



2 Templewood Avenue
London NW3 7XA

OVERHEATING REPORT

Issue 1 30th November 2022
Issue 2 2nd December 2022

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1. Scope

The purpose of this report is to assess the overheating risk in limited areas of the building where there are likely to be high process loads and limited options for natural ventilation.

The areas under review are;

Kitchen
Laundry
Gym

A thermal model has been constructed in IES VE 2022.

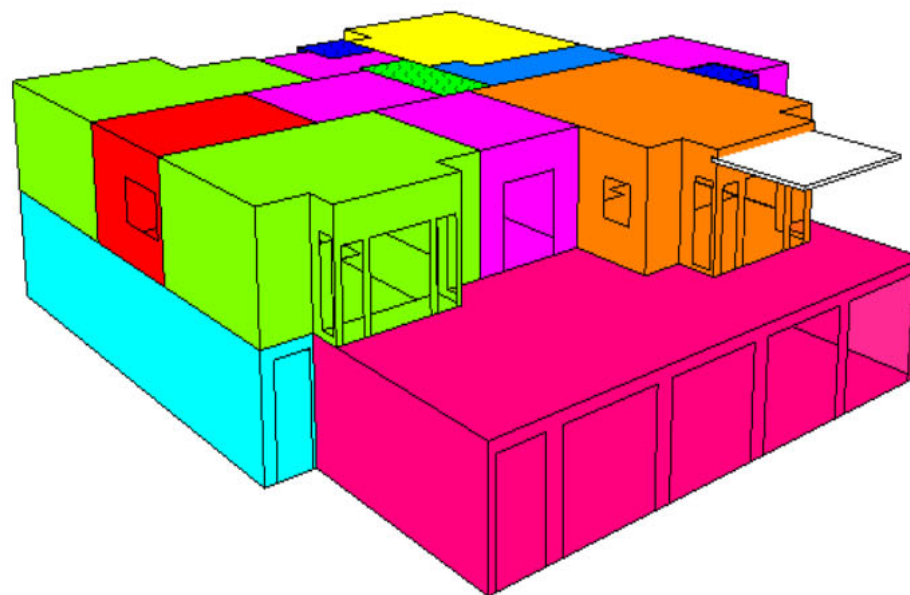
As we are considering rooms with process loads, the analysis has been carried out under CIBSE TM52. For the sake of completeness an analysis has also been carried out under TM59 using the three DSY files recommended by TM49; the London Heathrow files have been used as they are recommended for urban and sub-urban locations.

2. Model

The model views below show only the basement and ground levels. The three areas of interest are the laundry (dark purple), the gym (cyan) and the kitchen (cerise). An external canopy is shown over the kitchen windows.

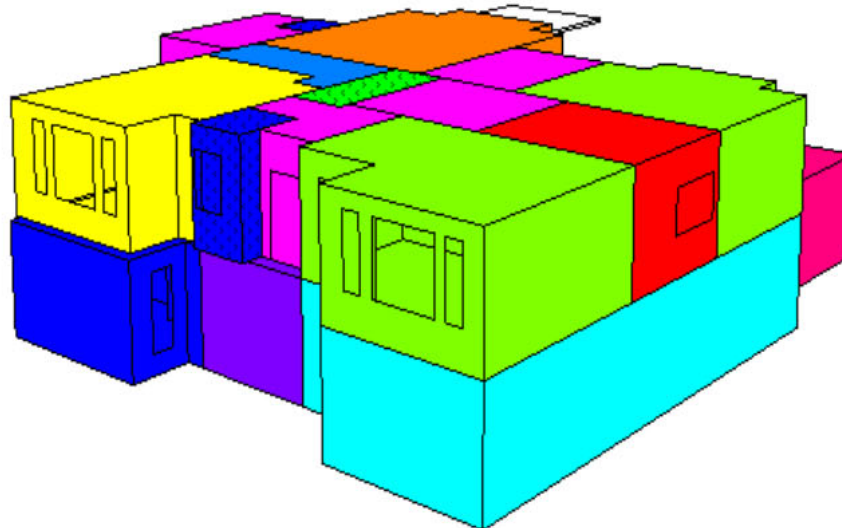
Thermal Template

- Bar
- Bathroom
- Bedroom
- Dining Room
- Gym
- Hallway
- Kitchen
- Kitchenette
- Laundry
- Lounge
- Storage & Plant
- Swimming Pool
- Treatment Room
- Void
- WC



