Prior to completing the CIBSE TM59 calculations, MacroFlo software was used to simulate levels of natural ventilation flowing through openable windows located on all floor levels. MacroFlo considers the height of each room above ground floor level, the volume of air entering through openable windows, and the overall cooling impact. Macroflow air volumes and overall reduction on internal temperatures are linked. The greater the airflow, the lower the internal temperature gradient. Windows with greater opening profiles will have greater cooling capacity².

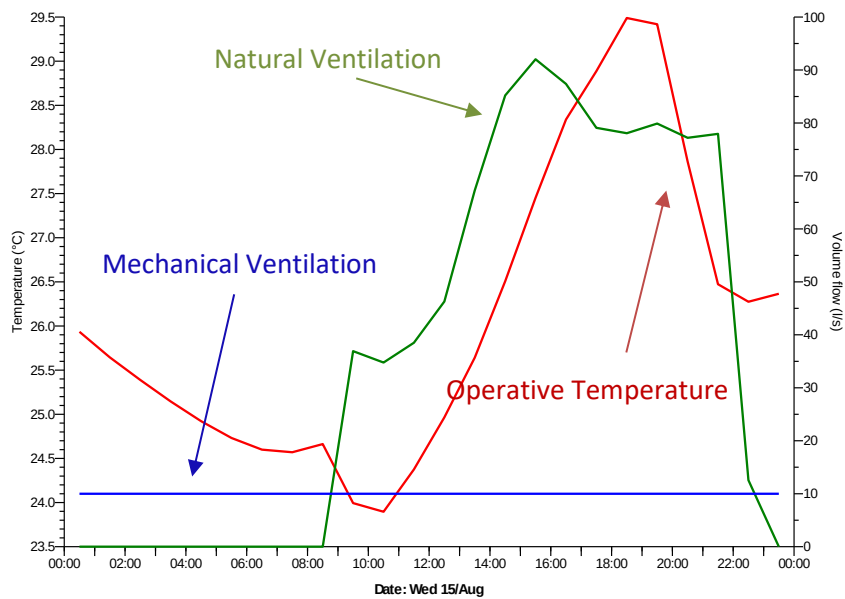
¹ SunCast is a software program that simulates the Sun's trajectory throughout the day, and the subsequent levels of solar gain on a building[s] elevations. This enables architects, designers and engineers to assess negative and/or positive impacts resulting from solar gain, and how a building's position, orientation, construction strategy, glazing details, etc. can be adjusted to improve internal temperature gradients.

² Macroflow is a software program that calculates zonal airflow, and bulk air movement throughout a building[s] rooms and zones, which are driven by wind and buoyancy induced pressures.

Unit 01, Lounge, Temperature & Air Flow Volumes, 15th August, (No MVHR Present)



Hollingswood House Type, Bedroom2, Temperature & Air Flow Volumes, 15th August



10.0 Whitemoss Road , Part O/CIBSE TM59 Overheating Criteria

10.1 Part O/CIBSE TM59 Overheating Criteria, Naturally Ventilated Buildings

- (a) *For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).*
- (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 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).*

Note: Criteria 2 and 3 of CIBSE TM52 may fail to be met, but both (a) and (b) above must be Passed for all relevant rooms.

10.2 Part O/CIBSE TM59 Overheating Criteria, Mechanically Ventilated Buildings

For dwellings with restricted window openings fixed temperature tests must be followed.

All occupied rooms and zones should not exceed an operative temperature of 26°C for more than 3% of the annual occupied hours.

11.0 Whitemoss Road, Part O/CIBSE TM59 Overheating Results

11.1 Natural Ventilation, Part O/CIBSE TM59 Overheating Results

This report confirms all occupied rooms and zones achieve full compliance with Part O and the TM59 criteria using a natural ventilation strategy.

Appendix A provides a full list of details results and calculations returned from the thermal analysis.

Appendix A:

Table1: Whitemoss Road. Part O/CIBSE TM59 Overheating Results, Natural Ventilation

