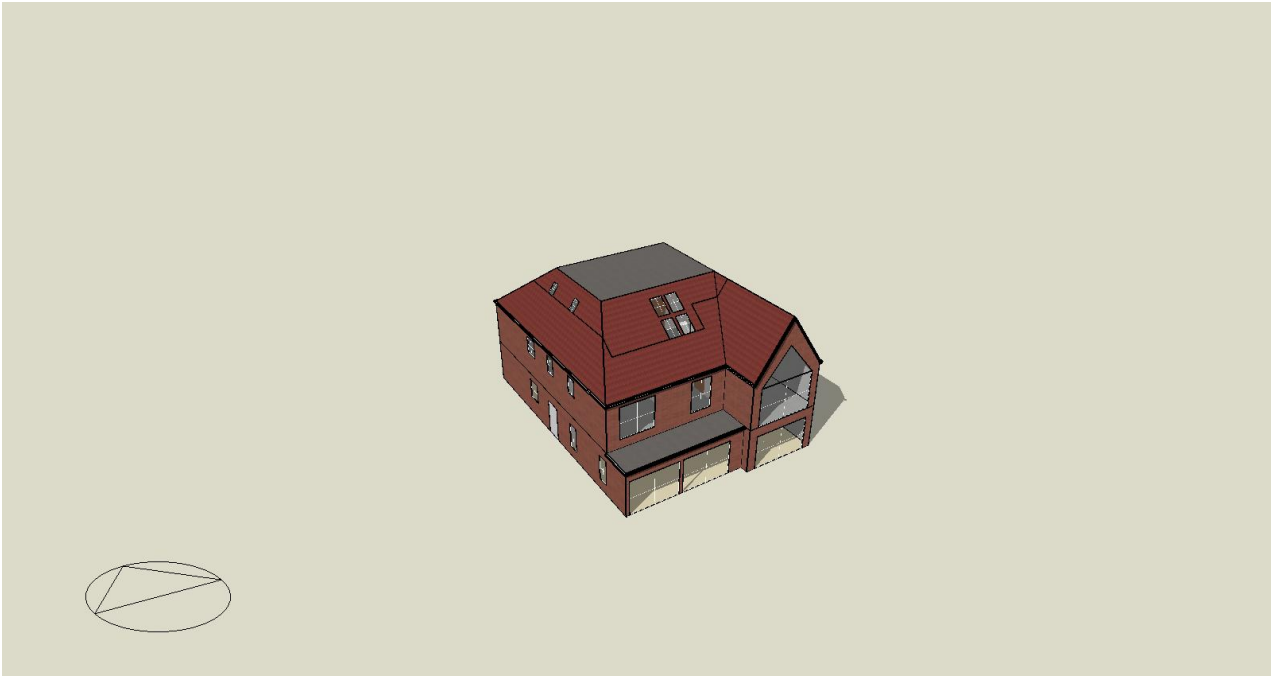


Overheating Study

CIBSE TM59 (2017)

401 Wilbraham Road

Chorlton

Manchester

M21 0UT

GC Reports Limited
Britannia House, High Street, Scunthorpe,
North Lincolnshire, DN15 6EA
info@gcreports.co.uk

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TERMS OF USE

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SCOPE AND EXCLUSIONS

GC Reports has been commissioned by Omar Fiaz to carry out Overheating risk assessment of the proposed development at 401 Wilbraham Road in order to assess the overheating risk of the design.

This report assesses overheating risk in compliance with CIBSE TM59:2017 Design Methodology for the Assessment of Overheating risk in Homes.

The study is based on dynamic simulation modelling (DSM), which estimates the indoor climate of the building over a “non-heating season” based on a range of factors including:

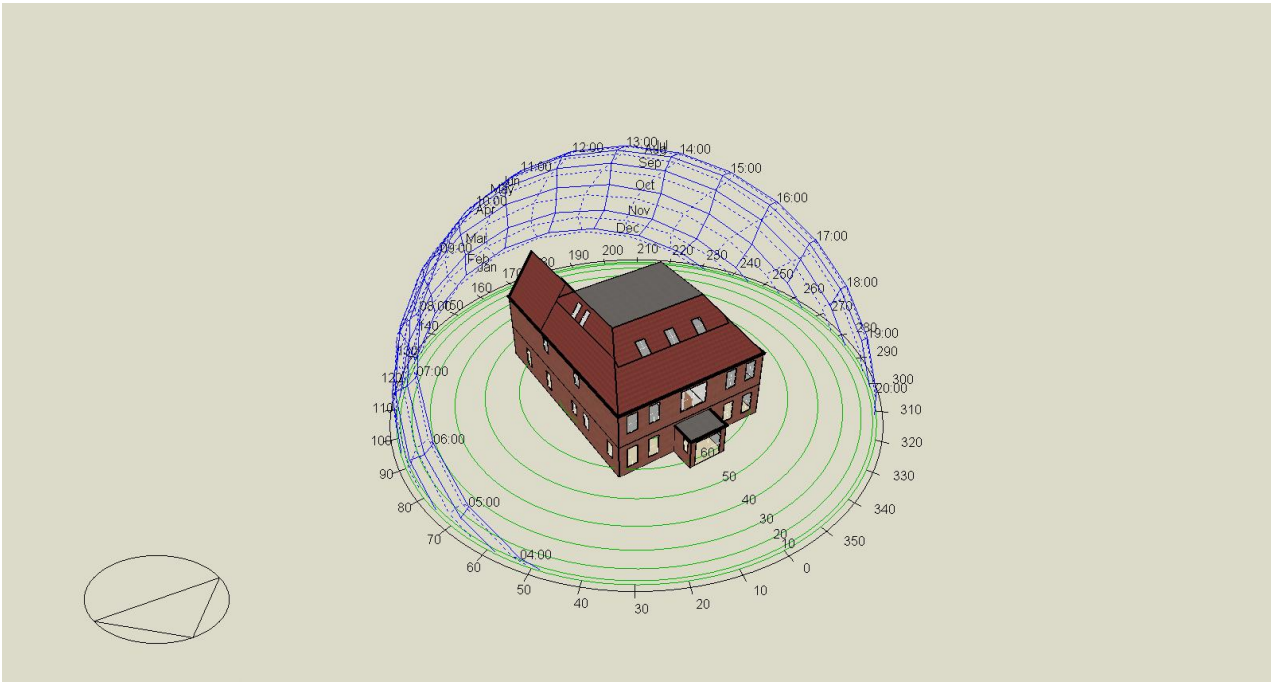
- Weather and climate predictions
- Solar heat gain through building façade
- Heat loss though building thermal envelope
- Building Heating, Ventilation and Air-conditioning