Thermal Template

- Bar
- Bathroom
- Bedroom
- Dining Room
- Gym
- Hallway
- Kitchen
- Kitchenette
- Laundry
- Lounge
- Storage & Plant
- Swimming Pool
- Treatment Room
- Void
- WC



3. Calculation

The calculation run under IES uses the following inputs;

Wall U value, including 50mm internal insulation	0.6
Window U value	1.4
Window g value	0.4
Mechanical ventilation (fresh air)	30l/s/person
Weather file	CIBSE DSY5 London
Period	1 st May to 30 th September – 153 days

The wall value represents the existing brick walls with new internal insulation, the windows are replacement double glazed units with low g value glass. The proposed 30l/s/person ventilation rate is three times higher than the normal 10l/s used for offices.

4. Results

TM52 assesses overheating under three criteria. A building or room that fails two or more of the criteria is deemed to be at unacceptable risk of overheating. The criteria are;

Criterion 1: Hours of Exceedance

Criterion 1 sets a limit of 3% on the number of occupied hours that the operative temperature can exceed the threshold comfort temperature, T_{max} , by 1K or more during the occupied hours of a typical non-heating season – 1 May to 30 September. T_{max} is a function of the outdoor running-mean temperature.

Criterion 2: Daily Weighted Exceedance

Criterion 2 deals with the severity of overheating within any one day, which can be as important as its frequency. This is a function of both temperature above T_{max} and its duration. This criterion sets a daily limit for acceptability. If each hour (or part-hour) in which the temperature exceeds T_{max} by at least 1K is multiplied by the number of degrees by which it is exceeded, then this 'excess' should not be more than six degree-hours.