Room Name	TM59/TM52 Criterion A (% Hrs Top- Tmax>=1K) [target >3%]	TM59 Criterion A Pass/Fail	TM59 Criterion B Bedrooms Only No. hours >26°C 10pm – 07am	TM59 Criterion B Pass/Fail
Unit 01 - Living	0.4	PASS	N/A	N/A
Unit 01 - Kitchen	0.6	PASS	N/A	N/A
Unit 01 - Bedroom 01	1.1	PASS	3	PASS
Unit 01 - Bedroom 02	1.1	PASS	2	PASS
Unit 01 - Bedroom 03	0.4	PASS	9	PASS
Unit 02 - Living	0.3	PASS	N/A	N/A
Unit 02 - Kitchen	1.6	PASS	N/A	N/A
Unit 02 - Bedroom 01	0.6	PASS	2	PASS
Unit 02 - Bedroom 02	1.3	PASS	3	PASS
Unit 02 - Bedroom 03	1.5	PASS	1	PASS
Unit 03 - Living	1.1	PASS	N/A	N/A
Unit 03 - Kitchen	1.3	PASS	N/A	N/A
Unit 03 - Bedroom 01	1.4	PASS	5	PASS
Unit 03 - Bedroom 02	1.1	PASS	6	PASS
Unit 03 - Bedroom 03	0.4	PASS	5	PASS
Unit 04 - Living	0.4	PASS	N/A	N/A
Unit 04 - Kitchen	1.5	PASS	N/A	N/A
Unit 04 - Bedroom 01	0.1	PASS	3	PASS
Unit 04 - Bedroom 02	1.1	PASS	4	PASS
Unit 04 - Bedroom 03	0.8	PASS	3	PASS
Unit 05 - Living	0.0	PASS	N/A	N/A
Unit 05 - Kitchen	0.8	PASS	N/A	N/A
Unit 05 - Bedroom 01	0.0	PASS	7	PASS
Unit 05 - Bedroom 02	0.0	PASS	5	PASS
Unit 06 - Living	0.8	PASS	N/A	N/A
Unit 06 - Kitchen	1.0	PASS	N/A	N/A
Unit 06 - Bedroom 01	0.2	PASS	2	PASS
Unit 06 - Bedroom 02	0.4	PASS	8	PASS
Unit 07 - Living	0.3	PASS	N/A	N/A
Unit 07 - Kitchen	1.1	PASS	N/A	N/A
Unit 07 - Bedroom 01	0.3	PASS	2	PASS
Unit 07 - Bedroom 02	0.4	PASS	0	PASS

Unit 08 - Living	1.1	PASS	N/A	N/A
Unit 08 - Kitchen	1.3	PASS	N/A	N/A
Unit 08 - Bedroom 01	0.9	PASS	6	PASS
Unit 08 - Bedroom 02	0.3	PASS	5	PASS
Unit 09 - Living	0.7	PASS	N/A	N/A
Unit 09 - Kitchen	1.2	PASS	N/A	N/A
Unit 09 - Bedroom 01	0.1	PASS	9	PASS
Unit 09 - Bedroom 02	1.6	PASS	2	PASS
Unit 10 - Living	1.3	PASS	N/A	N/A
Unit 10 - Kitchen	0.4	PASS	N/A	N/A
Unit 10 - Bedroom 01	0.6	PASS	0	PASS
Unit 10 - Bedroom 02	1.4	PASS	7	PASS
Unit 10 - Bedroom 03	1.5	PASS	7	PASS
Unit 11 - Living	1.5	PASS	N/A	N/A
Unit 11 - Kitchen	1.4	PASS	N/A	N/A
Unit 11 - Bedroom 01	0.9	PASS	9	PASS
Unit 11 - Bedroom 02	1.0	PASS	9	PASS
Unit 11 - Bedroom 03	0.2	PASS	1	PASS
Unit 12 - Living	1.1	PASS	N/A	N/A
Unit 12 - Kitchen	1.5	PASS	N/A	N/A
Unit 12 - Bedroom 01	1.0	PASS	3	PASS
Unit 12 - Bedroom 02	1.1	PASS	7	PASS
Unit 13 - Living	1.4	PASS	N/A	N/A
Unit 13 - Kitchen	1.3	PASS	N/A	N/A
Unit 13 - Bedroom 01	0.5	PASS	1	PASS
Unit 13 - Bedroom 02	0.6	PASS	2	PASS
Unit 14 - Living	0.2	PASS	N/A	N/A
Unit 14 - Kitchen	0.7	PASS	N/A	N/A
Unit 14 - Bedroom 01	0.0	PASS	5	PASS
Unit 14 - Bedroom 02	0.6	PASS	9	PASS
Unit 15 - Living	1.2	PASS	N/A	N/A
Unit 15 - Kitchen	0.9	PASS	N/A	N/A
Unit 15 - Bedroom 01	0.5	PASS	7	PASS
Unit 15 - Bedroom 02	1.2	PASS	7	PASS
Unit 15 - Bedroom 03	1.0	PASS	2	PASS
Unit 16 - Living	0.5	PASS	N/A	N/A
Unit 16 - Kitchen	0.4	PASS	N/A	N/A
Unit 16 - Bedroom 01	1.3	PASS	8	PASS
Unit 16 - Bedroom 02	1.6	PASS	8	PASS
Unit 16 - Bedroom 03	0.2	PASS	2	PASS
Unit 17 - Living	0.8	PASS	N/A	N/A
Unit 17 - Kitchen	0.2	PASS	N/A	N/A

