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Chorlton Baths, Chorlton:
2no. 4 Storey Apartment Blocks:
Part O, CIBSE TM59:
Overheating Calculations &
Building Regulations Compliance Report,
Revision A.



*"Delivering Buildings That Don't
Cost the Earth"*

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Chorlton Baths, Chorlton: 2no. 4 Storey Apartment Blocks



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

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Chorlton Baths, Chorlton:
2no. 4 Storey Apartment Block:
Part O, CIBSE TM59:
Overheating Calculations:
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Compliance Report, RevA.



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1.0 Introduction

Chorlton Baths is a proposed new-build 2no. 4 storey apartment block to be constructed within the suburban district of Chorlton. The site is located approximately two and a half mile South West of Manchester, and approximately five miles North West of Stockport. The A6010 provides the primary access route to and from the site with the M60 providing a nearby motorway link. The proposed development is to construct 50no. residential dwellings over 4no. storeys, consisting of 1/2no. bedroom apartments, including communal facilities, circulation areas and ancillary rooms.

Chorlton Baths 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.

Chorlton Baths , 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 Chorlton Baths, Part O, Building Regulations Compliance Checklist

Building & Site Details	
Building Name	n/a
Street	Chorlton Baths
Town	Chorlton
County	Greater Manchester
Postcode	
Proposed Building Use/Type	2No. 4 storey residential apartment block
• Security Issues	No security issues present other than obvious restrictions such as ground floor bedrooms being locked at night during sleeping hours.
• Noise Issues	A noise impact report was completed by Azymuth Acoustic UK, dated March 2023. The noise report confirmed windows cannot be open at night and MVHR should be utilised.
• Pollution Issues	No pollution issues were reported by the Caddick Construction project team.
Designer Details	
Designer's Name	Thomas Claffey
Company	TWC Consulting, [Zero Carbon Consultants] Ltd
Address	Suite1, 1 st Floor Aintree Building, Aintree Retail & Business Park, Merseyside
Postcode	L9 5AQ
Tel:	07856476976
Designer's declaration	

Has the building construction been modelled accurately?	Yes	No
Designer's name	Thomas Claffey	
Designer's organisation	TWC Consulting, [Zero Carbon Consultants] Ltd	
Designer's signature	T Claffey	
Registration number	CIBSE LCEA-168467	
Date of design	19-04-2023	

3.1 Chorlton Baths, 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, all rooms and zones within the building were modelled. This approach was taken to ensure all dwellings achieved compliance with the Part O requirements.	

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;
- Communal facilities and corridors were not included within the calculations as no hot-water pipework[s] is known to be located within in these areas.

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 specifications confirmed by Caddick Construction
External wall	0.16W/m2K	As per Stage3 specifications confirmed by Caddick Construction
Roof	0.12W/m2K	As per Stage3 specifications confirmed by Caddick Construction
Windows	1.40W/m2K	As per Stage3 specifications confirmed by Caddick Construction
Corridor Doors	0.0W/m2K	As per Stage3 specifications confirmed by Caddick Construction

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 Chorlton Baths, which included the following;

- ✓ Low g-values/solar protection for all double glazing units;
- ✓ High level thermal mass concrete located at each intermediate floor;
- ✓ 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 Buttress Architects, see pg.10 for further details. The following window profiles were included.

Type	Dimensions	Handing	Opening Profile	G Value
All openable windows	As per drawings issued by Buttress	Top hung	30 degree openable	0.40 – All Elevations
Living/Kitchen Windows	As per drawings issued by Buttress	Side Hung	30 degree openable	0.40 – All Elevations
Living/Kitchen Doors	As per drawings issued by Buttress	Side Hung	90 degree openable	0.40 – All Elevations

