



TM59 - Overheating Risk Assessment

Issue 3 - Issued for Planning
20/10/2023

Braemar Avenue Baptist Church
Wood Green, London, N22 7BY

Prepared for:



on behalf of:

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Executive Summary

This Overheating Risk Assessment was prepared by Energylab Consulting Ltd. in support of the full planning application for the new build development of 15 flats at Braemar Avenue Baptist Church, London N22 7BY to comply with building regulation Part O and CIBSE TM59: 2017 design methodology for assessment of overheating risk in dwellings.

The report confirms that the proposed development remains in compliance with CIBSE TM59 guidelines in reducing the risk of overheating, particularly in summer months. The climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following planning policies of Haringey Council and the London Plan:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD) (2012)
2. The London Plan relevant planning policies within section 9, i.e. Policy SI 4 - Managing Overheating Risk
3. The Approved Document: Part O 2021

The CIBSE TM59 Assessment provides a robust methodology to analyse and understand the risk of overheating in dwellings as a result of these rising temperatures. This assessment is conducted at the design stage to identify any potential high risk areas, and implement mitigation measures where necessary.

The Overheating Assessment for the proposed development has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach.

Three models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy utilising CIBSE weather file London_LWC_DSY1_2020High50:

1. Model A - utilising solely passive cooling measures
2. Model B - utilising mechanical ventilation with heat recovery (MVHR)
3. Model C - utilising active cooling measures for high risk spaces

The summarised pass rate for the assessed spaces across each model is displayed below:

1. Model A
2. Model B
3. Model C (as designed): **100%**

As displayed, the proposed strategy ensures compliance with CIBSE TM59 criteria across all proposed spaces.

Model C (as designed) was also assessed against DSY2 and DSY3 files to identify any potential future overheating risk. The results are displayed in Appendices C and D. Risk is identified across a number of spaces. Potential mitigation measures include the use of fans and internal blinds.

Finally, **Appendix I presents the CIBSE TM52 Overheating Assessment results for the proposed non-domestic Church Space.** A similar methodology was utilised, assessing the space against the London Plan Cooling Hierarchy. It has been determined that active cooling will be required to treat the church hall. This is primarily due to the potential capacity of the space, and lack of opportunity for natural ventilation, being that it is a basement.

1.Introduction

1.1 Existing Site

The site is located on Braemar Avenue, within the London Borough of Haringey. The existing site currently comprises a church building and derelict church hall.

1.2 The Proposal

The proposal is for a mixed-use development comprising a 4 storey new-build block of flats as well as an additional baptist church on the ground and lower ground floors.

The total number of residential units will be 15, comprising 7 No. One Bed Flats, 5 No. Two Bed Flat and 3 No. Three Bed Flats. The residential development will include private outdoor amenity space in the form of a terrace or balcony for each dwelling, waste and recycle storage space, bicycle storage, and amendments to the existing church building.

The non-domestic church building proposal consists of a basement church hall, tea point and WC, with a reception area and WC on the ground floor.

As the proposed church building is not considered a major development, it has not been included in the overheating assessment. The CIBSE TM59 applies only to domestic developments.

Please see Figure 1 for a 3D image of the proposed development.



Figure 1: 3D image of the proposed scheme.

The area schedule for the proposed domestic development is displayed below in Table 1.

Table 1: Domestic Area Schedule	
Building	Approximate Gross Internal Area (sqm)
Lower Ground Floor	213.2
Ground Floor	141.2
1st Floor	220.1
2nd Floor	220.1
3rd Floor	124.0

1.3 GLA Domestic Overheating Checklist

The GLA energy planning document, Appendix 5 states, regarding the domestic overheating checklist:

'This checklist is intended to assist designers to identify potential overheating risk in residential accommodation early on in the design process and trigger the incorporation of passive measures within the building envelope and services design to mitigate overheating and reduce cooling demand in line with London Plan policy 5.9.'

Section 1 of the checklist should be completed at the start of the design process (concept design) and should be submitted with the preliminary energy information provided to GLA at pre-app stage. Section 1 and 2 should be reviewed as the design progresses and the full checklist should be completed and included within the energy assessment submitted at stage 1 of the planning application.'

Section 1 - Site features affecting vulnerability or overheating		Yes or No
Site location	Urban – within central London or in a high density conurbation	Yes
	Peri-urban – on the suburban fringes of London	No
Air quality and/or Noise sensitivity – are any of the following in the vicinity of buildings?	Busy roads / A roads	No
	Railways / Overground / DLR	No
	Airport / Flight path	No
	Industrial uses / waste facility	No
Proposed building use	Will any buildings be occupied by vulnerable people (e.g. elderly, disabled, young children)?	Yes
	Are residents likely to be at home during the day (e.g. students)?	Yes
Dwelling aspect	Are there any single aspect units?	Yes
Glazing ratio	Is the glazing ratio (glazing: internal floor area) greater than 25%?	Yes
	If yes, is this to allow acceptable levels of daylighting?	Yes
Security - Are there any security issues that could limit opening of windows for ventilation?	Single storey ground floor units	Yes
	Vulnerable areas identified by the Police Architectural Liaison Officer	TBC
	Other	-

Section 2 - Design features implemented to mitigate overheating risk		Please respond
Landscaping	Will deciduous trees be provided for summer shading (to windows and pedestrian routes)?	Yes
	Will green roofs be provided?	Yes
	Will other green or blue infrastructure be provided around buildings for evaporative cooling?	-
Materials	Have high albedo (light colour) materials been specified?	Yes
Dwelling aspect	% of total units that are single aspect	50
	% single aspect with N / NE / NW orientation	0
	% single aspect with E orientation	50
	% single aspect with S / SE / SW orientation	0
	% single aspect with W orientation	50
Glazing ratio - What is the glazing ratio (glazing; internal floor area) on each facade?	N / NE / NW	0.28
	E	0.31
	S / SE / SW	0.24
	W	0.3
Daylighting	What is the average daylight factor range?	-
Window opening	Are windows openable?	Yes
Window opening	What is the average percentage of openable area for the windows?	25
Window opening - What is the extent of the opening?	Fully openable	No
	Limited (e.g. for security, safety, wind loading reasons)	Security

Security	Where there are security issues (e.g. ground floor flats) has an alternative night time natural ventilation method been provided (e.g. ventilation grates)?	No
Shading	Is there any external shading?	Yes
	Is there any internal shading?	Yes
Glazing specification	Is there any solar control glazing?	Yes
Ventilation - What is the ventilation strategy?	Natural - background	Yes
	Natural - purge	Yes
	Mechanical - background (MVHR)	Yes
	Mechanical - purge	Yes
	What is the average design air change rate	0.15
Heating system	Is communal heating present?	No
	What is the flow/return temperature?	-
	Have horizontal pipe runs been minimised?	-
	Do the specifications include insulation levels in line with the London Heat Network Manual	-

1.4 CIBSE TM59 Criteria

A key aspect of the Haringey Council's Sustainable Design and Construction SPD and the Approved Document Part O 2021 is to ensure developments are prepared against rising temperatures. The airtight envelope is critical in reducing energy demand for space heating and domestic hot water, however, this imposes some real challenges related to the risks of overheating.

Appropriate mitigation methods must be adopted and considered throughout the design process to ensure adequate thermal comfort is maintained through the occupancy of the building. CIBSE have produced a methodology to assess the risk of overheating within a domestic building during occupancy.

For predominantly mechanically ventilated rooms, the CIBSE TM59 Overheating Assessment states *'the operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours'*.