All results and strategies are directly affected by the inputs listed in this document; any deviation from these is bound to output different results.

It is important to note that with any modelling exercise there are assumptions and approximations that must be made. Details of assumptions made, and approximations used are supplied as part of the report.

All results are based on the output from computer modelling software which is based on climatic conditions and patterns of use bound not to be identical to the real-life situation. Therefore, these results should be read as those following the overheating mitigation risk calculation methodology, but not as guaranteed real-life observations.

DSM MODEL



The building has been modelled using DesignBuilder Dynamic Simulation Modelling Software (Version 7.3.1.003), using the internationally approved EnergyPlus Simulation Engine.

The DSM model can be used to provide:

- Overheating analysis (this report)
- Energy consumption prediction
- Heating and Cooling Load prediction
- Thermal Fluid Dynamics Assessment
- Building Compliance Assessment (Building Regulations Part-L and EPC)

TM59 Criteria

The methodology of TM59 is based on the use of dynamic thermal modelling for the treatment and assessment of overheating risk in residential buildings.

This methodology is proposed for all residences and should especially be considered for:

- Large developments
- Developments in urban areas, particularly Southern England
- Blocks of flats
- Dwellings with high levels of insulation and air-tightness
- Single aspect flats

CRITERIA FOR HOMES PREDOMINANTLEY NATURALLY VENTILATED

Compliance is based on passing both of the following two criteria:

(*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).

SPECIFICATION FOR MODEL

The following information has been used to produce the building model:

Drawings

Drawing pack	From Client

Weather Data

Data File	Manchester_DSY1_2020High50_ (2020, high emissions, 50% percentile scenario)

Building Services

HVAC	Heated Floor & Radiators, Boiler HW, Natural Ventilation
Lighting	Part L1 compliant lighting scheme

Construction Properties

The following values have been used and are taken from the SAP calculations completed for the project:

U-Values

Walls	U=0.17
Slope Roof	U=0.15
Flat Roof	U=0.17
Floor	U=0.11
Window properties	U=1.21, g=0.49
Infiltration	EnergyPlus “Good” Crack Template (defined by IEA Technical note AIVC-44)

Ventilation Strategy

Natural (purge) ventilation is provided by opening windows. The windows are simulated to be opened when a room is occupied and the operative temperature in the room is above 22°C, subject to external weather being appropriate.

Internal doors are simulated to be open between 7:00 to 22:00 every day.

The rate of natural ventilation depends upon the strength and direction of the wind, and its interaction with the available openings, and the availability of cross ventilation to the zone.

Air infiltration through other openings, vents and cracks in the building structure is simulated and included in the natural ventilation rate.

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Internal Condition

Internal conditions are produced by the simulation based on occupancy schedules and loads defined by a set of custom templates in the model.

Adjacent Buildings

Details of any adjacent buildings have not been used in the model. This is the optimum method for overheating analysis, as no reliance has been made on shading from adjacent structures to prevent overheating.

RESULTS

The Bedrooms, Living and Kitchen zones are expected to overheat in excess of the TM59 Criteria. It has been modelled with the available doors open, however this does not provide enough purge ventilation to cool the areas.

To mitigate overheating risk, glazing with a low g-value is required. The glazing is to have a g-value of 0.49 and a u-value of 1.21. This reduces overheating in all zones, however not enough to meet TM59 Criteria. This is shown in the results table below.

Zone Name	Criterion A (%)	Criterion B (hr)	Results
FIRST - BED1	26.04	43.67	Fail
FIRST - BED2	11.10	5.00	Fail
FIRST - BED3	1.14	12.00	Pass
FRIST - BED4	1.20	16.50	Pass
GROUND - FAMILYDINING	2.53	N/A	Pass
GROUND - KITCHEN	0.00	N/A	Pass
GROUND - LOUNGE	0.00	N/A	Pass
SECOND - BED 5	5.57	39.00	Fail

Further measures are required to meet TM59 criteria. Installing air conditioning in each failing zone provides mechanical cooling, mitigating overheating risk in these zones.

Zone Name	Criterion A (%)	Criterion B (hr)	Results
FIRST - BED3	1.30	10.67	Pass
FRIST - BED4	1.28	14.67	Pass
GROUND - FAMILYDINING	2.54	N/A	Pass
GROUND - KITCHEN	0.00	N/A	Pass
GROUND - LOUNGE	0.00	N/A	Pass

With these combined measures, the dwelling will achieve a Pass under TM59 criteria.

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