Criterion 3: Upper Limit Temperature

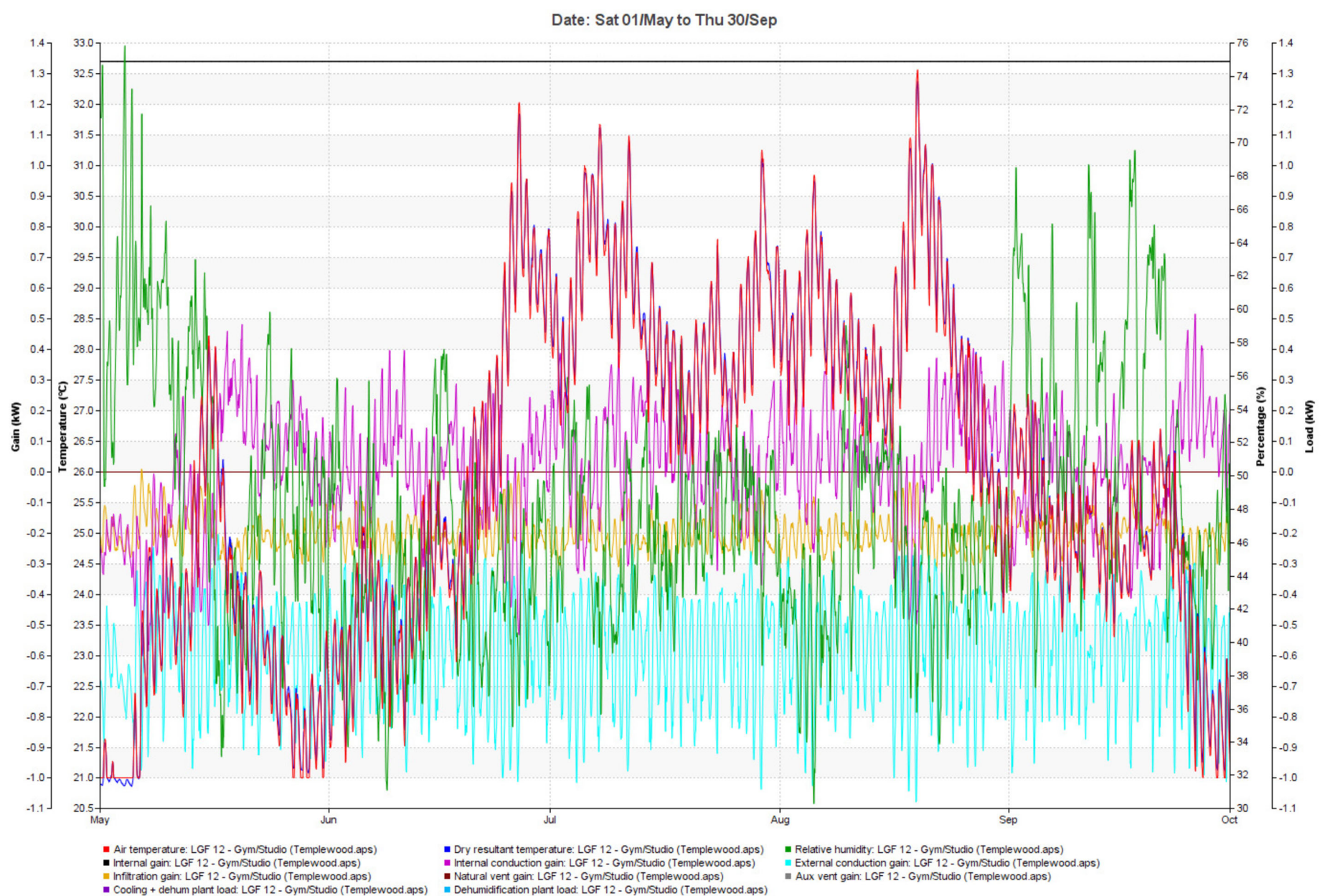
Criterion 3 sets an absolute maximum temperature of $(T_{max} + 4)$ °C for a room (T_{upp}), beyond which the level of overheating is unacceptable. The overheating risk is assessed between the 1st of May and the 31st of September.

The results are shown in the table below;