4.5 Mechanical Flow rates and Infiltration

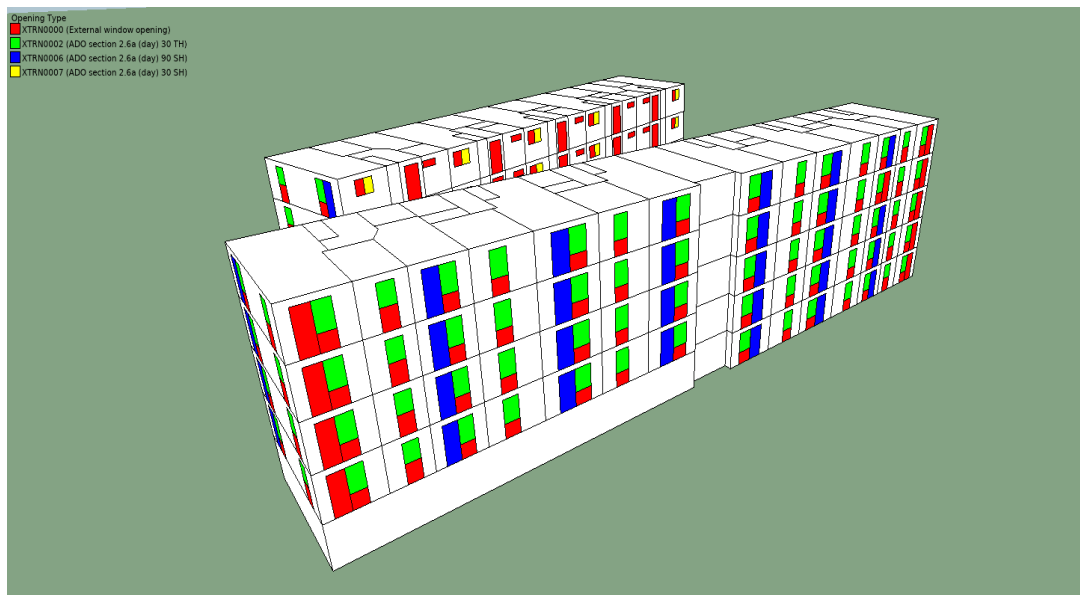
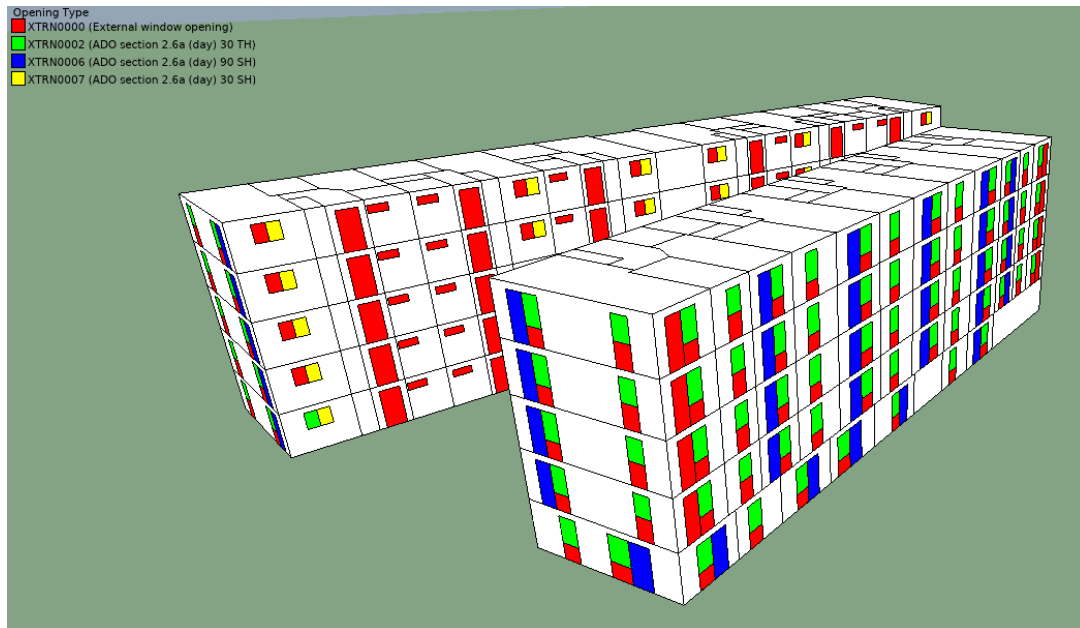
Mechanical flow rates included with the model are as per the specification documents issued by KGA [UK] Ltd, M&E designers. The following infiltration and flow rates were modelled.

