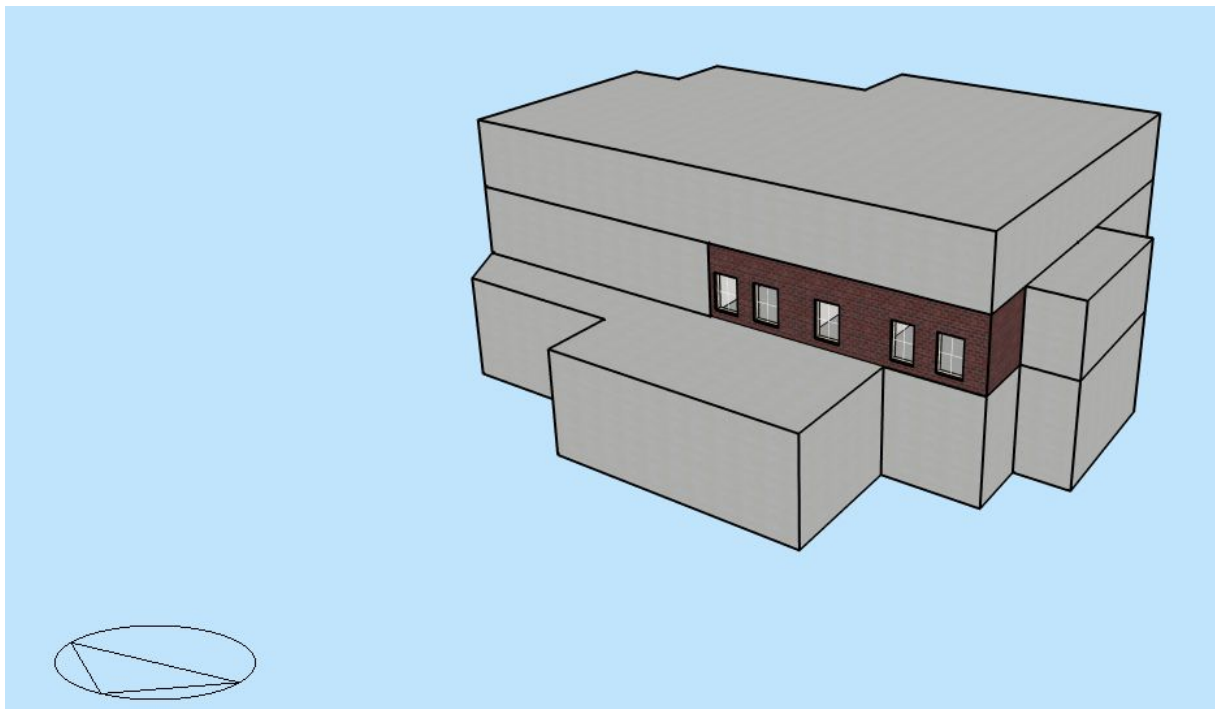


Approved Document O - TM59 Dynamic Thermal Modelling Assessment

**Proposed residential development at:
5-7 Wilbraham Road, M14 6JZ**



Client: Viridian Consulting Engineers Ltd
Project: 5-7 Wilbraham Road
Assessor: Sam Carr

Contact: John Hughes
Reference: P0601
Email: sam@aldrock.co.uk

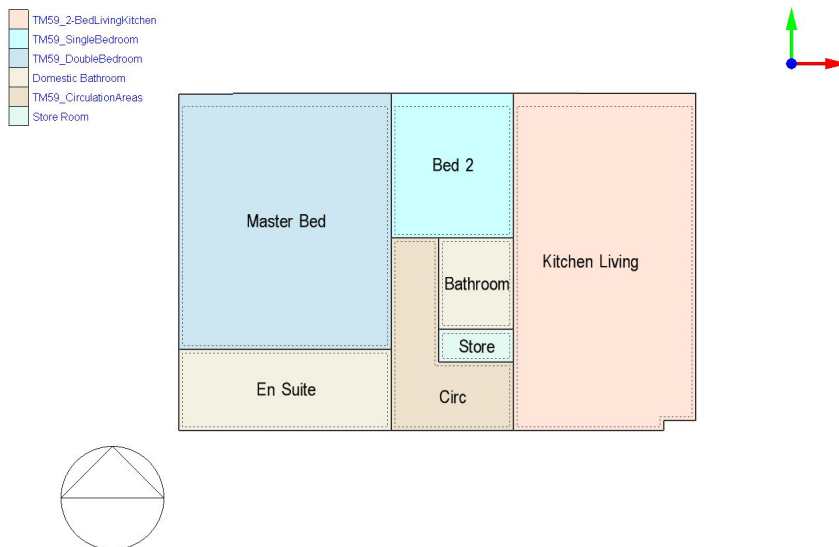
The accompanying TM59 assessment demonstrates that the proposed dwelling at the above address achieves Approved Document Part O compliance using Dynamic Thermal Modelling.