For predominantly naturally ventilated rooms, the CIBSE TM59 Overheating Assessment states:

- A. *'For living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1°K from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.'*
- B. *'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).'*

Finally, the 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 the total annual hours, then this should be identified as a significant risk within the TM59 overheating report.'

If the stated criteria fail during the assessment, the spaces within the domestic building are considered unacceptable for risk of overheating. Following this, appropriate mitigation measures must be considered following the cooling hierarchy.

2. Strategy

2.1 The Cooling Hierarchy

As stated, the Overheating Assessment for the proposed development has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach. The cooling hierarchy is outlined below:

1. Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure;
2. Minimise internal heat generation through energy efficient design;
3. Manage the heat within the building through exposed internal thermal mass and high ceilings;
4. Provide passive ventilation;
5. Provide mechanical ventilation;
6. Provide active cooling systems.

This approach aims to counter overheating risk whilst minimising energy consumption through reducing the reliance on air conditioning systems.

Additionally, this strategy is encouraged within Haringey Council's Sustainable Design and Construction SPD, stating '*Buildings should avoid overheating during summer months without reliance on energy intensive mechanical cooling systems.*'

2.2 Proposed Strategy

The cooling strategy proposed has been developed in line with the GLA Cooling Hierarchy. Please see the to proposed response each stage of the cooling hierarchy below:

1. Solar gain has been reduced through the following:
 - a) There is limited capability in altering orientation due to the constraints of the site.
 - b) Glazing with a G-value of 0.40 has been specified to mitigate solar gain.
 - c) The building has large areas to the north-east and south-west façade providing local shade.
 - d) External shading for a number of dwellings utilising balconies, external shading devices/buildups and external louvres.
 - e) A green sedum roof has been proposed for 100% of the total roof area.
2. Energy efficient equipment has been proposed to reduce internal gains, such as:
 - a) High efficiency LED lighting
 - b) Energy efficient appliances
3. The buildings thermal mass and internal heights have been maximised within the confines of the site, structure and location, allowing heat to dissipate from occupied spaces.
4. Natural ventilation has been proposed for all flats through the incorporation of openable windows.

5. Mechanical ventilation is proposed: Centralised continuous mechanical ventilation with heat recovery (MVHR) has been proposed to service all dwellings with summer overpass.
6. Following the meeting with the council energy officers, further external shading devices/buildups have been provided to reduce the demand for cooling within the spaces with potential risk of overheating.

The shading devices/buildups were introduced to all windows facing the main road and the rooms facing south. (this approach helped in eliminating the need for cooling on the top flat, previously needed cooling).

The proposed windows design comes with deep window reveals to further reduce the solar gain.

7. A water-cooled split cooling system is proposed for spaces at high risk of overheating without the requirement for an external unit. (To clarify, these systems have only been proposed to service high-risk spaces to mitigate reliance on energy-intensive cooling equipment. These have been identified as the units with limited ability to openable windows, i.e., the ground floor flats. Please see sections 4.3 and 4.4 for additional information.) The units will be placed within the designated services cupboard. Following the meeting with the council energy officer and their advice to assume that windows will be 15% openable during night time (ground floor flats); a new simulation/assessment has been carried out on that basis. This helped in reducing the demand for cooling but did not eliminate the need for comfort cooling within the ground floor apartments

2.3 Future Weather Overheating risk Mitigation Strategy

1. The potential to include/install external windows shutters
2. Installation of tinted windows and/or applying tinted films to window's glass
3. Update the proposed MVHR to provide comfort cooling with minimal extension to the existing kit (does not need any external outdoor units installation and all can be done within the utility cupboard)
4. Planting additional trees where potentially possible

3. Methodology

3.1 Software Utilised

This assessment has been carried out using dynamic modelling software Integrated Environmental Solutions Virtual Environment (IES VE). All dwellings have been modelled specifying the building fabric, glazing and systems, providing an accurate representation of the proposed development.

The thermal calculations were conducted utilising Apachesim within IES VE.

3.2 Model Inputs

3.2.1 Construction

Table 2 displays the proposed fabric properties utilised for the model.

Table 2: Proposed Fabric Properties and Part L 2021 Fabric Standards for Domestic and Non-Domestic Developments		
	Proposed Design	Part L Limiting Values
Walls U-Value Target	0.14 W/m ² .k	0.26 W/m ² .k
Floors U-Value Target	0.09 W/m ² .k	0.18 W/m ² .k
Roofs U-Value Target	0.1 W/m ² .k	0.16 W/m ² .k
Doors U-Value Target	0.9 W/m ² .k	1.6 W/m ² .k
Windows U-Value Target	0.9 W/m ² .k	1.6 W/m ² .k
Windows G Value Target	0.4	-
Air Permeability Target	3 m ³ /h.m ² @50pa	8 m ³ /h.m ² @50p
Thermal Bridging Target	0.04 (y-value)	0.2 (y-value)
Heating system pipework	Insulated pipework and fittings within the plant room to reduce heat loss (All primary pipework insulated to reduce heat loss - domestic hot water and heating).	
Thermal Mass	Medium	-
Green Roof	100% of the roof total area for domestic and non domestic buildings	

3.2.2 Weather Files

To accurately simulate the periods in a year in which overheating is likely to occur, the 'design summer year' (DSY) weather files must be used as per the CIBSE TM49. Three CIBSE weather files are available:

1. DSY1 - a moderately warm summer
2. DSY2 - a summer with a short intense spell
3. DSY3 - a summer with a longer less intense warm spell

In line with Haringey Council's Key Overheating Planning Requirements, the London_LWC_DSY1_2020High50 was utilised. The London_LWC_DSY2_2020High50 and London_LWC_DSY3_2020High50 were used to determine any potential future overheating.

The DSY1 weather file has been utilised to determine compliance with the TM59 requirements as per CIBSE guidance. The DSY2 and DSY3 files are used as a method of 'future-proofing' developments; to further ensure they are prepared against rising temperatures.

3.2.3 Internal Gains

Occupancy, equipment and lighting gains/profiles are fixed and defined in Appendices A and B as per the CIBSE TM59 for different types of residential spaces, (bedrooms, living rooms, kitchens etc.):

- Bedrooms are set with 24 hr occupancy (1 person in daytime, 1 person in single bedroom at night, 2 people in double bedroom at night).
- Kitchens and living rooms are occupied during the day, and unoccupied during sleeping hours.

- Occupant gains: 75 W/person (sensible), 55 W/person (latent); 30% reduction when sleeping.
- Lighting gains: 2 W/m² between 6 pm and 11 pm for efficient new-builds. Higher values should be used for existing buildings or specialist design.
- Corridors: Corridors must be analysed if community heating pipework runs through them.

3.2.4 Solar Gain

Solar gain is modelled using the SunCast (solar shading analysis) module within IES VE. This models any internal gains into the development based on its orientation and the position of the sun. Please see Figures 2a and 2b for images of the model with and without the surrounding buildings, respectively.

Following the meeting with the council energy officers, further external shading devices/buildups have been provided to reduce the demand for cooling within the spaces with potential risk of overheating.

The shading devices/buildups were introduced to all windows facing the main road and the rooms facing south. (please see figure below for more information).

The proposed windows design comes with deep window reveals to further reduce the solar gain.



