



Thermal Comfort Assessment

**59 Upper Chorlton Road
Manchester
M16 7RQ**

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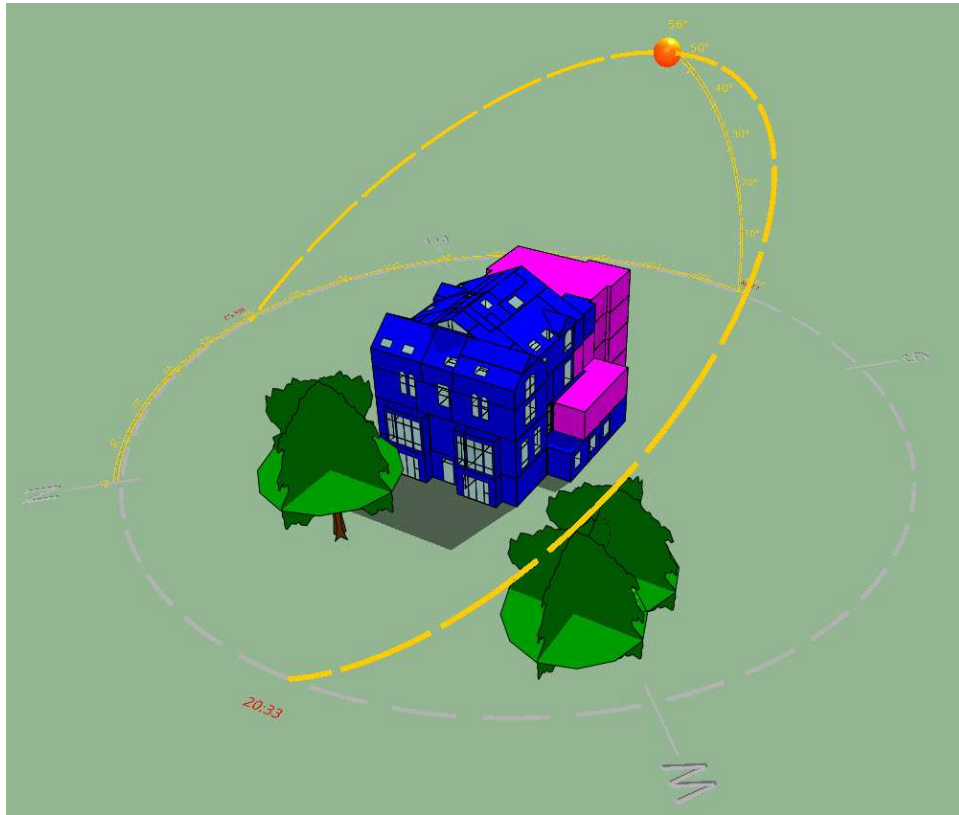
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Introduction

This report aims to assess the risk of overheating in the proposed development at 59 Upper Chorlton Road, Manchester. The north west façade faces Upper Chorlton Road and opening windows may present a noise issue for residents. The building has been assessed using dynamic simulation modelling and the CIBSE TM 59 guidance (Design methodology for the assessment of overheating risk in homes).



Methodology

The following calculations were undertaken using IES Virtual Environment ApacheSim, a whole building energy simulation programme. Weather data is taken from the CIBSE DSY1 weather file for Manchester, which is the closest weather data location.

The geometry of the model is based on drawings created by Simon James Architects. Input data has been taken from the design drawings, which would also be used in the SAP calculations for Part L of the Building Regulations.

CIBSE TM59 has been used to assess the risk of overheating and the criteria for predominantly naturally ventilated dwellings are as follows:

- Criterion 1 of TM52 should also be met for domestic style living rooms, kitchens and bedrooms. Limiting the number of hours that the actual operative temperature can exceed the threshold comfort temperature (upper limit range of comfort temperature) by 1°K or more during the occupied hours of a typical non-heating season (1 May to 30 September).

- Operative temperature shall not exceed 26°C for more than 1% of annual hours, between the hours of 10pm and 7am. 1% of the hours during this time frame annually equates to 32 hours, thus 33 or more hours above 26°C would be recorded as a fail.
- Communal corridors should not exceed an operative temperature of 28°C for more than 3% of the annual hours.

For predominantly mechanically ventilated spaces, the following criterion applies:

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

Although just a few apartments face north west, in order to build an accurate model, surrounding spaces have been included. Results for those spaces have also been included.

