

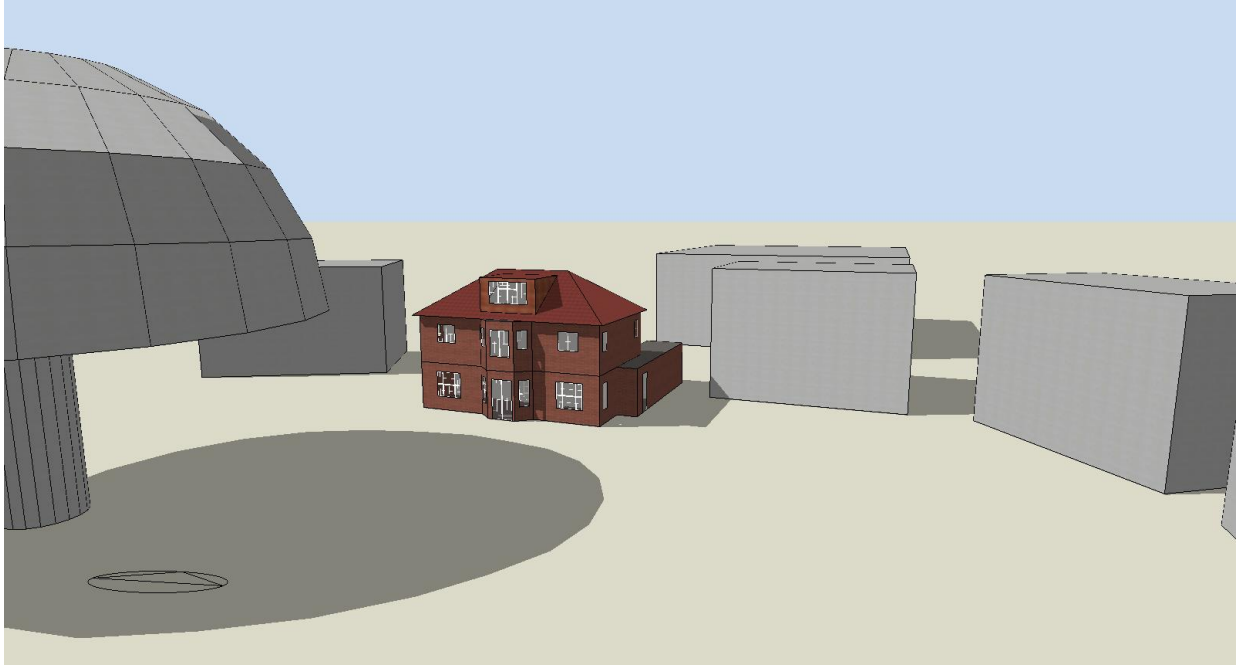
TM59: Overheating Risk Assessment

For

**4 Ellerdale Close
London
NW3 6BE**

Date: 14 April 2022

EXISTING DWELLING
4 ELLERDALE CLOSE, NW3 6BE



Modelled in DesignBuilder 6.1.8.021 Utilizing Energyplus Version 8.9.0.001 in accordance with CIBSE AM11 using guidance outlined in CIBSE TM59.

CONTENTS

EXECUTIVE SUMMARY.....	4
Basis of Methodology for this Assessment.....	5
Results Overview.....	5
CALCULATION PARAMETERS.....	6
U-Values	6
Thermal Mass.....	6
Ventilation Strategy	6
Internal Gains	7
Weather File	7
OVERHEATING	8
Results	8
Indoor Temperature Distribution	9
COOLING HIERARCHY.....	10

EXECUTIVE SUMMARY

This report seeks to demonstrate whether the existing dwelling at 4 Ellerdale Close, London meets the requirements of TM59: Design methodology for the assessment of overheating risk in homes. If the requirements of TM59 are shown not to be met, installing Air Conditioning is an option which may be sought providing the requirements of the Cooling Hierarchy within the Camden Local Plan are investigated and other methods of achieving acceptable comfort levels cannot be introduced as an alternative.

Compliance Criteria

Homes that are predominantly naturally ventilated, including homes that have mechanical ventilation with heat recovery (mvhr), with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method based on CIBSE TM52 (2013).

In order to allow the occupants to 'adapt', each habitable room needs operable windows with a minimum free area that satisfies the purge ventilation criteria set in Part F of the Building Regulations for England (NBS, 2010), i.e. the window opening area should be at least 1/20th of the floor area of the room (different conditions exist for windows with restricted openings, and the same requirement applies for external doors). Control of overheating may require accessible, secure, quiet ventilation with a significant openable area.