Figure 2a - Proposed shading

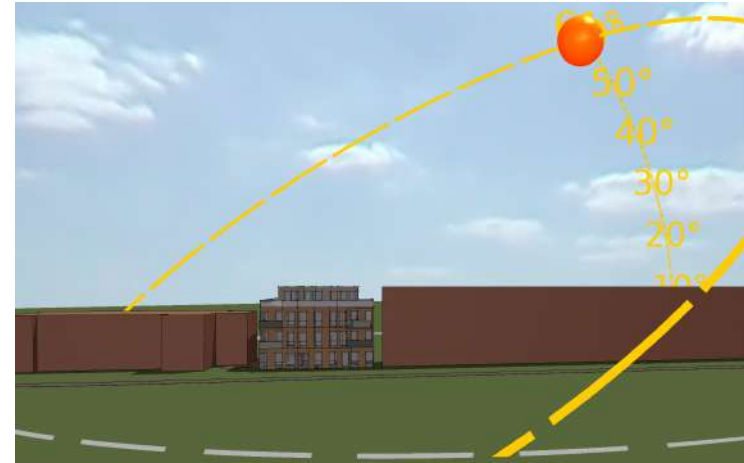


Figure 2b - IES VE Model (With Local Shade)

3.2.5 Security, Noise and Pollution

3.2.5.1 Acoustics

The Approved Document Part O 2021 states in areas where noise may pose an issue during sleeping hours (11pm - 7am), ventilation should not be reliant on openable windows:

'Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.'

a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).

b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am).'

A Noise Impact Assessment was conducted by KP Acoustics Ltd. in July 2022. The results from the survey displayed an average noise level of 44dB during sleeping hours in the proposed amenity spaces.

Further analysis was conducted by KP Acoustics to determine the allowable free area for bedrooms to remain in compliance with Part O 2021 regulation during sleeping hours. 15% free opening area was advised by KP Acoustics. The model has therefore incorporated a maximum 15% openable area during sleeping hours to ensure noise levels are compliant.

3.2.5.2 Security

Furthermore, the Approved Document Document Part O states, *'When determining the free area available for ventilation during sleeping hours, only the proportion of openings that can be opened securely should be considered to provide useful ventilation. This particularly applies in the following locations, where openings may be vulnerable to intrusion by a casual or opportunistic burglar.'*

Dwellings along the ground floor are, therefore, at risk of intrusion. As a result of this, all amenity doors/windows modelled have been left closed during sleeping hours to ensure thermal comfort is not solely dependent on the opening of doors and windows. However, following the meeting with the council energy officer and their advice to assume that windows will be 15% openable during night time; a new simulation/assessment has been carried out on that basis. This helped in reducing the demand for cooling but did not eliminate the need for comfort cooling within the ground floor apartments.

3.2.5.3 Pollution

Additionally, Approved Document Part O states *'Buildings located near to significant local pollution sources should be designed to minimise the intake of external air pollutants.'* Once again, with the site being located near central London, it may be subject to poor air quality during congested hours, therefore, mitigating the reliance site can have on openable windows.

3.2.5.4 Passive Ventilation

The windows have been modelled to open when the internal room temperature exceeds 21.0°C. A fully openable window has been specified for the top-hung windows in all floors including the ground floor. The glazed doors are open when the internal room temperature is >21.0°C and assumes a fully open sliding patio style mechanism. Internal doors are assumed to be always open with the exception of flat entrance doors from the landlord's circulation corridors which are assumed to be closed.

The buildings shall be predominantly natural ventilation via openable windows/doors in addition to MVHR ventilation operating in summer bypass modes to increase ventilation flow rates to occupied areas.

Windows in bedrooms and ground floor flats have been modelled with windows with 15% openable area at night time due to security and noise issues as explained earlier in this report.

3.2.5.5 Mechanical Ventilation with Heat Recovery (MVHR)

The bathroom, bedrooms and living/kitchen/dining spaces are mechanically ventilated by mechanical ventilation heat recovery (MVHR). The volume of air is based on the unit provided, i.e., the Zehnder ComfoAir Q600 (or any

similar product). This unit has the capacity to provide up to 60 l/s of fresh air to each habitable room when in 'boost' mode.

Intake ducts for the MVHR units will be located at shaded, cooler areas of the building to circulate fresh, cooler air throughout the dwellings.

Additionally, each room has a small amount of air infiltration, this has been set at 0.15 air changes per hour (ACH), in line with CIBSE Guide TM59.



Figure 3: Zehnder ComfoClima 36 with ComfoAir Q600 (or any similar product)

3.3 Models Assessed

A number of models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy:

Model A - utilising solely passive cooling measures

Model B - utilising passive measures with MVHR

Model C- utilising active cooling via a split-system for remaining at risk spaces

These models have been assessed across all proposed dwellings to ensure compliance with TM59 criteria across the whole development.

4. Results

All results have been obtained utilising the DSY1 weather file, required for compliance with CIBSE TM59 criteria.

4.1 Model A

Model A utilises solely passive measures with natural ventilation. All windows were modelled to open with 15% free area on restricted windows (due to noise) and 100% openable on all other areas when temperatures exceeded 21°C. The openable areas are displayed by the green areas in Figure 4.

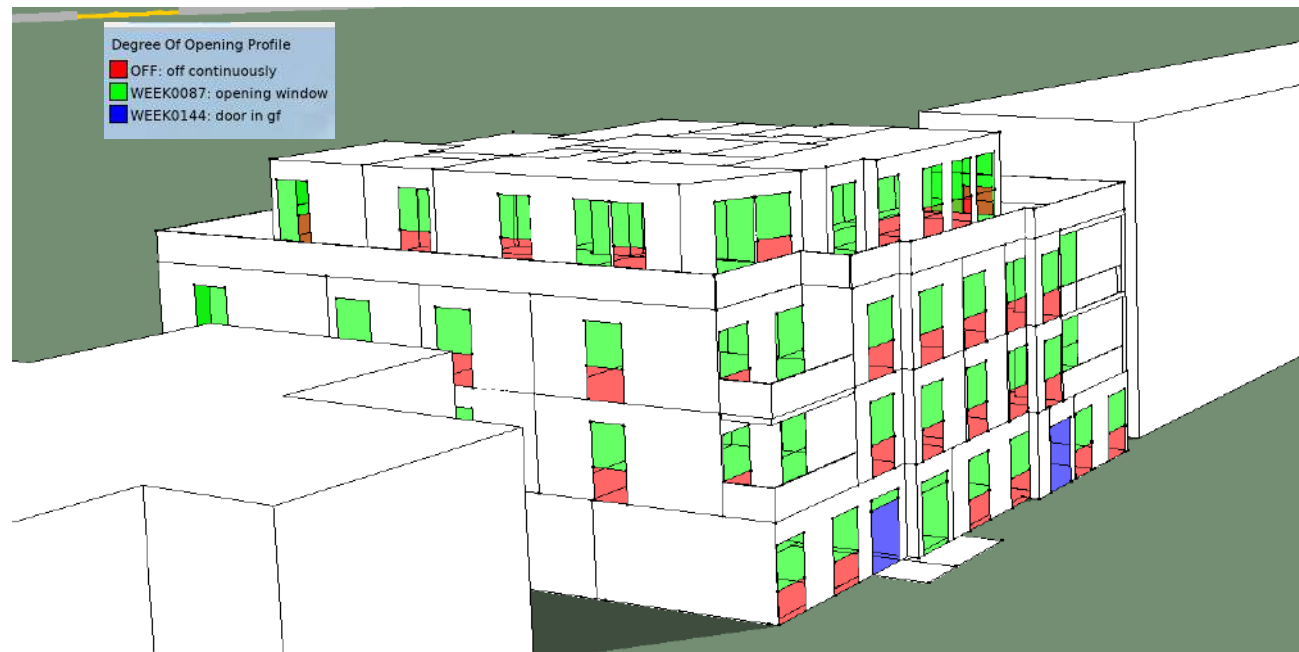


Figure 4: IES Model Displaying Highlighted Openable Windows

For predominantly naturally ventilated rooms, the CIBSE TM59 Overheating criteria states:

Criteria 1: 'For living rooms, kitchens and bedrooms, the number of hours during which ΔT is greater than or equal to 1^oK from May to September (or November to March for southern hemisphere locations) shall not exceed 3% of occupied hours.'