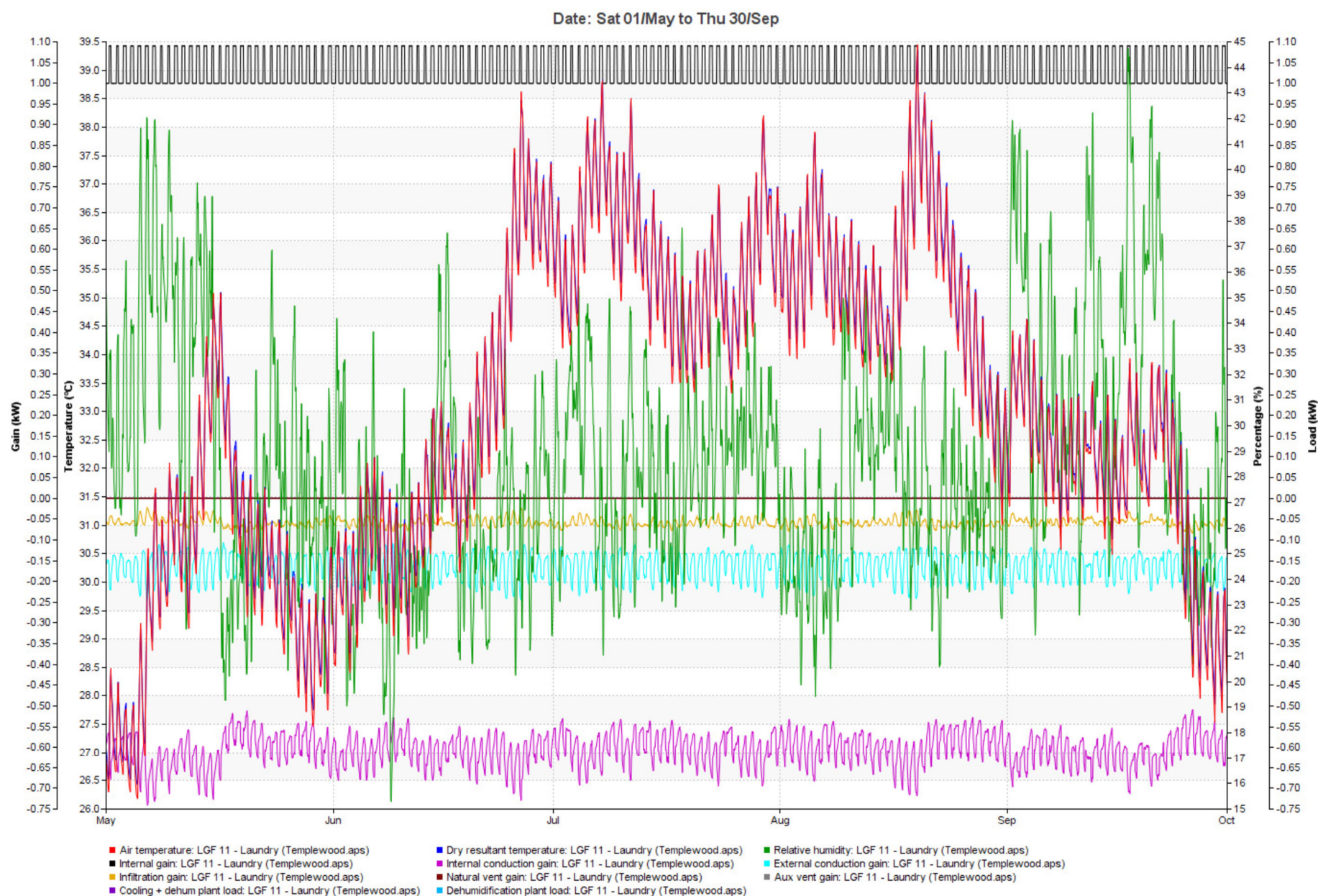
Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing
LGF 11 - Laundry	99.9	90	10	1 & 2 & 3
LGF 12 - Gym/Studio	9.4	40	3	1 & 2
G12 - Kitchen	7.2	13	3	1 & 2

From this it can be seen that all areas under review fail the TM52 overheating test, with the laundry particularly poor.

The results are shown graphically below;



Gym Modelling Result



Laundry Modelling Result

5. Conclusion

All practical measures recommended by the GLA to reduce overheating have been adopted, including;

Insulating existing walls
 Installing new windows with low g values
 Providing external shading
 High levels of mechanical ventilation.

In spite of these measures the three areas in question all fail under TM52, and also using TM59 with TM49 DSY. The TM59 results are appended to this report.

A reasonable response to achieve a comfortable thermal environment in the rooms in question is to install limited comfort cooling.

The system proposed is a 4 pipe heat pump which is capable of transferring heat from one area to another and also using the heat extracted by the cooling system to heat domestic hot water, thus not rejecting the heat to atmosphere.

End 02.12.22

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Overheating risk in residential buildings
for
Templewood

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Building details

Project name: Templewood	Date: 02-12-2022 16:06:54
Location: London Heathrow , United Kingdom	
Address:	
Building use:	
Are there any security, noise, or pollution issues:	

Designer's details

Designer's name:
Designer's organisation:
Designer's address:

Dynamic thermal model

Software: IESVE version 2022.2.0.0	
Weather file: London_LHR_DSY1.epw	
Results file: Templewood.aps	
Number of rooms analysed: 3	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy:	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	NO
Designer's signature:	

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Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy criterion A, T_{max} is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O section 2.6 applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
LGF 11 - Laundry	-	-	Fail	-
LGF 12 - Gym/Studio	-	-	Fail	-
G12 - Kitchen	Fail	N/A	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
G12 - Kitchen	1989	820	41.2	Fail