Room/zone	Ventilation Supply	Flow Rate	Description
Double bedrooms	MVHR Purge Fan	10 l/s 50l/s	EnergiSava 300 MVHR Model tbc
Single bedrooms	MVHR Purge Fan	10 l/s 50l/s	EnergiSava 300 MVHR Model tbc
Living/Kitchens	MVHR	20l/s	EnergiSava 300 MVHR
Air permeability 3m3@50Pa			

Chorlton Baths , Typical Floor Plan & Dwelling Types



5.0 Elevations



Apartment 13, Living Kitchen

Openable windows, 30-degree angle
day-time only, side hung

Apartment 13, Living Kitchen

Openable windows, 30-degree angle
day-time only, top hung

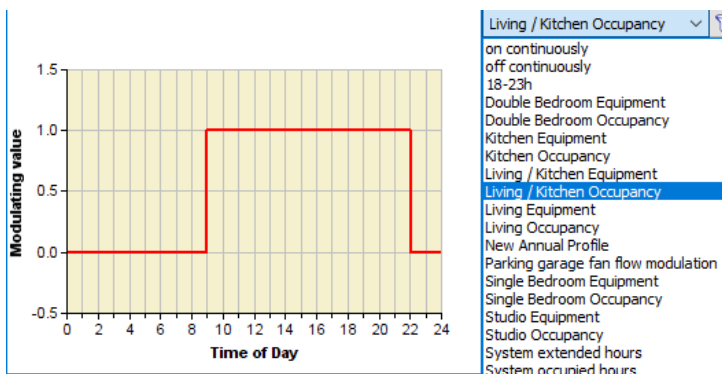
Apartment 13, Living Kitchen
Openable door, 90-degree
angle
day-time only, side hung

Apartment 13: Bedroom 1

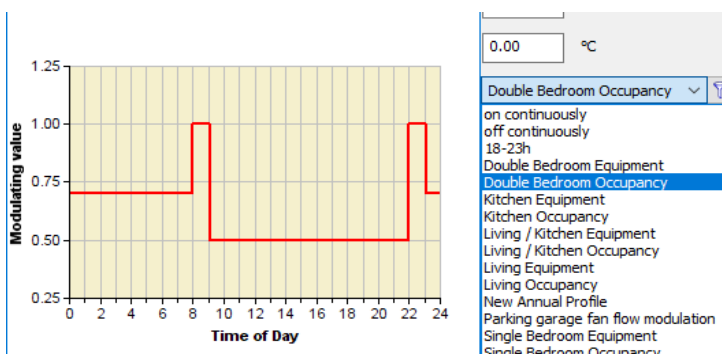
Openable windows, 30-degree
angle, day-time only, top hung

6.0 CIBSE TM59 Modelling Occupancy Profiles

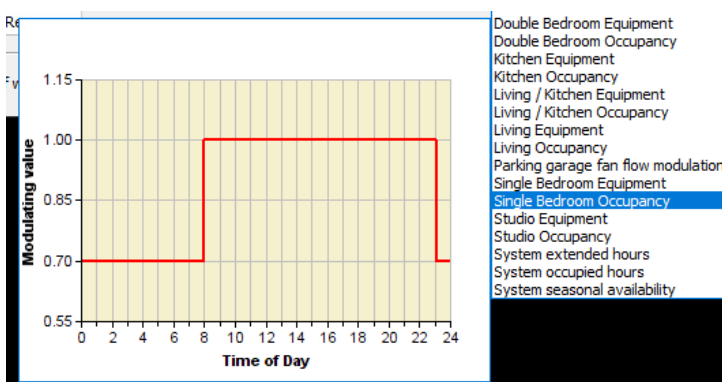
CIBSE TM59 occupancy profiles were used to assess the risk of overheating within each dwelling. The profiles included all living, kitchen and bedrooms. Occupancy profiles are listed as follows;



