Dynamic Overheating Report

Highgate Care Ltd

Mary Feilding Guild Care Home

Final

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Our team of technical specialists offer advanced levels of expertise and experience to our clients. We have a wide experience of the construction and development industry and tailor teams to suit each individual project.

We are able to advise at all stages of projects from planning applications to handover.

Our emphasis is to provide innovative and cost-effective solutions that respond to increasing demands for quality and construction efficiency.

This report has been prepared by Hodkinson Consultancy using all reasonable skill, care and diligence and using evidence supplied by the design team, client and where relevant through desktop research.

Hodkinson Consultancy can accept no responsibility for misinformation or inaccurate information supplied by any third party as part of this assessment.

Executive Summary

This report details the findings and methodology of the dynamic overheating assessment of a sample of representative spaces for the proposed development at the “Former” Mary Feilding Guild Care Home in the London Borough of Haringey.

The assessed spaces have been selected for the overheating assessment based on design characteristics that establish them as representative of the overall proposed scheme. This selection includes consideration of varying floors, different orientations and both single and aspect spaces.

For the purposes of this report, it is assumed that spaces will utilise openable windows as the primary means of ventilation, with a background mechanical ventilation system. Passive measures such as high efficiency building fabric, solar control glazing and use of external shading in the form of balconies or structural shadings have been explored as far as practicable to avoid the need for active cooling.

The performance of the bedrooms and communal spaces have been assessed against the Chartered Institution of Building Services Engineers (CIBSE) guidance TM59 *Design methodology for the assessment of overheating risk in homes* (2017) and TM52 *The limits of thermal comfort: Avoiding overheating in European buildings* (2013) respectively. This dynamic overheating assessment of representative spaces demonstrates that an acceptable overheating risk is achieved.

All bedrooms tested demonstrate compliance with the CIBSE TM59 overheating assessment criteria and the communal areas against the TM52 overheating assessment criteria under the mandatory weather file (DSY1 for the 2020s, high emissions, 50% percentile scenario). The results are based on key design features and passive mitigation measures following the London Plan cooling hierarchy.

Table i: Design features incorporated in accordance with the London Plan cooling hierarchy

Cooling hierarchy	Design feature	Discussion
1. Reduce amount of heat entering the building	Efficient building fabric and air tightness standards	In line with energy strategy (model inputs provided in Appendix B and D)
	Solar control glazing with a g-value of 0.3	A low G-value reduces solar gain, but has implications on CO_2 emissions, fabric energy efficiency and internal daylight levels and has therefore been optimised to balance all aspects as far as possible
	External shading provided by balcony overhangs and structural shading	In line with design proposals

Table i: Design features incorporated in accordance with the London Plan cooling hierarchy		
Cooling hierarchy	**Design feature**	**Discussion**
2. Minimise internal heat generation	Energy efficient design of building services	In line with energy strategy (model inputs provided in Appendix B and D)
3. Manage the heat	Concrete floor slab between spaces in apartment blocks	The thermal mass of this will help reduce the risk of overheating by absorbing heat during the daytime
4. Passive ventilation	Openable windows used as the primary means of ventilation for overheating (window opening schedule provided in Table 1)	Windows are simulated to be open when the internal temperature exceeds 22 °C and the external temperature is lower than the internal temperature
5. Mechanical ventilation	Background mechanical ventilation rate set at 1 ACH for bedrooms. Communal spaces used a mechanical ventilation rate of 5 l/s m^2.	As agreed by HWM Building Services (M&E engineer)
6. Active cooling	No requirement for active cooling	

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1. INTRODUCTION

1.1 This document has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development to present the overheating mitigation strategy for the proposed development at the “Former” Mary Feilding Guild Care Home in the London Borough of Haringey.

Site Location

1.2 The proposed development at the “Former” Mary Feilding Guild Care Home in the London Borough of Haringey is located at Highgate, London N6 4DP, as shown in Figure 1 below.

Figure 1: Site Location - Map data © 2021 Google

1.3 The site measures 0.374 hectares and it is occupied by a series of five interlinked buildings which wrap around the site in an L shape. The current Mary Feilding Guid Care Home is a registered care home for the elderly. The building has the main frontage on to North Hill to the east and a back entrance with parking spaces on to View Road to the south-east.