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
G12 - Kitchen	N/A	N/A	N/A	N/A

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
LGF 11 - Laundry	965	29.8	Fail
LGF 12 - Gym/Studio	1797	20.5	Fail

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Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
LGF 11 - Laundry	13.55	TM59 - Store	System occupied hours	18-23h	
LGF 12 - Gym/Studio	80.01	TM59 - Studio	Studio Occupancy	Studio Equipment	18-23h
G12 - Kitchen	56.0	TM59 - 3 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
LGF 11 - Laundry	0.0				0.0	
LGF 12 - Gym/Studio	5.2	0.3984, 0.3984	1.26, 2.7	20.0, 20.0	0.99	ADO.Section_26a, ADO.Section_26a
G12 - Kitchen	21.09	0.3984, 0.3984, 0.3984, 0.3984	0.97, 1.26, 1.26, 1.26, 3.57, 1.26	20.0, 20.0, 20.0, 20.0, 20.0, 20.0	3.42	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
LGF 11 - Laundry	0.15	0.89
LGF 12 - Gym/Studio	0.15	2.7
G12 - Kitchen	0.15	0

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Building details

Project name: Templewood	Date: 02-12-2022 16:21:43
Location: London Heathrow , United Kingdom	
Address:	
Building use:	
Are there any security, noise, or pollution issues:	

Designer's details

Designer's name:
Designer's organisation:
Designer's address:

Dynamic thermal model

Software: IESVE version 2022.2.0.0	
Weather file: London_LHR_DSY3.epw	
Results file: Templewood.aps	
Number of rooms analysed: 3	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy:	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	NO
Designer's signature:	

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Summary

CIBSE TM59 overheating methodology for predominantly naturally ventilated rooms assesses against two criteria, (a) and (b) (for Category I occupancy criterion A, T_{max} is reduced by 1K):

- Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours
- Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Approved document O section 2.6 applies limits to CIBSE TM59 section 3.3 (openings); these requirements are applied by appropriate assignment of MacroFlo types / scripted profiles in the model (see Modelled Openings Section).

CIBSE TM59 overheating methodology for predominantly mechanically ventilated rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
LGF 11 - Laundry	-	-	Fail	-
LGF 12 - Gym/Studio	-	-	Fail	-
G12 - Kitchen	Fail	N/A	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
G12 - Kitchen	1989	827	41.6	Fail

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
G12 - Kitchen	N/A	N/A	N/A	N/A

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
LGF 11 - Laundry	792	24.5	Fail
LGF 12 - Gym/Studio	1689	19.3	Fail

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Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
LGF 11 - Laundry	13.55	TM59 - Store	System occupied hours	18-23h	
LGF 12 - Gym/Studio	80.01	TM59 - Studio	Studio Occupancy	Studio Equipment	18-23h
G12 - Kitchen	56.0	TM59 - 3 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
LGF 11 - Laundry	0.0				0.0	
LGF 12 - Gym/Studio	5.2	0.3984, 0.3984	1.26, 2.7	20.0, 20.0	0.99	ADO.Section_26a, ADO.Section_26a
G12 - Kitchen	21.09	0.3984, 0.3984, 0.3984, 0.3984	0.97, 1.26, 1.26, 1.26, 3.57, 1.26	20.0, 20.0, 20.0, 20.0, 20.0, 20.0	3.42	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
LGF 11 - Laundry	0.15	0.89
LGF 12 - Gym/Studio	0.15	2.7
G12 - Kitchen	0.15	0

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Building details

Project name: Templewood	Date: 02-12-2022 16:16:29
Location: London Heathrow , United Kingdom	
Address:	
Building use:	
Are there any security, noise, or pollution issues:	

Designer's details

Designer's name:
Designer's organisation:
Designer's address:

Dynamic thermal model

Software: IESVE version 2022.2.0.0	
Weather file: London_LHR_DSY2.epw	
Results file: Templewood.aps	
Number of rooms analysed: 3	
TM59: summer elevated air speed: 0.1	
TM59: occupant category: Category II (normal)	
Overheating mitigation strategy:	
Has the building construction proposal been modelled accurately?	YES
Have the analysed rooms passed the assessment for Approved Doc O Dynamic Thermal Modelling Method (CIBSE TM 59)?	NO
Designer's signature:	

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Summary

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CIBSE TM59 also states that the inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. While there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours this should be identified as a significant risk.