Criteria 2: '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).'

For predominantly mechanically ventilated rooms, i.e., rooms with opening restrictions to opening windows, the CIBSE TM59 Overheating criteria states:

'The operative temperature of all rooms shall not exceed 26°C for more than 3% of annual occupied hours'.

This has been applied to all ground floor flats due to the potential security risk associated with openable windows.

Table 3: TM59 Overheating Results (Model A - Solely Passive Measures)					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	0.5	48	-	2	Fail
B1 - unit 1.2	0.5	45	-	2	Fail
B1 - unit 1.3	1.0	29	-	-	Pass
B1 - unit 1.4	0.8	29	-	-	Pass

B1 - unit 2.1	0.7	43	-	2	Fail
B1 - unit 2.2	1.0	30	-	-	Pass
B1 - unit 2.3	1.0	52	-	2	Fail
B1 - unit 2.4	0.6	47	-	2	Fail
B1 - unit 3.1	1.1	22	-	-	Pass
B1 - unit 3.2	0.9	33	-	2	Fail
B2 - unit 1.2	1.2	40	-	2	Fail
B2 - unit 2.2	1.2	34	-	2	Fail
B2 - unit 3.1	1.0	26	-	-	Pass
B2 - unit 3.2	1.2	33	-	2	Fail
B3 - unit 1.2	0.8	38	-	2	Fail
B3 - unit 2.2	0.9	33	-	2	Fail
KLD - unit 1.2	1.4	NA	-	-	Pass
KLD - unit 2.3	1.6	NA	-	-	Pass
KLD - unit 1.1	1.3	NA	-	-	Pass
KLD - unit 1.3	1.2	NA	-	-	Pass

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KLD - unit 1.4	1.8	NA	-	-	Pass
KLD - unit 2.1	1.3	NA	-	-	Pass
KLD - unit 2.2	1.8	NA	-	-	Pass
KLD - unit 2.4	2.3	NA	-	-	Pass
KLD - unit 3.1	1.6	NA	-	-	Pass
KLD - unit 3.2	3.8	NA	-	1	Fail
KLD - unit 1.2	1.8	NA	-	-	Pass
B1 - U 0.1	-	-	3.9	3	Fail
B1 - U 0.2	-	-	3.2	3	Fail
B1 - U 0.4	-	-	3	-	Pass
B1 - U 0.5	-	-	3.1	3	Fail
B2 - U 0.1	-	-	3.2	3	Fail
B2 - U 0.2	-	-	3.2	3	Fail
B2 - U 0.3	-	-	3.1	3	Fail
B2 - U 0.3	-	-	3.2	3	Fail
B2 - U 0.4	-	-	3.3	3	Fail

B3 - U 0.4	-	-	3	-	Pass
KLD - U 0.4	-	-	4.5	3	Fail
KLD - U 0.1	-	-	5.2	3	Fail
KLD - U 0.2	-	-	4.8	3	Fail
KLD - U 0.3	-	-	5.4	3	Fail
KLD - U 0.5	-	-	5.1	3	Fail

As displayed by Table 3, solely passive measures, utilising openable doors and windows is not sufficient to achieve compliance with CIBSE TM59 criteria across all spaces. That being said, the proposed passive strategy is sufficient to achieve compliance across **60%** of the proposed habitable spaces.

4.2 Model B

Model B utilises continuous mechanical ventilation with heat recovery (MVHR). This allows for stale air to be extracted from spaces when humidity and temperature rise above a certain threshold, whilst supplying fresh air to the occupied spaces. The results are displayed in Table 4. This strategy has been applied to all dwellings to maximise emission reductions across the development. Please refer to the Energy Statement provided by Energylab Consulting Ltd. for more information.

Table 4: TM59 Overheating Results (Model B - Passive Measures + MVHR)

Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	0.7	22	Na	-	Pass
B1 - unit 1.2	0.8	19	Na	-	Pass
B1 - unit 1.3	0.8	21	Na	-	Pass
B1 - unit 1.4	0.6	25	Na	-	Pass
B1 - unit 2.1	0.7	23	Na	-	Pass
B1 - unit 2.2	0.8	19	Na	-	Pass
B1 - unit 2.3	0.9	32	Na	-	Pass
B1 - unit 2.4	0.7	24	Na	-	Pass

B1 - unit 3.1	1.1	19	Na	-	Pass
B1 - unit 3.2	0.8	22	Na	-	Pass
B2 - unit 1.2	0.9	20	Na	-	Pass
B2 - unit 2.2	0.9	18	Na	-	Pass
B2 - unit 3.1	0.9	20	Na	-	Pass
B2 - unit 3.2	1	20	Na	-	Pass
B3 - unit 1.2	0.8	20	Na	-	Pass
B3 - unit 2.2	0.8	19	Na	-	Pass
KLD - unit 1.2	1.4	Na	Na	-	Pass
KLD - unit 2.3	1.5	Na	Na	-	Pass
KLD - unit 1.1	1.3	Na	Na	-	Pass
KLD - unit 1.3	1.2	Na	Na	-	Pass
KLD - unit 1.4	1.8	Na	Na	-	Pass
KLD - unit 2.1	1.3	Na	Na	-	Pass
KLD - unit 2.2	1.7	Na	Na	-	Pass
KLD - unit 2.4	2.3	Na	Na	-	Pass

KLD - unit 3.1	1.5	Na	Na	-	Pass
KLD - unit 3.2	1.8	Na	Na	-	Pass
KLD - unit 1.2	1.7	Na	Na	-	Pass
B1 - U 0.1			2.7		Pass
B1 - U 0.2	-	-	2.6		Pass
B1 - U 0.4	-	-	3.0		Pass
B1 - U 0.5	-	-	3.0		Pass
B2 - U 0.1	-	-	2.5		Pass
B2 - U 0.2	-	-	2.7		Pass
B2 - U 0.3	-	-	2.3		Pass
B2 - U 0.3	-	-	2.4		Pass
B2 - U 0.4	-	-	2.9		Pass
B3 - U 0.4	-	-	3.0		Pass
KLD - U 0.4	-	-	4.0		Fail
KLD - U 0.1	-	-	4.2		Fail
KLD - U 0.2	-	-	3.9		Fail

KLD - U 0.3	-	-	4.5		Fail
KLD - U 0.5	-	-	4.3		Fail

As displayed by Table 3, when MVHR is employed, all occupied spaces are compliant with TM59 criteria, with exception for the ground floor Kitchen/Living/Dining Room spaces, failing Criteria 3 as well as one Kitchen/Living/Dining Room on the top floor in Unit 3.2. This strategy results in **88%** of spaces passing TM59 criteria.

It is anticipated that further mitigation measures must be adopted for the spaces failing Criteria 3: ***KLD - U 0.4, KLD - U 0.1, KLD - U 0.2, KLD - U 0.3 and KLD - U 0.5.***

4.2 Model C (As Designed)

Model C utilises active cooling for the remaining spaces displaying high overheating risk. Due to constraints on available external space, active cooling through water-cooled air conditioning units (without external units) is suggested for only the spaces failing TM59 criteria. These units can be wall-mounted, providing controlled AC when desired by the occupants. Please see Figure 5 for an example of this technology.