Proposed Development

1.4 The proposed development is described as follows:

1.5 *"Demolition of existing buildings and redevelopment to provide a new care home (Class C2 - Residential Institution), together with a well-being and physiotherapy centre. The proposed care home includes up to 70 bedrooms, a hydrotherapy pool, steam room, sauna, gym, treatment/medical rooms, hairdressing and beauty salon, restaurant, cafe, lounge, bar, well-being shop, general shop, car and cycle parking, refuse/recycling storage, mechanical and electrical plant, landscaping and associated works."*

1.6 Figure 2 below illustrates the ground floor layout.

Figure 2: Proposed Ground Floor Layout (DWA Architects, November 2021)

Overheating and Thermal Comfort

1.7 Maintaining comfortable thermal comfort conditions in the face of climate change and increasing temperatures is one of the greatest challenges to be addressed by designers. The main objective is to achieve thermal comfort and minimise summertime overheating without the use of conventional air conditioning systems, which typically have associated greenhouse gas emissions and impact on the urban heat island effect.

1.8 Dynamic thermal simulations have been carried out for representative spaces, to determine whether there is a risk of overheating. Appropriate mitigation measures have been recommended to mitigate the overheating risk and ensure that comfortable thermal conditions are achieved.

2. REQUIRED STANDARDS

2.1 The following planning policies and requirements have informed the sustainable design of the proposed development.

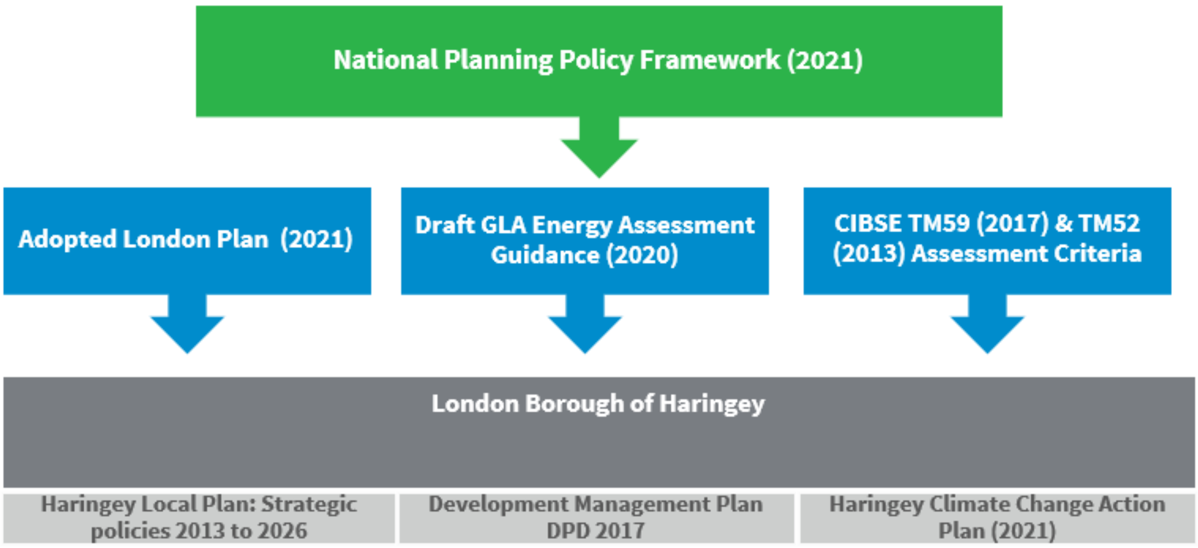

Figure 3: Visualisation of applicable policies

National Planning Policy: NPPF

2.2 The revised National Planning Policy Framework (NPPF) was published on the 20th July 2021 and sets out the Government's planning policies for England. It describes a proactive approach that plans should take to mitigating and adapting to climate change, considering the risk of overheating from rising temperatures.

2.3 New developments should be planned for in ways that avoid increased vulnerability to the range of impacts arising from climate change.