Living/Kitchen: Occupancy Profile



Double Bedroom: Occupancy Profile

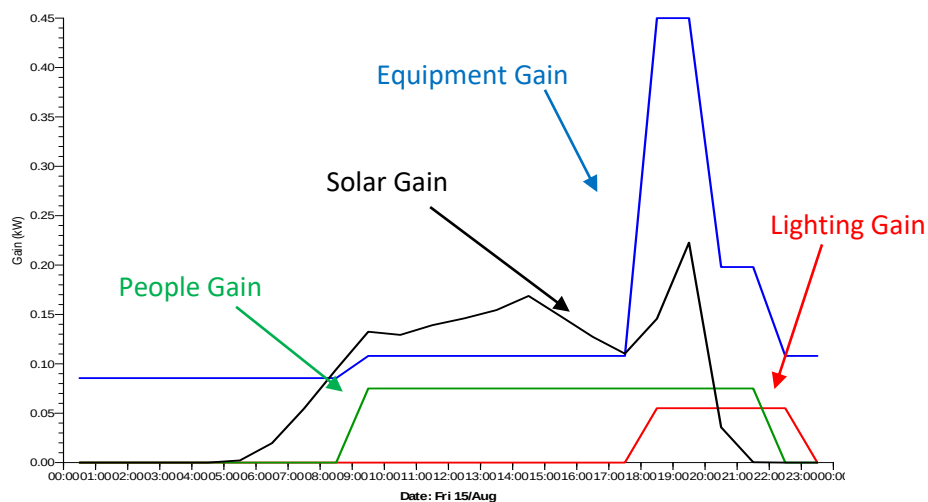


Single Bedroom: Occupancy Profile

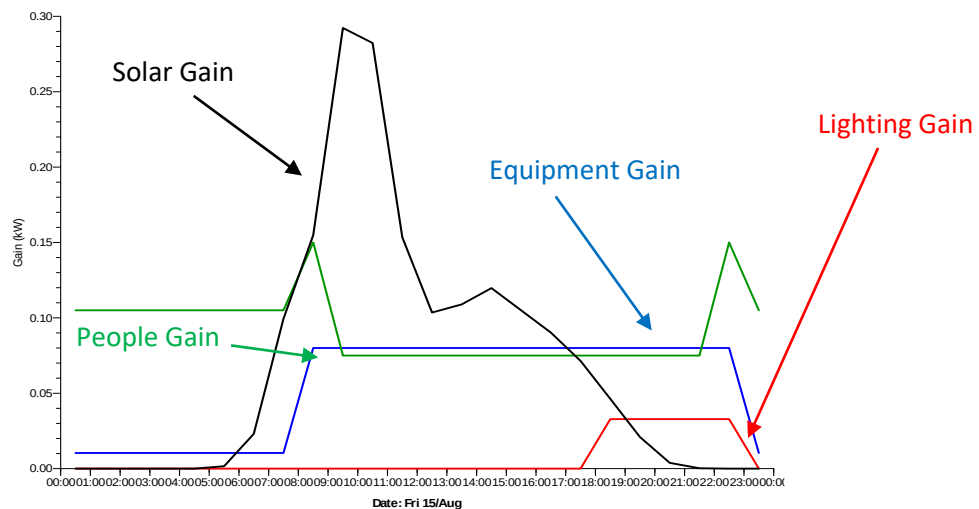
7.0 Internal Heat Gains & Equipment Profiles

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.

Apartment 13, Living Kitchen, Internal Heat Gain Profile, 15th August, West Elevation