Unit 17 - Bedroom 01	1.0	PASS	3	PASS
Unit 17 - Bedroom 02	1.1	PASS	5	PASS
Unit 18 - Living	1.3	PASS	N/A	N/A
Unit 18 - Kitchen	1.5	PASS	N/A	N/A
Unit 18- Bedroom 01	0.0	PASS	3	3
Unit 18 - Bedroom 02	0.1	PASS	7	7
Unit 25 - Living	1.2	PASS	N/A	N/A
Unit 25 - Kitchen	1.2	PASS	N/A	N/A
Unit 25 - Bedroom 01	0.5	PASS	4	PASS
Unit 25 - Bedroom 02	1.0	PASS	9	PASS
Unit 25 - Bedroom 03	0.4	PASS	7	PASS
Unit 26 - Living	0.3	PASS	N/A	N/A
Unit 26 - Kitchen	1.1	PASS	N/A	N/A
Unit 26 - Bedroom 01	0.2	PASS	4	PASS
Unit 26 - Bedroom 02	1.2	PASS	4	PASS
Unit 26 - Bedroom 03	1.5	PASS	9	PASS
Unit 27 - Living	1.5	PASS	N/A	N/A
Unit 27 - Kitchen	0.3	PASS	N/A	N/A
Unit 27 - Bedroom 01	0.7	PASS	6	PASS
Unit 27 - Bedroom 02	1.3	PASS	3	PASS
Unit 28 - Living	0.3	PASS	N/A	N/A
Unit 28 - Kitchen	0.1	PASS	N/A	N/A
Unit 28 - Bedroom 01	0.9	PASS	2	PASS
Unit 28 - Bedroom 02	1.4	PASS	6	PASS
Unit 29 - Living	0.8	PASS	N/A	N/A
Unit 29 - Kitchen	0.0	PASS	N/A	N/A
Unit 29 - Bedroom 01	0.4	PASS	4	PASS
Unit 29 - Bedroom 02	0.4	PASS	7	PASS
Unit 30 - Living	0.2	PASS	N/A	N/A
Unit 30 - Kitchen	1.4	PASS	N/A	N/A
Unit 30- Bedroom 01	0.2	PASS	7	PASS
Unit 30 - Bedroom 02	0.1	PASS	4	PASS
Unit 19 - Living	0.6	PASS	N/A	N/A
Unit 19 - Kitchen	0.7	PASS	N/A	N/A
Unit 20 - Living	0.6	PASS	N/A	N/A
Unit 20 - Kitchen	0.8	PASS	N/A	N/A
Unit 21 - Living	1.8	PASS	N/A	N/A
Unit 21 - Kitchen	1	PASS	N/A	N/A
Unit 22 - Living	2.8	PASS	N/A	N/A
Unit 22 - Kitchen	0.8	PASS	N/A	N/A
Unit 23 - Living	0.6	PASS	N/A	N/A
Unit 23 - Kitchen	0.7	PASS	N/A	N/A

Whitemoss Road, Radcliffe:
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Unit 24 - Living	2.5	PASS	N/A	N/A
Unit 24 - Kitchen	2	PASS	N/A	N/A

Appendix B:

Table2: Whitemoss Road. Part O/CIBSE TM59 Overheating Results, Mechanical Ventilation

Room Name	No. Hours > 26°C	[%] Annual Hours > 26°C	Pass/Fail
Unit 21 - Bedroom 3	2	173	PASS
Unit 21 - Bedroom 2	2	177	PASS
Unit 21 - Bedroom 1	2.3	200	PASS
Unit 22 - Bedroom 3	2	173	PASS
Unit 22 - Bedroom 2	2.1	183	PASS
Unit 22 - Bedroom 1	2.3	203	PASS
Unit 19 - Bedroom 2	2.5	216	PASS
Unit 19 - Bedroom 1	2.4	212	PASS
Unit 20 - Bedroom 2	1.8	156	PASS
Unit 20 - Bedroom 1	1.9	169	PASS
Unit 24 - Bedroom 2	1.9	164	PASS
Unit 24 - Bedroom 1	2.4	208	PASS
Unit 23 - Bedroom 2	1.5	129	PASS
Unit 23 - Bedroom 1	2.4	208	PASS