Regional Planning Policy: The London Plan (2021)

2.4 The following key policy in the newly adapted version of the London Plan is considered relevant to the proposed development and this Overheating Assessment:

2.5 **Policy SI4 Managing Heat Risk** states that development proposals should minimise adverse impacts on urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure and that major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy (Figure 4):

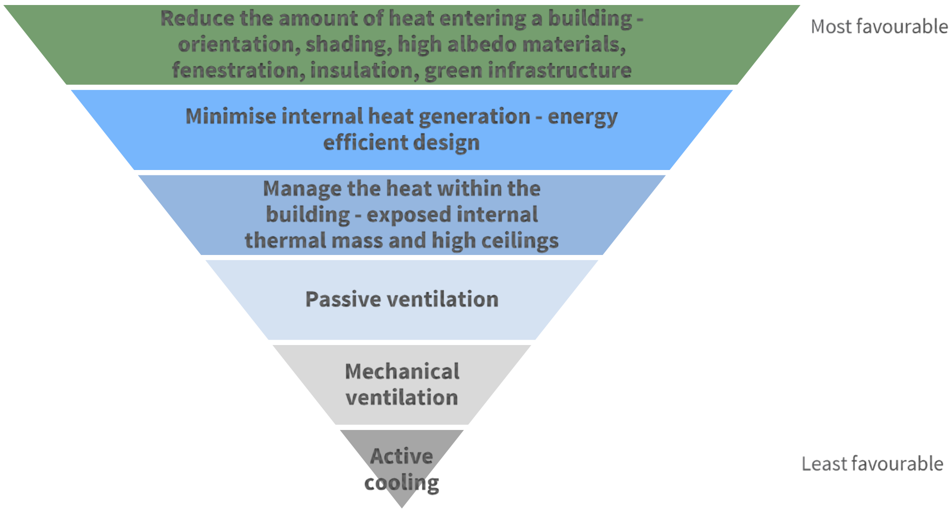

Figure 4: Cooling Hierarchy (London Plan 2021)

2.6 Low-energy measures should be used to mitigate overheating risk. These include solar shading, building orientation and solar-controlled glazing. Occupant behaviour will also have an impact on overheating risk.

2.7 Passive ventilation should be prioritised, (accounting for external noise issues and local air quality). The increased use of air conditioning systems is not desirable. If active cooling systems, such as air conditioning systems, are unavoidable, these should be designed to reuse the waste heat they produce.

Draft GLA Energy Assessment Guidance (2020)

2.8 The Draft GLA Energy Assessment Guidance (2020) requires all developments to undertake a detailed analysis of the risk of overheating.

2.9 For Care Home buildings, CIBSE TM59 guidance is identified as being the most appropriate methodology for the assessment of overheating risk.

2.10 For non-domestic areas, CIBSE TM52 methodology should be followed. There are exceptions to the overheating requirements where opportunities for reducing cooling demands via passive measures are constrained, for example supermarkets, cinemas, and retail outlets where doors may remain open to allow customer access.

CIBSE TM59 (2017) Assessment Criteria

2.11 The criteria for the assessment of overheating risk have been specified by the Chartered Institute of Building Services Engineers (CIBSE) in the CIBSE TM59: *Design methodology for the assessment of overheating risk in homes* (2017). CIBSE TM59 provides a standardised approach to predicting overheating risk for both naturally and mechanically ventilated residential buildings.

2.12 The following criteria must be met in order to demonstrate compliance:

> **For living rooms, kitchens, and bedrooms:** The indoor operative temperature should not exceed the threshold comfort temperature by 1ºC or more for more than 3 % of occupied hours.

> **For bedrooms only:** To guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am should not exceed 26°C for more than 1% of annual hours.

CIBSE TM52 (2013) Assessment Criteria

2.13 CIBSE TM52: 2013 *The Limits of Thermal Comfort: Avoiding Overheating in European Buildings*, contains guidance on the limits of thermal comfort for both naturally and mechanically ventilated residential buildings through an adaptive comfort model.

2.14 A room or building **must pass at least two out of the three following criteria** to demonstrate that overheating risk is reduced to an acceptable level.

> **Criterion 1: Hours of Exceedance:** The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°C or more during the occupied hours of a typical non-heating season (1 May to 30 September). The indoor operative temperature should not exceed the threshold comfort temperature by 1°C or more for more than 3% of occupied hours.

> **Criterion 2: Daily Weighted Exceedance:** The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperature rise and its duration. To allow for the severity of overheating the weighted exceedance (We) should be less than or equal to 6 in any one day.