Figure 5: Example of Wall-Mounted AC in Bedroom

The results for this strategy are displayed below in Table 5, with the spaces provided with active cooling highlighted in light blue.

Table 5: TM59 Overheating Results (Model C - As Designed)

Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	0.7	22	Na	-	Pass
B1 - unit 1.2	0.8	19	Na	-	Pass
B1 - unit 1.3	0.8	21	Na	-	Pass
B1 - unit 1.4	0.6	25	Na	-	Pass
B1 - unit 2.1	0.7	23	Na	-	Pass
B1 - unit 2.2	0.8	19	Na	-	Pass
B1 - unit 2.3	0.9	32	Na	-	Pass
B1 - unit 2.4	0.7	24	Na	-	Pass
B1 - unit 3.1	1.1	19	Na	-	Pass
B1 - unit 3.2	0.8	22	Na	-	Pass
B2 - unit 1.2	0.9	20	Na	-	Pass

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B2 - unit 2.2	0.9	18	Na	-	Pass
B2 - unit 3.1	0.9	20	Na	-	Pass
B2 - unit 3.2	1	20	Na	-	Pass
B3 - unit 1.2	0.8	20	Na	-	Pass
B3 - unit 2.2	0.8	19	Na	-	Pass
K/dining - unit 1.2	1.4	Na	Na	-	Pass
Living & K/ Dining - unit 2.3	1.5	Na	Na	-	Pass
living & K/dining - unit 1.1	1.3	Na	Na	-	Pass
Living & K/Dining - unit 1.3	1.2	Na	Na	-	Pass
Living & K/dining - unit 1.4	1.8	Na	Na	-	Pass
Living & K/Dining - unit 2.1	1.3	Na	Na	-	Pass
Living & K/Dining - unit 2.2	1.7	Na	Na	-	Pass
Living & K/Dining - unit 2.4	2.3	Na	Na	-	Pass
Living & K/Dining - unit 3.1	1.5	Na	Na	-	Pass
Living & K/Dining - unit 3.2	1.8	Na	Na	-	Pass
living room - unit 1.2	1.7	Na	Na	-	Pass

B1 - U 0.1	Na	Na	2.7	-	Pass
B1 - U 0.2	Na	Na	2.6	-	Pass
B1 - U 0.4	Na	Na	3	-	Pass
B1 - U 0.5	Na	Na	3	-	Pass
B2 - U 0.1	Na	Na	2.5	-	Pass
B2 - U 0.2	Na	Na	2.7	-	Pass
B2 - U 0.3	Na	Na	2.3	-	Pass
B2 - U 0.3	Na	Na	2.4	-	Pass
B2 - U 0.4	Na	Na	2.9	-	Pass
B3 - U 0.4	Na	Na	3	-	Pass
Living & K/ Dining - U 0.4	Na	Na	1.9	-	Pass
Living & K/Dining - U 0.1	Na	Na	1.8	-	Pass
Living & K/Dining - U 0.2	Na	Na	1	-	Pass
Living & K/Dining - U 0.3	Na	Na	1.9	-	Pass
Living & K/Dining - U 0.5	Na	Na	1.1	-	Pass

As displayed **100%** of all spaces are now compliant with TM59 criteria.

5. Conclusion

This Overheating Risk Assessment was prepared by Energylab Consulting Ltd. in support of the full planning application for the new build development of 15 flats at Braemar Avenue Baptist Church, London N22 7BY to comply with building regulation Part O and CIBSE TM59: 2017 design methodology for assessment of overheating risk in dwellings.

The report confirms that the proposed development remains in compliance with CIBSE TM59 guidelines in reducing the risk of overheating, particularly in summer months. The climate change mitigation measures proposed for this development are in line and in compliance with the relevant and applicable targets and requirement listed within the following planning policies of Haringey Council and the London Plan:

1. Haringey Council's Sustainable Design and Construction Supplementary Planning Document (SPD) (2012)
2. The London Plan relevant planning policies within section 9, i.e. Policy SI 4 - Managing Overheating Risk
3. The Approved Document: Part O 2021

The CIBSE TM59 Assessment provides a robust methodology to analyse and understand the risk of overheating in dwellings as a result of these rising temperatures. This assessment is conducted at the design stage to identify any potential high risk areas, and implement mitigation measures where necessary.

The Overheating Assessment for the proposed development has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach.

Three models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy utilising CIBSE weather file London_LWC_DSY1_2020High50:

1. Model A - utilising solely passive cooling measures
2. Model B - utilising mechanical ventilation with heat recovery (MVHR)
3. Model C - utilising active cooling measures for high risk spaces

The summarised pass rate for the assessed spaces across each model is displayed below:

1. Model A: **60%**
2. Model B: **88%**
3. Model C (as designed): **100%**

As displayed, the proposed strategy ensures compliance with CIBSE TM59 criteria across all proposed spaces.

Model C (as designed) was also assessed against DSY2 and DSY3 files to identify any potential future overheating risk. The results are displayed in Appendices C and D. Risk is identified across a number of spaces. Potential mitigation measures include the use of fans and internal blinds.

Finally, **Appendix I presents the CIBSE TM52 Overheating Assessment results for the proposed non-domestic Church Space.** A similar methodology was utilised, assessing the space against the London Plan Cooling Hierarchy. It has been determined that active cooling will be required to treat the church hall. This is primarily due to the potential capacity of the space, and lack of opportunity for natural ventilation, being that it is a basement.

Appendix A: Occupancy and Equipment Gains

Number of people	Description	Peak load (W)		Period																							
		Sensible	Latent	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
				Hour ending																							
				1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
1	Single bedroom occupancy	75	55	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
2	Double bedroom occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.7
2	Studio occupancy	150	110	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
1	1-bedroom living/kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1	1-bedroom living occupancy	75	55	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
1	1-bedroom kitchen occupancy	75	55	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
2	2-bedroom living/kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
2	2-bedroom living occupancy	150	110	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
2	2-bedroom kitchen occupancy	150	110	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
3	3-bedroom living/kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
3	3-bedroom living occupancy	225	165	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
3	3-bedroom kitchen occupancy	225	165	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
	Single bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Double bedroom equipment	80		0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.13
	Studio equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living/kitchen equipment	450		0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	1	1	0.44	0.44	0.24	0.24
	Living equipment	150		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1	1	1	1	0.4	0.4
	Kitchen equipment	300		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	1	1	0.17	0.17	0.17	0.17
	Lighting profile	2 (W/m2)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0

Appendix B: CIBSE TM59 Profiles

Table 2 Occupancy and equipment gain descriptions		
Unit/ room type	Occupancy	Equipment load
Studio	2 people at all times	Peak load of 450 W from 6 pm to 8 pm*. 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room	1 person at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
1-bedroom apartment: kitchen	1 person at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room	2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
2-bedroom apartment: kitchen	2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 people at 5% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
3-bedroom apartment: kitchen	3 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm base load of 50 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gain in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom (too small to accommodate double bed)	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours

Appendix C: Model C (As Designed) DSY2 Results

Table C1: TM59 Overheating Results (Model C - As Designed) - DSY2 Results					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	1.7	63	Na	2	Fail
B1 - unit 1.2	1.7	48	Na	2	Fail
B1 - unit 1.3	2	55	Na	2	Fail
B1 - unit 1.4	1.7	66	Na	2	Fail
B1 - unit 2.1	2	64	Na	2	Fail
B1 - unit 2.2	2.3	62	Na	2	Fail
B1 - unit 2.3	2.5	72	Na	2	Fail
B1 - unit 2.4	1.9	68	Na	2	Fail
B1 - unit 3.1	2.6	55	Na	2	Fail
B1 - unit 3.2	2.4	67	Na	2	Fail
B2 - unit 1.2	2.3	55	Na	2	Fail