Homes that are predominantly mechanically ventilated because they have either no opportunity or extremely limited opportunities for opening windows (e.g. due to noise levels or air quality) should be assessed for overheating using the fixed temperature method based on CIBSE Guide A (2015a).

Criteria for homes predominantly 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 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*).

(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)).

Basis of Methodology for this Assessment

There is good opportunity for natural ventilation in the summer within the property and therefore the adaptive method for homes predominately naturally ventilated is to be used.

Assessments are based upon occupied hours between May and September, this equates to 3,672 hours per year for bedrooms and 1,989 hours per year for Living rooms.

Results Overview

The results obtained from the thermal model demonstrate that the home as a whole does not pass the requirements of TM59, whilst ground floor areas do meet the requirements and do not suggest significant overheating will occur, all bedrooms at both first and second floor do fail the requirements indicating significant overheating will occur.

CALCULATION PARAMETERS

U-Values

External Walls, solid birch 225mm	2.23 W/m ² K
Roofs	2.60 W/m ² K
Ground Floor	1.70 W/m ² K
Windows & Glazed Doors	5.50 W/m ² K

Glazing

Existing windows and glazed doors with an anticipated g-value of 0.80 and light transmission of 0.80 has been allowed for.

Room and Glazing Sizes

Taken from plan drawings, elevations and sections produced by Peek Architecture.

Thermal Mass

Medium-weight construction to ground and first floor elements.
Light-weight construction to second floor elements.

Ventilation Strategy

Openable windows available to all occupied areas. Free Areas calculated from drawings.

In accordance with TM59 windows to be open when the internal dry bulb temperature exceeds 22°C and the room is occupied.

Lighting

In accordance with TM59, lighting gains are set at 2 W/m² and on between 6pm and 11pm.

Air Permeability

Air permeability set at 25.0 m³/(h.m²) at 50 Pa.

Internal Gains

In accordance with TM59

Room Ref:	Occupancy Gains	Lighting Gains W/m ²	Equipment Gains W/m ²
Bedrooms	2*	2.0	80W Peak Load*
Living	4*	2.0	450W Peak Load*

*Adjusted in accordance with TM59 for differing time periods of the day.

Occupied Times

In accordance with TM59

Room Ref	Occupancy
Living Room/Kitchen	4 people from 9am to 10pm; room unoccupied for the rest of the day.
Double Bedrooms	2 people at 70% gains from 11pm to 8am 2 people at full gains from 8am to 9am and from 10pm to 11pm 1 person at full gain in the bedroom from 9am to 10pm

Weather File

London Central DSY1 2020s, high emissions, 50%percentile scenario in accordance with TM59

OVERHEATING

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

(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*).

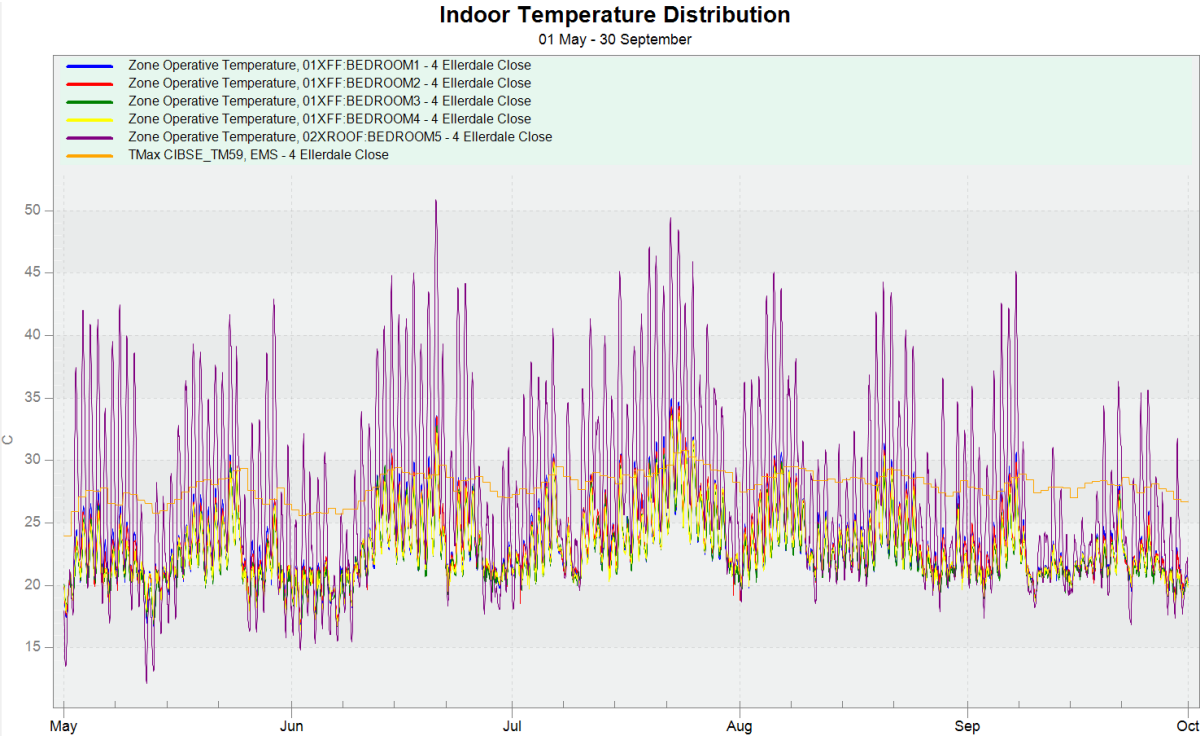
(b) *For bedrooms only*: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (*Note*: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