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The building has been modelled using DesignBuilder Dynamic Simulation Modelling Software, using the 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)

First Floor layout



Classification of Overheating

TM59 provides a single criterion for assessing comfort and overheating in mechanically ventilated buildings:

For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26 °C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

Specification for Model

See Appendix B.

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.* However in this model window openings are restricted due to noise and pollution issues so ventilation is predominately provided by mechanical sources.

Air infiltration through other openings, vents and cracks in the building structure is simulated and included in the natural ventilation rate. The building condition set for this assessment is Mechanical Ventilation.

Internal Conditions

Defined by dynamic simulation model as per TM59:2017, Section 6, Table 2:

Adjacent Buildings

Details of any adjacent buildings have not been used in the model.

Criteria for homes predominantly naturally ventilated

Based on the principals of CIBSE TM52, CIBSE Technical Memorandum 59 sets two simplified criteria for compliance:

1. Criterion A - For living rooms, kitchens and bedrooms: the number of hours during which DT 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).
2. Criterion 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).

Criteria for homes predominantly mechanically ventilated

For homes with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied annual hours (CIBSE Guide A (2015a)).

Criteria for communal corridors

The overheating test for corridors is based on the number of annual hours for which an operative temperature of 28°C is exceeded. Whilst there is no mandatory target, if an operative temperature of 28°C is exceeded for more than 3% of total annual hours, this should be flagged as a significant risk.

This development does not contain any communal corridors as only apartment 1 has been sampled.

Limits on CIBSE's TM59 modelling

CIBSE's TM59 method requires the modeller to make choices. Approved Document O applies limits to these choices. These limits should be applied when following the guidance in CIBSE's TM59.

All of the following limits on CIBSE's TM59, apply:

- When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following.
 - Start to open when the internal temperature exceeds 22°C.
 - Be fully open when the internal temperature exceeds 26°C.
 - Start to close when the internal temperature falls below 26°C.
 - Be fully closed when the internal temperature falls below 22°C.
- At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.
 - The opening is on the first floor or above and not easily accessible.
 - The internal temperature exceeds 23°C at 11pm.
- When a ground floor or easily accessible room is unoccupied, both of the following apply.
 - In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely using fixed or lockable louvred shutters, window grilles or railings.
 - At night, windows, patio doors and balcony doors should be modelled as closed.
- An entrance door should be included, which should be shut all the time.

Acceptable strategies for reducing overheating risk

Limiting solar gains

Solar gains in summer should be limited by any of the following means.

- Fixed shading devices, comprising any of the following.
 - Shutters.
 - External blinds.
 - Overhangs.
 - Awnings.
- Glazing design, involving any of the following solutions.
 - Size.

- Orientation.
- g-value.
- Depth of the window reveal.
- Building design – for example, the placement of balconies.
- Shading provided by adjacent permanent buildings, structures or landscaping.
- Although internal blinds and curtains provide some reduction in solar gains, they should not be taken into account when considering whether the requirements of Approved Document O have been met. Likewise shading from foliage, such as tree cover, should not be included.

Removing excess heat

Excess heat should be removed from the residential building by any of the following means.

- Opening windows (the effectiveness of this method is improved by cross-ventilation).
- Ventilation louvres in external walls.
- A mechanical ventilation system.
- A mechanical cooling system

The building should be constructed to meet the requirements of Approved Document O using passive means as far as reasonably practicable. It should be demonstrated to the building control body that all practicable passive means of limiting unwanted solar gains and removing excess heat have been used first before adopting mechanical cooling. Any mechanical cooling (air-conditioning) is expected to be used only where requirement O1 cannot be met using openings.

Current Building Design

Table of TM59 results by zone

- Current Building Design meets the criteria set out in CIBSE guide TM59:2017 “Design methodology for the assessment of overheating risk in homes”.

Criteria for predominantly mechanically ventilated homes			
Block	Zone	% Hours Exceeded	Pass/Fail
FLAT1	BED2	1.19	Pass
FLAT1	KITCHENLIVING	2.37	Pass
FLAT1	MASTERBED	1.07	Pass

Criteria for corridors			
Block	Zone	% Hours Exceeded	Pass/Fail
FLAT1	CIRC	0	Pass

As a result the building has passed the TM59.

Recommendations for improvement

There are no recommendations as the design has passed the TM59.