B2 - unit 2.2	2.4	57	-	2	Fail
B2 - unit 3.1	2.4	61	-	2	Fail
B2 - unit 3.2	2.5	62	-	2	Fail
B3 - unit 1.2	2.1	55	-	2	Fail
B3 - unit 2.2	2.3	57	-	2	Fail
K/dining - unit 1.2	2.9	-	-	-	Pass
Living & K/ Dining - unit 2.3	3.7	-	-	1	Fail
living & K/dining - unit 1.1	3	-	-	-	Pass
Living & K/Dining - unit 1.3	3.4	-	-	1	Fail
Living & K/dining - unit 1.4	4.2	-	-	1	Fail
Living & K/Dining - unit 2.1	3.4	-	-	1	Fail
Living & K/Dining - unit 2.2	4.1	-	-	1	Fail
Living & K/Dining - unit 2.4	4.7	-	-	1	Fail
Living & K/Dining - unit 3.1	3.6	-	-	1	Fail
Living & K/Dining - unit 3.2	4.3	-	-	1	Fail
living room - unit 1.2	1.7	-	-	-	Pass

B1 - U 0.1	-	-	2.9	-	Pass
B1 - U 0.2	-	-	2.9	-	Pass
B1 - U 0.4	-	-	2.9	-	Pass
B1 - U 0.5	-	-	2.4	-	Pass
B2 - U 0.1	-	-	2.9	-	Pass
B2 - U 0.2	-	-	2.9	-	Pass
B2 - U 0.3	-	-	2.8	-	Pass
B2 - U 0.3	-	-	2.8	-	Pass
B2 - U 0.4	-	-	3.3	3	Fail
B3 - U 0.4	-	-	3.4	3	Fail
Living & K/ Dining - U 0.4	-	-	3	-	Pass
Living & K/Dining - U 0.1	-	-	2.7	-	Pass
Living & K/Dining - U 0.2	-	-	2	-	Pass
Living & K/Dining - U 0.3	-	-	2.8	-	Pass
Living & K/Dining - U 0.5	-	-	1.7	-	Pass

Appendix D: Model C (As Designed) DSY3 Results

Table D1: TM59 Overheating Results (Model C - As Designed) - DSY3 Results					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	2.1	66	-	2	Fail
B1 - unit 1.2	2.2	50	-	2	Fail
B1 - unit 1.3	2.4	61	-	2	Fail
B1 - unit 1.4	2.2	69	-	2	Fail
B1 - unit 2.1	2.3	63	-	2	Fail
B1 - unit 2.2	2.8	60	-	2	Fail
B1 - unit 2.3	3	76	-	2	Fail
B1 - unit 2.4	2.3	72	-	2	Fail
B1 - unit 3.1	3.3	57	-	1 & 2	Fail
B1 - unit 3.2	2.9	63	-	2	Fail
B2 - unit 1.2	2.7	54	-	2	Fail

B2 - unit 2.2	2.8	59	-	2	Fail
B2 - unit 3.1	3	58	-	2	Fail
B2 - unit 3.2	3	61	-	2	Fail
B3 - unit 1.2	2.6	55	-	2	Fail
B3 - unit 2.2	2.6	56	-	2	Fail
K/dining - unit 1.2	3.6	41	-	2	Fail
Living & K/ Dining - unit 2.3	4.7	-	-	-	Fail
living & K/dining - unit 1.1	3.8	-	-	-	Fail
Living & K/Dining - unit 1.3	4	-	-	-	Fail
Living & K/dining - unit 1.4	5.1	-	-	-	Fail
Living & K/Dining - unit 2.1	4.1	-	-	-	Fail
Living & K/Dining - unit 2.2	5	-	-	-	Fail
Living & K/Dining - unit 2.4	5.6	-	-	-	Fail
Living & K/Dining - unit 3.1	4.6	-	-	-	Fail
Living & K/Dining - unit 3.2	5.2	-	-	-	Fail
living room - unit 1.2	2.8	-	-	-	Pass

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B1 - U 0.1	-	-	3.7	3	Fail
B1 - U 0.2	-	-	3.7	3	Fail
B1 - U 0.4	-	-	3.7	3	Fail
B1 - U 0.5	-	-	3.2	3	Fail
B2 - U 0.1	-	-	3.6	3	Fail
B2 - U 0.2	-	-	3.7	3	Fail
B2 - U 0.3	-	-	3.5	3	Fail
B2 - U 0.3	-	-	3.6	3	Fail
B2 - U 0.4	-	-	3.9	3	Fail
B3 - U 0.4	-	-	4	3	Fail
Living & K/ Dining - U 0.4	-	-	4.3	3	Fail
Living & K/Dining - U 0.1	-	-	4	3	Fail
Living & K/Dining - U 0.2	-	-	3.4	3	Fail
Living & K/Dining - U 0.3	-	-	4.2	3	Fail
Living & K/Dining - U 0.5	-	-	2.8	-	Pass

Appendix E: Model C (As Designed) 2050 Results

Table D1: TM59 Overheating Results (Model C - As Designed) - DSY1 Results					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	1.4	101.4	Na	2	Fail
B1 - unit 1.2	1.9	101.9	Na	2	Fail
B1 - unit 1.3	1.8	101.8	Na	2	Fail
B1 - unit 1.4	1.4	101.4	Na	2	Fail
B1 - unit 2.1	1.6	101.6	Na	2	Fail
B1 - unit 2.2	2.8	102.8	Na	2	Fail
B1 - unit 2.3	2.3	102.3	Na	2	Fail
B1 - unit 2.4	1.6	101.6	Na	2	Fail
B1 - unit 3.1	2.9	102.9	Na	2	Fail
B1 - unit 3.2	2.2	102.2	Na	2	Fail
B2 - unit 1.2	2.6	102.6	Na	2	Fail

B2 - unit 2.2	3	103	Na	2	Fail
B2 - unit 3.1	2.4	102.4	Na	2	Fail
B2 - unit 3.2	2.9	102.9	Na	2	Fail
B3 - unit 1.2	2.3	102.3	Na	2	Fail
B3 - unit 2.2	2.3	102.3	Na	2	Fail
K/dining - unit 1.2	2.3	Na	Na	-	Pass
Living & K/ Dining - unit 2.3	3.8	Na	Na	1	Fail
living & K/dining - unit 1.1	2.6	Na	Na	-	Pass
Living & K/Dining - unit 1.3	3	Na	Na	-	Pass
Living & K/dining - unit 1.4	4.3	Na	Na	1	Fail
Living & K/Dining - unit 2.1	3.1	Na	Na	1	Fail
Living & K/Dining - unit 2.2	4.5	Na	Na	1	Fail
Living & K/Dining - unit 2.4	5.3	Na	Na	1	Fail
Living & K/Dining - unit 3.1	3.9	Na	Na	1	Fail
Living & K/Dining - unit 3.2	5.2	Na	Na	1	Fail
living room - unit 1.2	2.7	Na	Na	2	Pass