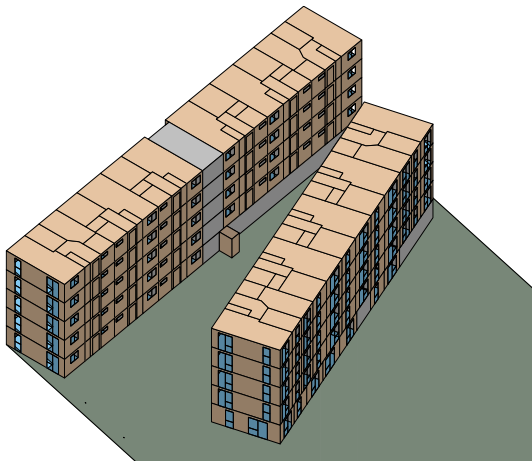


Apartment 13, Bedroom 1, Internal Heat Gain Profile, 15th August, West Elevation

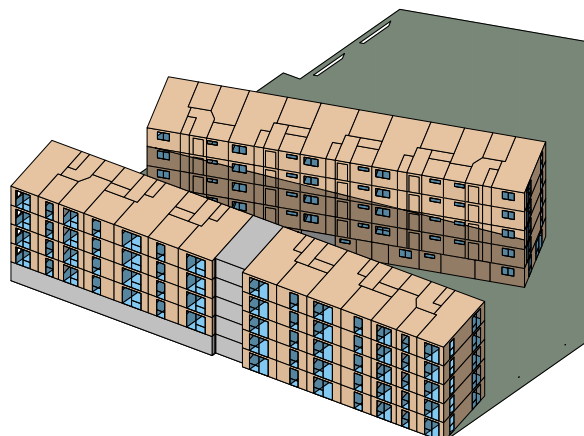


8.0 SunCast Simulation

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.



Chorlton Baths , SunCast Shading
Profile, 15th August, 10:00



Chorlton Baths , SunCast Shading
Profile, 15th August, 17:00

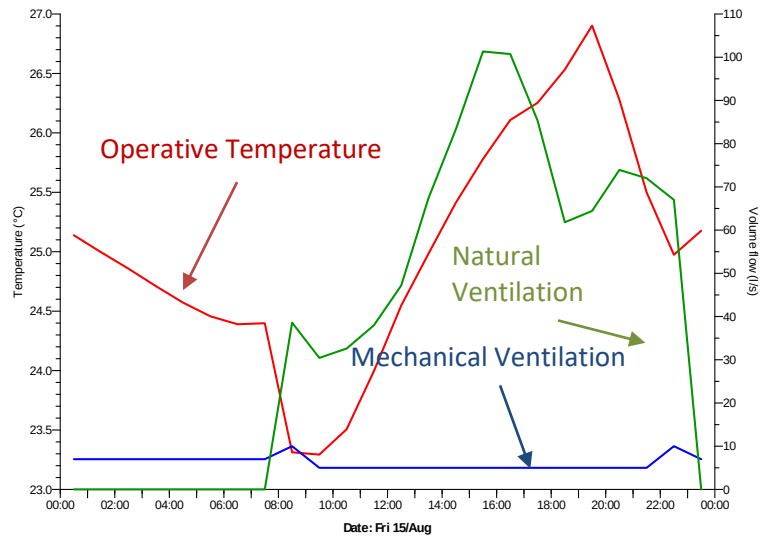
9.0 Microflo Simulation

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.

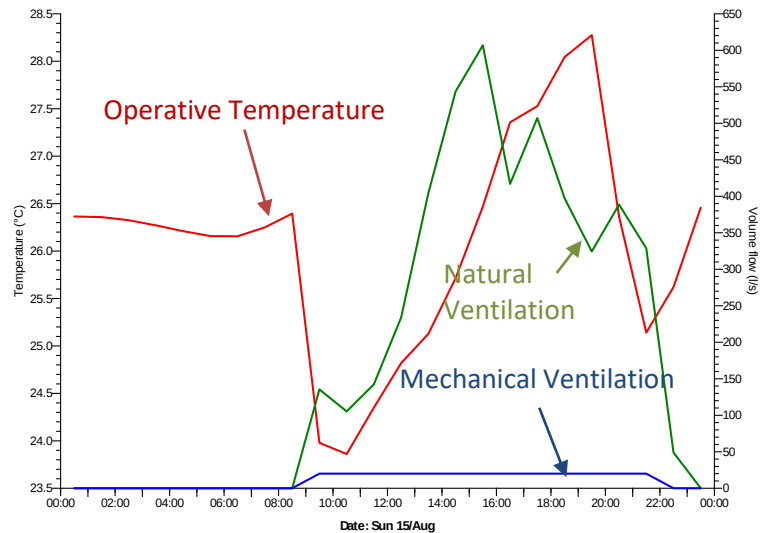
¹ SunCast is a software program that simulates the Sun's trajectory throughout the day, and the subsequent levels of solar gain on a building[s] elevations. This enables architects, designers and engineers to assess negative and/or positive impacts resulting from solar gain, and how a building's position, 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.