Room name	Naturally ventilated Criterion a check	Naturally ventilated Criterion b check	Mechanically ventilated check	Corridor overheating risk check
LGF 11 - Laundry	-	-	Fail	-
LGF 12 - Gym/Studio	-	-	Fail	-
G12 - Kitchen	Fail	N/A	-	-

Naturally ventilated rooms – criterion (a)

Criterion (a) states that for living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.

Room name	Occupied hours	No. hours $\Delta T \geq 1^\circ\text{K}$	% Occupied hours $\Delta T \geq 1^\circ\text{K}$	Criterion a check
G12 - Kitchen	1989	641	32.2	Fail

Naturally ventilated rooms – criterion (b)

Criterion (b) states that the operative temperature of the bedrooms from 22:00-07:00 shall not exceed 26°C for more than 1% of annual hours (33 hours is therefore recorded as a fail). Any rooms that are not bedrooms are therefore not assessed, hence the corresponding N/A values.

Room name	No. hours > 26°C 22:00-24:00	No. hours > 26°C 00:00-07:00	Total hours > 26°C	Criterion b check
G12 - Kitchen	N/A	N/A	N/A	N/A

Mechanically ventilated rooms

CIBSE TM59 overheating methodology for predominantly mech. vent. rooms states the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours.

Room name	No. hours > 26°C	% Annual hours > 26°C	Mechanically ventilated check
LGF 11 - Laundry	986	30.5	Fail
LGF 12 - Gym/Studio	1748	20.0	Fail

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Communal corridors

CIBSE TM59 states that whilst there is no mandatory target for communal corridors, if an operative temperature of 28°C is exceeded for more than 3% of annual hours, then this should be identified as a significant risk within the TM59 overheating report.

Room name	No. hours > 28°C	% Annual hours > 28°C	Corridor overheating risk check
No corridors	N/A	N/A	N/A

Modelled details & overheating mitigation strategy

Approved document O: Providing Information & Appendix B requires information about the model and the overheating mitigation strategy. The following tables detail the modelling method and mitigation strategies applied to each analysed room. Where multiple active openings per space (windows & louvres) exist they are all listed. Occupancy, equipment and lighting profiles for occupied rooms comply with TM59 section 5.

Modelled occupancy

Room name	Floor area m²	Thermal template	Occupancy profile	Equipment profile	Lighting profile
LGF 11 - Laundry	13.55	TM59 - Store	System occupied hours	18-23h	
LGF 12 - Gym/Studio	80.01	TM59 - Studio	Studio Occupancy	Studio Equipment	18-23h
G12 - Kitchen	56.0	TM59 - 3 Bedroom - Kitchen	Kitchen Occupancy	Kitchen Equipment	18-23h

Modelled openings

Room name	Window to wall ratio %	Window g-value (EN 410)	Opening gross area m²	Opening free area (avg) %	Opening free area / floor area ratio %	Opening profile(s)
LGF 11 - Laundry	0.0				0.0	
LGF 12 - Gym/Studio	5.2	0.3984, 0.3984	1.26, 2.7	20.0, 20.0	0.99	ADO.Section_26a, ADO.Section_26a
G12 - Kitchen	21.09	0.3984, 0.3984, 0.3984, 0.3984	0.97, 1.26, 1.26, 1.26, 3.57, 1.26	20.0, 20.0, 20.0, 20.0, 20.0, 20.0	3.42	ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a, ADO.Section_26a

Modelled ventilation

Room name	Infiltration rate ACH	Mech vent flow rate ACH
LGF 11 - Laundry	0.15	0.89
LGF 12 - Gym/Studio	0.15	2.7
G12 - Kitchen	0.15	0