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B1 - U 0.1	Na	Na	5.4	3	Fail
B1 - U 0.2	Na	Na	5.4	3	Fail
B1 - U 0.4	Na	Na	5.3	3	Fail
B1 - U 0.5	Na	Na	4.3	3	Fail
B2 - U 0.1	Na	Na	5.2	3	Fail
B2 - U 0.2	Na	Na	5.3	3	Fail
B2 - U 0.3	Na	Na	5.1	3	Fail
B2 - U 0.3	Na	Na	5.2	3	Fail
B2 - U 0.4	Na	Na	5.8	3	Fail
B3 - U 0.4	Na	Na	5.8	3	Fail
Living & K/ Dining - U 0.4	Na	Na	5.2	3	Fail
Living & K/Dining - U 0.1	Na	Na	4.6	3	Fail
Living & K/Dining - U 0.2	Na	Na	2.6	-	Pass
Living & K/Dining - U 0.3	Na	Na	5	3	Fail
Living & K/Dining - U 0.5	Na	Na	2.4	-	Pass

Appendix F: Model C (As Designed) 2080 Results

Table D1: TM59 Overheating Results (Model C - As Designed) - DSY1 Results					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	4.1	189	Na	1 & 2	Fail
B1 - unit 1.2	4.1	177	Na	1 & 2	Fail
B1 - unit 1.3	4.6	189	Na	1 & 2	Fail
B1 - unit 1.4	4.1	194	Na	1 & 2	Fail
B1 - unit 2.1	4.3	225	Na	1 & 2	Fail
B1 - unit 2.2	5.8	183	Na	1 & 2	Fail
B1 - unit 2.3	5.9	231	Na	1 & 2	Fail
B1 - unit 2.4	4.3	202	Na	1 & 2	Fail
B1 - unit 3.1	6.2	195	Na	1 & 2	Fail
B1 - unit 3.2	5.5	216	Na	1 & 2	Fail

B2 - unit 1.2	5.5	169	Na	1 & 2	Fail
B2 - unit 2.2	5.8	203	Na	1 & 2	Fail
B2 - unit 3.1	5.8	215	Na	1 & 2	Fail
B2 - unit 3.2	6	133	Na	1 & 2	Fail
B3 - unit 1.2	5	203	Na	1 & 2	Fail
B3 - unit 2.2	5.3	200	Na	1 & 2	Fail
K/dining - unit 1.2	6.7	Na	Na	1	Fail
Living & K/ Dining - unit 2.3	9.1	Na	Na	1	Fail
living & K/dining - unit 1.1	7.1	Na	Na	1	Fail
Living & K/Dining - unit 1.3	8	Na	Na	1	Fail
Living & K/dining - unit 1.4	9.7	Na	Na	1	Fail
Living & K/Dining - unit 2.1	7.6	Na	Na	1	Fail
Living & K/Dining - unit 2.2	9.4	Na	Na	1	Fail
Living & K/Dining - unit 2.4	10.9	Na	Na	1	Fail
Living & K/Dining - unit 3.1	8.5	Na	Na	1	Fail
Living & K/Dining - unit 3.2	9.9	Na	Na	1	Fail

living room - unit 1.2	4.1	Na	Na	1	Fail
B1 - U 0.1	Na	Na	6.4	3	Fail
B1 - U 0.2	Na	Na	6.4	3	Fail
B1 - U 0.4	Na	Na	5.9	3	Fail
B1 - U 0.5	Na	Na	5	3	Fail
B2 - U 0.1	Na	Na	6.1	3	Fail
B2 - U 0.2	Na	Na	6.5	3	Fail
B2 - U 0.3	Na	Na	6.7	3	Fail
B2 - U 0.3	Na	Na	5.9	3	Fail
B2 - U 0.4	Na	Na	7.1	3	Fail
B3 - U 0.4	Na	Na	6.4	3	Fail
Living & K/ Dining - U 0.4	Na	Na	6.6	3	Fail
Living & K/Dining - U 0.1	Na	Na	5.3	3	Fail
Living & K/Dining - U 0.2	Na	Na	3.6	3	Fail
Living & K/Dining - U 0.3	Na	Na	5.8	3	Fail
Living & K/Dining - U 0.5	Na	Na	3.6	3	Fail

Appendix G: Model A (NO SHADING) 2020 Results

Table D1: TM59 Overheating Results (Model C - As Designed) - DSY1 Results					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	0.5	48	NA	2	Fail
B1 - unit 1.2	0.5	45	NA	2	Fail
B1 - unit 1.3	1	29	NA	-	Pass
B1 - unit 1.4	0.8	29	NA	-	Pass
B1 - unit 2.1	0.7	43	NA	2	Fail
B1 - unit 2.2	1	30	NA	-	Pass
B1 - unit 2.3	1	52	NA	2	Fail
B1 - unit 2.4	0.6	47	NA	2	Fail
B1 - unit 3.1	1.1	22	NA	-	Pass
B1 - unit 3.2	0.9	33	NA	2	Fail

B2 - unit 1.2	1.2	40	NA	2	Fail
B2 - unit 2.2	1.2	34	NA	2	Fail
B2 - unit 3.1	1	26	NA	2	Fail
B2 - unit 3.2	1.2	33	NA	2	Fail
B3 - unit 1.2	0.8	38	NA	2	Fail
B3 - unit 2.2	0.9	35	NA	2	Fail
K/dining - unit 1.2	1.4	NA	NA	-	Pass
Living & K/ Dining - unit 2.3	1.6	NA	NA	-	Pass
living & K/dining - unit 1.1	1.3	NA	NA	-	Pass
Living & K/Dining - unit 1.3	1.2	NA	NA	-	Pass
Living & K/dining - unit 1.4	1.8	NA	NA	-	Pass
Living & K/Dining - unit 2.1	1.3	NA	NA	-	Pass
Living & K/Dining - unit 2.2	1.8	NA	NA	-	Pass
Living & K/Dining - unit 2.4	2.3	NA	NA	-	Pass
Living & K/Dining - unit 3.1	1.6	NA	NA	-	Pass
Living & K/Dining - unit 3.2	3.8	NA	NA	1	Fail

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living room - unit 1.2	1.8	NA	NA	-	Pass
B1 - U 0.1	0.8	25	NA	-	Pass
B1 - U 0.2	0.8	51	NA	2	Fail
B1 - U 0.4	1	27	NA	-	Pass
B1 - U 0.5	1	50	NA	2	Fail
B2 - U 0.1	0.7	21	NA	-	Pass
B2 - U 0.2	0.8	26	NA	-	Pass
B2 - U 0.3	0.6	23	NA	-	Pass
B2 - U 0.3	0.7	26	NA	-	Pass
B2 - U 0.4	1	36	NA	2	Fail
B3 - U 0.4	1	21	NA	-	Pass
Living & K/ Dining - U 0.4	3.3	NA	NA	1	Fail
Living & K/Dining - U 0.1	3.4	NA	NA	1	Fail
Living & K/Dining - U 0.2	3.1	NA	NA	1	Fail
Living & K/Dining - U 0.3	3.4	NA	NA	1	Fail
Living & K/Dining - U 0.5	3.4	NA	NA	1	Fail

Appendix H: Model B (NO SHADING) 2020 Results

Table D1: TM59 Overheating Results (Model C - As Designed) - DSY1 Results					
Room Name	Criteria 1: %hrs Top-Tmax >= 1K	Criteria 2: Night hours OT>26°C	Criteria 3: Predominantly Mechanically Ventilated % Annual Hours>26°C	Criteria Failed:	Pass/Fail
B1 - unit 1.1	0.5	27	NA	-	Pass
B1 - unit 1.2	2.3	37	NA	2	Fail
B1 - unit 1.3	0.6	14	NA	-	Pass
B1 - unit 1.4	0.5	28	NA	-	Pass
B1 - unit 2.1	0.6	27	NA	-	Pass
B1 - unit 2.2	2.6	37	NA	-	Pass
B1 - unit 2.3	0.7	38	NA	2	Fail
B1 - unit 2.4	0.5	34	NA	2	Fail
B1 - unit 3.1	1.3	13	NA	-	Pass
B1 - unit 3.2	0.9	27	NA	-	Pass