Apartment 13, Bedroom 1, Temperature & Air Flow Volumes, 15th August



Apartment 13, Bedroom1, Temperature & Air Flow Volumes, 15th August



10.0 Chorlton Baths , 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 Chorlton Baths, 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.

11.2 Mechanical Ventilation, Part O/CIBSE TM59 Overheating Results

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

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

Approved Document O states natural ventilation should be achieved where possible and should be assessed first before exploring the use of mechanical ventilation. Therefore, both sets of results have been provided to show which zones fail via the natural ventilation criteria but pass mechanical ventilation criteria. The difference in assessment criteria typically occurs in zones where bedroom windows are shut at night. To confirm, all zones pass on at least one of the criteria, therefore compliance to Part O has been satisfied based on the IES model provided for Chorlton Baths.

Appendix A:

Table1: Chorlton Baths. 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
001 - Bedroom	1.7	Pass	N/A	N/A
001 - Bedroom	0.4	Pass	N/A	N/A
001 - Living/Kitchen	1.7	Pass	N/A	N/A
001 - Living/Kitchen	0.7	Pass	N/A	N/A
002 - Bedroom	1.7	Pass	N/A	N/A
002 - Bedroom	0.3	Pass	N/A	N/A
002 - Living/Kitchen	1.7	Pass	N/A	N/A
002 - Living/Kitchen	0.6	Pass	N/A	N/A
003 - Bedroom	1.2	Pass	N/A	N/A
003 - Bedroom	0.3	Pass	N/A	N/A
003 - Bedroom (Single)	2.8	Pass	N/A	N/A
003 - Bedroom (Single)	0.5	Pass	N/A	N/A
003 - Living/Kitchen	2.2	Pass	N/A	N/A
003 - Living/Kitchen	1.2	Pass	N/A	N/A
004 - Bedroom	1.3	Pass	N/A	N/A
004 - Bedroom	0.7	Pass	N/A	N/A
004 - Bedroom (Single)	2.9	Pass	N/A	N/A
004 - Bedroom (Single)	1.1	Pass	N/A	N/A
004 - Living/Kitchen	2.1	Pass	N/A	N/A

004 - Living/Kitchen	1.2	Pass	N/A	N/A
005 - Bedroom	2.1	Pass	N/A	N/A
005 - Bedroom	0.7	Pass	N/A	N/A
005 - Living/Kitchen	2	Pass	N/A	N/A
005 - Living/Kitchen	1	Pass	N/A	N/A
006 - Bedroom	2.1	Pass	N/A	N/A
006 - Bedroom	0.7	Pass	N/A	N/A
006 - Living/Kitchen	2.1	Pass	N/A	N/A
006 - Living/Kitchen	1.1	Pass	N/A	N/A
007 - Bedroom	2	Pass	N/A	N/A
007 - Bedroom	0.6	Pass	N/A	N/A
007 - Living/Kitchen	2	Pass	N/A	N/A
007 - Living/Kitchen	1	Pass	N/A	N/A
008 - Bedroom	2	Pass	N/A	N/A
008 - Bedroom	0.6	Pass	N/A	N/A
008 - Bedroom (Single)	1.2	Pass	N/A	N/A
008 - Living/Kitchen	2	Pass	N/A	N/A
008 - Living/Kitchen	1.8	Pass	N/A	N/A
009 - Bedroom	1.3	Pass	N/A	N/A
009 - Bedroom	0.7	Pass	N/A	N/A
009 - Bedroom (Single)	1.1	Pass	N/A	N/A
009 - Living/Kitchen	2.6	Pass	N/A	N/A
009 - Living/Kitchen	1.3	Pass	N/A	N/A
010 - Bedroom	1.2	Pass	N/A	N/A
010 - Bedroom	0.7	Pass	N/A	N/A
010 - Bedroom (Single)	2.9	Pass	N/A	N/A
010 - Living/Kitchen	2.1	Pass	N/A	N/A
010 - Living/Kitchen	1.1	Pass	N/A	N/A
011 - Bedroom	2.1	Pass	N/A	N/A
011 - Bedroom	0.7	Pass	N/A	N/A
011 - Living/Kitchen	2	Pass	N/A	N/A
011 - Living/Kitchen	1.1	Pass	N/A	N/A
012 - Bedroom	2.1	Pass	N/A	N/A
012 - Bedroom	0.7	Pass	N/A	N/A
012 - Living/Kitchen	2.1	Pass	N/A	N/A
012 - Living/Kitchen	1.1	Pass	N/A	N/A
013 - Bedroom	2.1	Pass	N/A	N/A