Building fabric

Based on the supplied design criteria, the building has been modelled using the following fabric performance: -

Element	U value (W/m ² K)	Cm value (kJ/(m ² K))
Door	2.2	13.875
Extension wall	0.18	21.95
Existing wall	0.3	21.95
Extension floor	0.22	200
Existing floor	0.25	16
Internal Ceiling/Floor	1.09	95
Internal partitions	1.79	8.75
All roof types	0.18	98.75
Rooflights	1.9	-

Blinds have been incorporated in to the design for the rooms with non-openable windows. These can be internal blinds and for the calculations, the performance of a typical cream holland linen blind has been used.

Ventilation strategy

The building is predominantly designed with openable windows, except for those on the north west elevation, which will be assumed to remain closed.

Window and glazed doors have been modelled from the plans and schedules supplied. Thermal and solar performance figures used are: -

Type	U value (W/m ² K)	G value	Location
Windows	1.6	0.63	All other
Windows solar control	1.6	0.50	NW façade

Windows solar control with blinds	1.6	0.50	NW façade – apartment 11 GF bedroom, apartment 6 LGF and GF bedrooms
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Where available, window openings have been modelled to open to an angle of 20° and 30° for skylights.

Openable windows have been set to open when the room is occupied and the air temperature exceeds 22°C, as per TM59 guidance.

The initial analysis showed that overheating would be an issue where windows cannot be opened. As such, a further analysis was run incorporating mechanical ventilation to provide fresh air and combat the risk of excessive internal temperatures.

Ventilation rates used are as follows:

Room	Ventilation type	Ventilation rate
Bedroom apartment 11	Supply air	25 l/s
LGF bedroom apartment 6	Supply air	25 l/s
GF bedroom apartment 6	Supply air	25 l/s

The building has been modelled to include outside air infiltration of 0.45 air changes per hour, based on CIBSE guidance for the existing building areas.

Occupancy profiles

Occupancy profiles are set up as required by CIBSE TM59, varying for bedrooms and living spaces.

Internal gains

Occupancy, lighting and equipment gains for occupied spaces, bedrooms and kitchen/living areas, have been taken directly from the TM59 guidance.

Results

For predominantly naturally ventilated spaces classed as kitchen / living / dining rooms, criterion A must be met. For bedrooms, both criteria must be met. For predominantly mechanically ventilated spaces, just the single criterion applies.

Cells highlighted in green demonstrate compliance and those in red are non-compliant. The tables below detail the results room by room.

Bedrooms – naturally ventilated

Room Name	Criterion a - % Hours (Top- Tmax >= 1K)	Criterion b (Night Hours Top > 26)
Bedroom apt 1 ii	0	0.18
Bedroom apt 1 i	0	0.18
Bedroom apt 12	0.54	0.03
Bedroom apt 12	0.6	0.21
Bedroom apt 15	0	0
Bedroom apt 15	0	0.09
Bedroom apt 16	0.25	0.43
Bedroom apt 16 loft	0	0
Bedroom apt 2 i	0	0.4
Bedroom apt 2 ii	0	0.3
Bedroom apt 4 i	0	0.15
Bedroom apt 4 ii	0	0.15
Bedroom apt 5 ii	0	0.18
Bedroom apt 5 i	0	0

Living areas – naturally ventilated

Room Name	Criterion a - % Hours (Top- Tmax >= 1K)
Kitchen/Living apt 1	0.54
Kitchen/Living apt 10	0
Kitchen/Living apt 11	0.33
Kitchen/Living apt 12	1.55
Kitchen/Living apt 15	0
Kitchen/Living apt 16	0.22
Kitchen/Living apt 17	0.03
Kitchen/Living apt 2	0.9
Kitchen/Living apt 4	0
Kitchen/living apt 5	0.63
Kitchen/Living apt 6	1.99

Corridors

Room Name	% Hours Top > 28
Circulation	0
Circulation	0.13
Circulation	0.24
Circulation	0.06
Circulation	0
Circulation	0.18
Circulation	0.07
Circulation	0
Circulation	0.11
Circulation_B1_10	0.21
Circulation_B1_19	0
Circulation_B1_20	0.29
Circulation_B1_6	0.11
Circulation_B1_7	0
Circulation_L0_12	0
Circulation_L0_13	0.29
Circulation_L0_14	0.5
Circulation_L0_15	0.79
Circulation_L1_13	0.4
Circulation_L1_14	1.05
Circulation_L1_2	0
Circulation_L1_9	0.03
Lobby_L0_8	0.21
Circulation_L1_12	0.26

Mechanically ventilated occupied spaces

Room Name	% Hours Top > 26
Bedroom apt 11	2.75
Bedroom apt 6 LGF	1.99
Bedroom apt 6 GF	2.72

All rooms are compliant with the CIBSE TM59 overheating criteria.