B2 - unit 1.2	2.1	37	NA	2	Fail
B2 - unit 2.2	2.6	33	NA	2	Fail
B2 - unit 3.1	1	22	NA	-	Pass
B2 - unit 3.2	1.4	32	NA	-	Pass
B3 - unit 1.2	1.4	32	NA	-	Pass
B3 - unit 2.2	1.9	33	NA	2	Fail
K/dining - unit 1.2	1.1	NA	NA	-	Pass
Living & K/ Dining - unit 2.3	1.9	NA	NA	-	Pass
living & K/dining - unit 1.1	1	Na	NA	-	Pass
Living & K/Dining - unit 1.3	1.7	NA	NA	-	Pass
Living & K/dining - unit 1.4	1.5	NA	NA	-	Pass
Living & K/Dining - unit 2.1	1.2	NA	NA	-	Pass
Living & K/Dining - unit 2.2	1.4	NA	NA	-	Pass
Living & K/Dining - unit 2.4	1.9	NA	NA	-	Pass
Living & K/Dining - unit 3.1	1.7	NA	NA	-	Pass
Living & K/Dining - unit 3.2	3.7	NA	NA	1	Fail
living room - unit 1.2	2.1	NA	NA	-	Pass

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B1 - U 0.1	NA	NA	2.7	-	Pass
B1 - U 0.2	NA	NA	2.6	-	Pass
B1 - U 0.4	NA	NA	3	-	Pass
B1 - U 0.5	NA	NA	3	-	Pass
B2 - U 0.1	NA	NA	2.5	-	Pass
B2 - U 0.2	NA	NA	2.7	-	Pass
B2 - U 0.3	NA	NA	2.3	-	Pass
B2 - U 0.3	NA	NA	2.4	-	Pass
B2 - U 0.4	NA	NA	2.9	-	Pass
B3 - U 0.4	NA	NA	3	-	Pass
Living & K/ Dining - U 0.4	NA	NA	4	3	Fail
Living & K/Dining - U 0.1	NA	NA	4.2	3	Fail
Living & K/Dining - U 0.2	NA	NA	3.9	3	Fail
Living & K/Dining - U 0.3	NA	NA	4.5	3	Fail
Living & K/Dining - U 0.5	NA	NA	4.3	3	Fail

Appendix I: TM52 Assessment for Church Building

A CIBSE TM52 Overheating Assessment was carried out for the proposed non-domestic church building. Similar to the TM59, the TM52 Assessment has been developed in line with the London Plan Cooling Hierarchy principles to mitigate overheating risk utilising a passive first approach. Three models were assessed in IES VE to assess overheating risk in line with the GLA cooling hierarchy utilising CIBSE weather file London_LWC_DSY1_2020High50:

1. Model A - utilising solely passive cooling measures
2. Model B - utilising mechanical ventilation with heat recovery (MVHR)
3. Model C - utilising active cooling measures for high risk spaces

The summarised pass rate for the assessed spaces across each model is displayed below:

1. Model A: **33%**
2. Model B: **86%**
3. Model C (as designed): **100%**

As displayed, the proposed strategy ensures compliance with CIBSE TM59 criteria across all proposed spaces.

Table E1: TM52 Overheating Results (Model A - Solely Passive Measures)					
Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
Church Hall	9.9	50	12	1 & 2 & 3	Fail
Tea Point	6	10	4	1 & 2	Fail
Church Reception	2.3	22	4	2	Pass

As displayed by Table E1, solely passive measures are not sufficient to mitigate overheating in the proposed church hall and tea point.

Table E2: TM52 Overheating Results (Model B - Utilising MVHR)

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
Church Hall	8.5	47	11	1 & 2 & 3	Fail
Tea Point	1.6	6	3	-	Pass
Church Reception	2.3	22	4	2	Pass

As displayed by Table E2, the introduction of MVHR is not sufficient to mitigate overheating in the Church Hall.

Table E3: TM52 Overheating Results (Model C - Utilising Active Cooling)

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
Church Hall	0	0	0	-	Pass
Tea Point	0	0	0	-	Pass
Church Reception	0	0	0	-	Pass

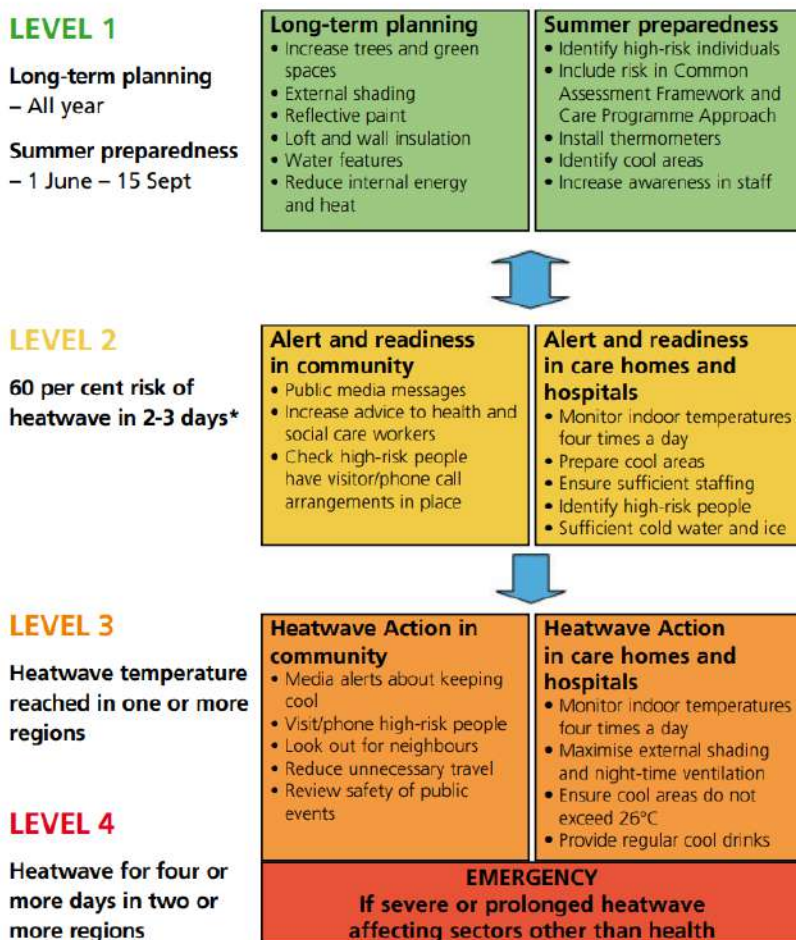
As displayed by Table E3, the proposed strategy is effective in mitigating overheating throughout all spaces.

Appendix J: Heatwave Plan

The Heatwave Plan for the proposed development is in line with the NHS Heatwave Plan for England:

PROTECTING HEALTH AND REDUCING HARM FROM EXTREME HEAT AND HEATWAVES

Figure 6. Summary of Heatwave Plan levels and actions.



High-risk Groups

Community: Over 75, female, living on own and isolated, severe physical or mental illness; urban areas, south-facing top flat; alcohol and over-exertion

Care home or hospital: over 75, female, frail, severe physical or mental illness; multiple medications; babies and young children.

*Because Level 2 is based on a prediction, there may be jumps between levels. Following Level 3, wait until temperatures cool to Level 1 before stopping Level 3 actions.

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