013 - Bedroom	0.6	Pass	N/A	N/A
013 - Bedroom (Single)	1.3	Pass	N/A	N/A
013 - Living/Kitchen	2	Pass	N/A	N/A
013 - Living/Kitchen	1.8	Pass	N/A	N/A
014 - Bedroom	2.1	Pass	N/A	N/A
014 - Bedroom	0.7	Pass	N/A	N/A
014 - Bedroom (Single)	1.1	Pass	N/A	N/A
014 - Living/Kitchen	2	Pass	N/A	N/A
014 - Living/Kitchen	1.4	Pass	N/A	N/A
015 - Bedroom	1.3	Pass	N/A	N/A
015 - Bedroom	0.8	Pass	N/A	N/A
015 - Living/Kitchen	2.6	Pass	N/A	N/A
015 - Living/Kitchen	1.1	Pass	N/A	N/A
016 - Bedroom	1.3	Pass	N/A	N/A
016 - Bedroom	0.8	Pass	N/A	N/A
016 - Bedroom (Single)	2.9	Pass	N/A	N/A
016 - Living/Kitchen	2.1	Pass	N/A	N/A
016 - Living/Kitchen	1.2	Pass	N/A	N/A
017 - Bedroom	2.1	Pass	N/A	N/A
017 - Bedroom	0.7	Pass	N/A	N/A
017 - Living/Kitchen	2	Pass	N/A	N/A
017 - Living/Kitchen	1.2	Pass	N/A	N/A
018 - Bedroom	2.1	Pass	N/A	N/A
018 - Bedroom	0.7	Pass	N/A	N/A
018 - Bedroom (Single)	1.3	Pass	N/A	N/A
018 - Living/Kitchen	2.1	Pass	N/A	N/A
018 - Living/Kitchen	2	Pass	N/A	N/A
019 - Bedroom	2.1	Pass	N/A	N/A
019 - Bedroom	0.6	Pass	N/A	N/A
019 - Bedroom (Single)	1	Pass	N/A	N/A
019 - Living/Kitchen	2	Pass	N/A	N/A
019 - Living/Kitchen	1.6	Pass	N/A	N/A
020 - Bedroom	2.1	Pass	N/A	N/A
020 - Bedroom	0.7	Pass	N/A	N/A
020 - Living/Kitchen	2	Pass	N/A	N/A
020 - Living/Kitchen	1.2	Pass	N/A	N/A
021 - Bedroom	0.7	Pass	N/A	N/A

021 - Living/Kitchen	2.7	Pass	N/A	N/A
021 - Living/Kitchen	1.2	Pass	N/A	N/A
022 - Bedroom	1.2	Pass	N/A	N/A
022 - Bedroom	0.6	Pass	N/A	N/A
022 - Bedroom (Single)	2.7	Pass	N/A	N/A
022 - Living/Kitchen	1.9	Pass	N/A	N/A
022 - Living/Kitchen	1.2	Pass	N/A	N/A
023 - Bedroom	2	Pass	N/A	N/A
023 - Bedroom	0.5	Pass	N/A	N/A
023 - Bedroom (Single)	1.1	Pass	N/A	N/A
023 - Living/Kitchen	1.9	Pass	N/A	N/A
023 - Living/Kitchen	1.8	Pass	N/A	N/A
024 - Bedroom	1.9	Pass	N/A	N/A
024 - Living/Kitchen	1.9	Pass	N/A	N/A
025 - Bedroom	2	Pass	N/A	N/A
025 - Living/Kitchen	1.9	Pass	N/A	N/A
026 - Bedroom	1.9	Pass	N/A	N/A
026 - Living/Kitchen	1.9	Pass	N/A	N/A
027 - Bedroom	1.3	Pass	N/A	N/A
027 - Bedroom (Single)	2.9	Pass	N/A	N/A
027 - Living/Kitchen	2.5	Pass	N/A	N/A
001 - Bedroom	1.7	Pass	N/A	N/A
001 - Bedroom	0.4	Pass	N/A	N/A