Results of the above calculations can be viewed below and can be seen that all tested ground floor occupied space fall within the required benchmark of CIBSE TM59, however all bedrooms at first and second floor levels do not meet the requirements.

Results

Dwelling	Level	Zone	Criterion A (%)	Criterion B (hr)	Pass / Fail
4 Ellerdale Close	Grd Flr	Dining Room	1.75	N/A	Pass
	Grd Flr	Drawing Room	1.95	N/A	Pass
	Grd Flr	Kitchen	0.96	N/A	Pass
	Grd Flr	Sitting Room	1.09	N/A	Pass
	First Flr	Bedroom 1	3.74	31.50	Fail
	First Flr	Bedroom 2	2.88	40.00	Fail
	First Flr	Bedroom 3	1.70	34.00	Fail
	First Flr	Bedroom 4	1.48	35.00	Fail
	Second Flr	Bedroom 5	36.87	274.00	Fail

Indoor Temperature Distribution



COOLING HIERARCHY

In accordance with Camden Local Plan air conditioning will only be permitted where dynamic thermal modelling demonstrates there is a clear need for it after all of the preferred measures are incorporated in line with the cooling hierarchy.

The cooling hierarchy includes:

- Minimise internal heat generation through energy efficient design;
- Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;
- Manage the heat within the building through exposed internal mass and high ceilings;
- Passive ventilation;
- Mechanical ventilation;
- Active cooling.

As this is an existing dwelling many of the above design considerations, applicable to new developments, cannot be incorporated without undertaking a significant refurbishment at great expense and would be outside of the keeping of the existing style of the property. There is little option to add thermal mass to the property as external walls at ground and first floor levels are already brickwork along with many of the existing partition walls. Bedrooms at first floor level could only be improved dramatically by changing all of the windows to include solar glazing, however this would not be in keeping with the existing property and would be at great expense to re-glaze the whole property. With regards the second floor bedroom, significant improvement to comfort levels could only be achieved by replacing the existing roof with a completely new roof to current building regulations at great expense, again all the windows would need to be replaced both at ground and first floor at considerable expense.

The property already benefits from adequate passive ventilation with unrestricted openable windows at all levels.

The calculations have been re-run to include mechanical ventilation providing 3 air changes per hour to all bedroom areas (way in excess of building regulations), whilst this would not be a straightforward installation it was felt this may be reasonably cost effective. However, from the results below it can be seen that all of bedrooms will still overheat.

Dwelling	Level	Zone	Criterion A (%)	Criterion B (hr)	Pass / Fail
4 Ellerdale Close	Grd Flr	Dining Room	1.75	N/A	Pass
	Grd Flr	Drawing Room	1.95	N/A	Pass
	Grd Flr	Kitchen	0.96	N/A	Pass
	Grd Flr	Sitting Room	1.09	N/A	Pass
	First Flr	Bedroom 1	3.6	30.00	Fail
	First Flr	Bedroom 2	2.74	38.00	Fail
	First Flr	Bedroom 3	1.56	33.50	Fail
	First Flr	Bedroom 4	1.47	34.00	Fail
	Second Flr	Bedroom 5	32.87	187.00	Fail

The results indicate, in order to provide thermal comfort within the property, air conditioning could be introduced in lieu of significant works of changing all windows and the whole roof structure.