Appendix

Below are some example charts of room profiles showing the operative temperature, solar gains, internal gains as well as gains / losses from the mechanical ventilation and window opening capabilities.

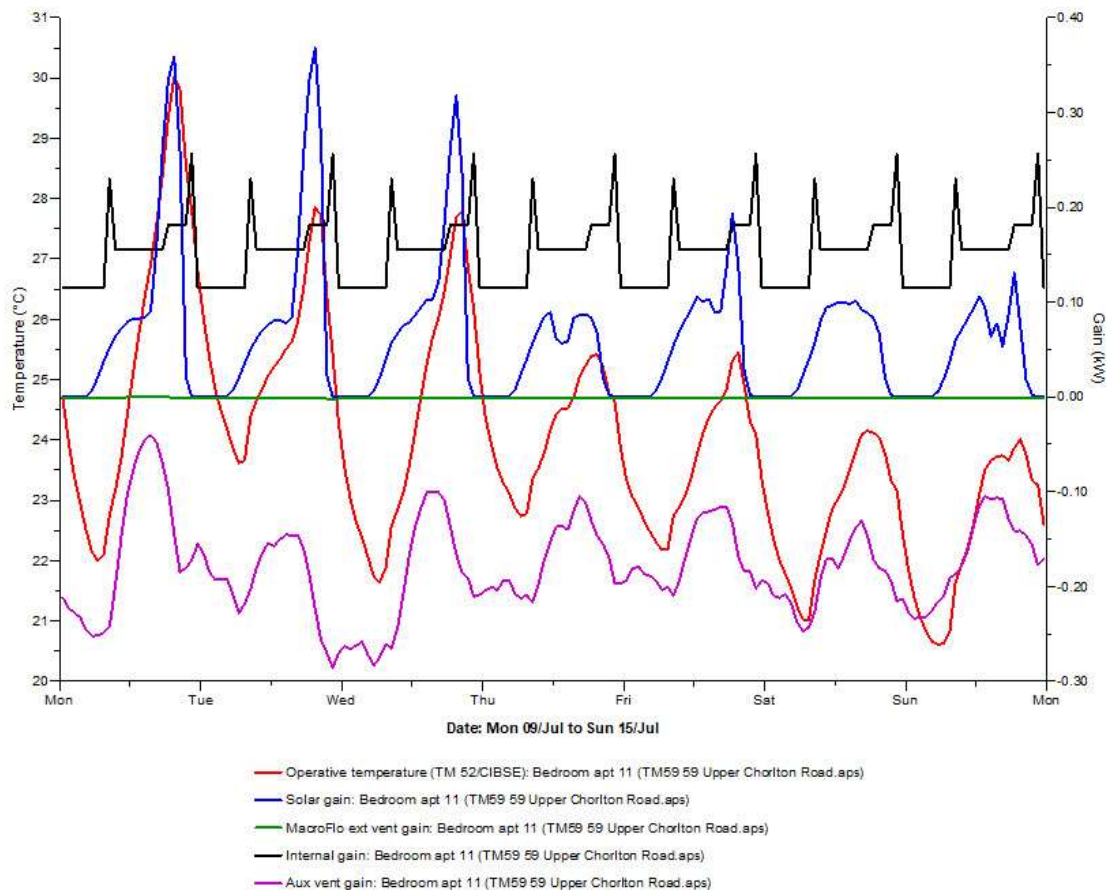
Some terms used in the charts, which are references from the dynamic simulation software, are as follows:

Aux vent gain – heat gains in the room, or heat reduction, if a negative value, associated with the mechanical ventilation system.

MacroFlo ext vent gain – heat gains in the room, or heat reduction, if a negative value, associated with heat flow through the external windows and doors.

Apartment 11 bedroom – July week with individual variables

This shows the operative temperature (red) and the individual gains (or losses) (internal, solar, MV system and window/door openings). The green line is on zero, indicating there is no ventilation associated with window openings.



Apartment 11 bedroom – July week with combined variables

This shows the internal, solar, MV system and window/door opening gains (or losses) combined. The blue line generally oscillates around the 0.00 Gain (kW) value on the right axis, meaning heat gains (solar and internal) are offset by heat losses from the ventilation system (none from windows, as they are fixed closed). There are some warmer days at the start of the week, where the heat gains are generally above 0kW; however, as demonstrated in the results, the comfort levels are met across the year.