Appendix B:

Table2: Chorlton Baths. Part O/CIBSE TM59 Overheating Results, Mechanical Ventilation

Room Name	No. Hours > 26°C	[%] Annual Hours > 26°C	Pass/Fail
001 - Bedroom	1.8	159	Pass
001 - Bedroom	1.3	114	Pass
002 - Bedroom	1.7	145	Pass
002 - Bedroom	1.1	93	Pass
003 - Bedroom	1.5	128	Pass
003 - Bedroom	1.1	92	Pass
003 - Bedroom (Single)	1.7	150	Pass
003 - Bedroom (Single)	1.2	102	Pass

004 - Bedroom	1.6	139	Pass
004 - Bedroom	1.2	109	Pass
004 - Bedroom (Single)	1.8	161	Pass
004 - Bedroom (Single)	1.4	125	Pass
005 - Bedroom	1.9	165	Pass
005 - Bedroom	1.6	142	Pass
006 - Bedroom	2.2	189	Pass
006 - Bedroom	1.6	140	Pass
007 - Bedroom	2.1	182	Pass
007 - Bedroom	1.4	126	Pass
008 - Bedroom	1.8	162	Pass
008 - Bedroom	1.1	96	Pass
008 - Bedroom (Single)	1.5	128	Pass
009 - Bedroom	1.6	138	Pass
009 - Bedroom	1.2	109	Pass
009 - Bedroom (Single)	1.8	158	Pass
009 - Bedroom (Single)	1.4	125	Pass
010 - Bedroom	1.6	139	Pass
010 - Bedroom	1.7	147	Pass
010 - Bedroom (Single)	1.8	160	Pass
011 - Bedroom	1.9	164	Pass
011 - Bedroom	1.7	147	Pass
012 - Bedroom	2.1	186	Pass
012 - Bedroom	1.5	131	Pass
013 - Bedroom	2.1	187	Pass
013 - Bedroom	1.1	99	Pass
013 - Bedroom (Single)	1.5	129	Pass
014 - Bedroom	1.9	166	Pass
014 - Bedroom	1.3	112	Pass
014 - Bedroom (Single)	1.4	127	Pass
015 - Bedroom	1.6	142	Pass
015 - Bedroom	1.7	150	Pass
015 - Bedroom (Single)	1.8	159	Pass
016 - Bedroom	1.6	139	Pass
016 - Bedroom	1.7	149	Pass
016 - Bedroom (Single)	1.8	160	Pass
017 - Bedroom	1.9	164	Pass

017 - Bedroom	1.5	134	Pass
018 - Bedroom	2.2	190	Pass
018 - Bedroom	1.1	100	Pass
018 - Bedroom (Single)	1.5	130	Pass
019 - Bedroom	2.2	190	Pass
019 - Bedroom	1.2	107	Pass
019 - Bedroom (Single)	1.4	126	Pass
020 - Bedroom	2	174	Pass
020 - Bedroom	1.7	148	Pass
021 - Bedroom	2.3	205	Pass
021 - Bedroom	1.7	149	Pass
021 - Bedroom (Single)	1.9	166	Pass
022 - Bedroom	1.6	138	Pass
022 - Bedroom	1.4	124	Pass
022 - Bedroom (Single)	1.8	154	Pass
023 - Bedroom	1.8	161	Pass
023 - Bedroom	1.1	99	Pass
023 - Bedroom (Single)	1.4	127	Pass
024 - Bedroom	2.1	181	Pass
025 - Bedroom	2.1	183	Pass
026 - Bedroom	1.8	160	Pass
027 - Bedroom	1.6	139	Pass
027 - Bedroom (Single)	1.8	156	Pass