Conclusion

An overheating analysis has been carried out on the Wilbraham Road development on behalf of the Client to show compliance with the thermal comfort criteria as set out in CIBSE guide TM59:2017 “Design methodology for the assessment of overheating risk in homes”.

Based on the modelling conducted, with the recommendations adopted the results show that all habitable rooms for Mill End Farm comply with the thermal comfort criteria as set out by CIBSE guide TM59:2017 “Design methodology for the assessment of overheating risk in homes”.

Appendix B: Compliance checklist

- B1** This compliance checklist is divided into three parts, as follows.
- Part 1 contains the building details and declarations.
 - Part 2a functions as a design checklist for the simplified approach detailed in Section 1.
 - Part 2b functions as a design checklist for the **dynamic thermal modelling** approach detailed in Section 2.
 - Part 3 is for verifying the completion details of the as-built residential building.
- B2** All three parts of the compliance checklist should be completed. The relevant parts of Part 2 and 3 should be signed by a person who is competent to design the residential building.
- B3** A copy of this checklist, or a similar checklist, may be submitted to the **building control body** as evidence that the building has been constructed as designed to reduce the risk of overheating.

Part 1 – Building details and declarations

The designer should complete this section.

1.1 Building and site details	
Residential building name/number	Apartment 1
Street	5-7. Walbraham Road
Town	Walkden
County	Greater Manchester
Postcode	M14 6JZ
Proposed building use/type of building	Apartments
Are there any security, noise or pollution issues?	Noise/ pollution restrictions in place
1.2 Designer's details	
Designer's name	Sam Carr
Company	Aldrock Surveyors
Address line 1	Unit 5, Cunningham Court, Shadsworth Business Park
Address line 2	Lions Drive, Blackburn
Postcode	BB1 2QX
Telephone number	01254774943
Email address	Sam@aldrock.co.uk

Part 2 – Design details

The designer should complete either Part 2a or 2b, depending on the method used.

Part 2a – Simplified method (as detailed in Section 1)

2a.1 Site details	
Site location, assigned using paragraph 1.3 ⁽¹⁾	
Building category, assigned using paragraph 1.4	
2a.2 Designed overheating mitigation strategy	
Details of standards selected:	
a. Maximum area of glazing	
b. Maximum area of glazing in the most glazed room	
c. Shading strategy	
d. Total minimum free area	
e. Bedroom minimum free area	
2a.3 Designer's declaration	
Designer's name	
Designer's organisation	
Designer's signature	
Registration number (if applicable)	
Date of design	

NOTE:

1. All references to paragraphs are to Approved Document O.

Part 2b – Dynamic thermal modelling method (as detailed in Section 2)

2b.1 Modelling details		
Dynamic software name and version	Designbuilder Energy+ Ver 7.2.0.32	
Weather file location used, including any additional, more extreme weather files	Manchester_DSY1_2020High50_.epw	
Number of sample units modelled, including an explanation of why the size/selection has been chosen	1 sample unit chosen as it is on the ground floor facing the main road. Apartment 1 was chosen to test that the apartments won't overheat due to the window opening restrictions required.	
2b.2 Modelled occupancy		
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6? ⁽¹⁾	Yes X	No
Details of the occupancy profiles used	TM59_DoubleBedroom	
Details of the equipment profiles used	TM59_DoubleBed_Equip	
Details of the opening profiles used	TM59_Restricted_Openings	
2b.3 Modelled overheating mitigation strategy		
Free areas	Varies per window type	
Infiltration and mechanical flow rates	15.0 at 50 Pa (m3/hr-m2)	
Window g-value	0.6G, 1.4 U Value	
Shading strategy	N/A	
Mechanical cooling	N/A	
2b.4 Modelling results		
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	Yes X	No
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	Overall heating strategy is building is mechanically ventilated with windows only providing extra purge ventilation over 26 degrees.	
2b.5 Designer's declaration		
Has the building construction proposal been modelled accurately?	Yes X	No
Designer's name	Sam Carr	
Designer's organisation	Aldrock Surveyors	
Designer's signature	<i>Samuel Carr</i>	
Registration number (if applicable)		
Date of design	06/12/2024	

NOTE:

1. All references to paragraphs are to Approved Document O.

Part 3 – Completion details

Both the builder and the building control body inspector should complete this section.

3.1 Builder's declaration		
Has the residential building been constructed and completed according to the specifications set out in Parts 1 and 2 of this checklist?	Yes	No
Builder's name		
Builder's organisation		
Builder's signature		
Date of signature		
3.2 Building control body inspector's declaration		
Is the residential building's construction consistent with the details provided in Parts 1 and 2 of this checklist?	Yes	No
Inspector's name		
Inspector's signature		
Registration number (if applicable)		
Date of inspection		