> **Criterion 3: Upper Limit Temperature:** The third criterion sets an absolute maximum daily value temperature for a room, beyond which the level of overheating is unacceptable. The indoor operative temperature should not exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 4°C or more during the occupied hours of a typical non-heating season.

Local Policy: London Borough of Haringey

Haringey's Local Plan: Strategic Policies 2013-2026 (March 2013)

2.15 The London Borough of Haringey's Local Plan was adopted in 2013. The following policies are considered relevant to this assessment:

2.16 **Policy SP4 – Working towards a low carbon Haringey** indicates that measures will be promoted to reduce carbon emissions from new and existing buildings. Although overheating is not specifically mentioned, this policy demonstrates the borough's commitment to low-carbon building practices.

2.17 **Policy SP11 – Design** requires development to:

> Ensure impacts on health, climate change, natural resources and biodiversity are minimised by adopting and improving sustainable design and construction techniques

> Ensure buildings are designed to be flexible and adaptable – and able to integrate services and functions.

Haringey Development Management Development Plan Document (DPD) (July 2017)

2.18 This document gives effect to Haringey's spatial strategy and the key objectives of the Strategic Policies Local Plan by supporting proposals that contribute to the delivery of sustainable development in accordance with the strategy. The following are the relevant policies:

2.19 **Policy DM1 – Delivering high quality design** indicates that all new developments and changes of use must achieve a high standard of design. Although overheating is not specifically mentioned, this policy demonstrates the borough's commitment to creating developments with a high standard of design, which is sustainable and adaptive to climate change.

2.20 **Policy DM9 – Management of the historic environment** dictates that development proposals which affect designated heritage assets should be assessed with said concerned assets in mind, to preserve their heritage significance. This is significant as part of the current Mary Feilding Guild Care Home development is the redevelopment of a historic building.

2.21 **Policy DM21 – Sustainable Design, Layout and Construction** requires that developments apply the cooling hierarchy to reduce the potential for overheating and limit reliance on mechanical air conditioning systems, in accordance with the London Plan.

Climate Change Action Plan (2021)

2.22 Recently implemented, the Climate Change Action Plan sets out a vision for the London Borough of Haringey in 2041, by which time it hopes to be a net-zero carbon borough. The following policy is relevant to this dynamic overheating assessment:

2.23 **Objective H2 – Deliver a net zero carbon housing portfolio for the first Council new build homes delivered by 2022.** This objective seeks to implement minimisation of overheating risk in all tenders in the house-building programme.

3. MODELLING APPROACH

Unit Selection

3.1 Dynamic thermal modelling has been undertaken using DesignBuilder Software (v.7). The performance of the units has been assessed under the CIBSE TM59 and CIBSE TM52 guidance, and the adaptive thermal comfort model for a primarily natural ventilated scenario.

3.2 Worst-case bedrooms with different orientations, layouts and floor levels have been assessed. More than 15% of all residential spaces were modelled, to obtain a thorough and representative sample of the bedroom spaces in the site. Communal areas on the ground and second floors were also assessed. The selection of the bedrooms for overheating risk assessment was based on the following design characteristics:

> Units located in different orientations and on different floor levels across the blocks (including ground floor, mid-floor and top floor bedrooms);

> Spaces with varying amounts of cross ventilation, including single and dual aspect units;

> Spaces with different layouts.

3.3 The location and the internal layouts of the residential bedrooms selected for assessment using CIBSE TM59 criteria are presented in Appendix A. Design modelling inputs for these assessed spaces can be found in Appendix B.

3.4 The location and the internal layouts of the communal areas selected for assessment using CIBSE TM52 criteria are presented in Appendix C. Design modelling inputs for these assessed communal areas are shown in Appendix D.

Site external weather conditions

3.5 External temperatures and incident solar gains are greatest during summer months, coinciding with periods of lower wind speeds. Solar altitude is also highest during summer months, increasing the effects of façade shading from balcony overhangs and window reveals. Such considerations should be accounted for when designing for overheating risk.

3.6 The effects of external conditions are vital in an overheating assessment as they influence:

> Solar heat gains (a function of incident direct and diffuse solar radiation and solar altitude); and

> Calculated natural ventilation rates (a function of external temperature, wind directions and speeds).

3.7 CIBSE design summer year (DSY) weather data for London Heathrow (representative of lower density urban and suburban areas) has been used for the 2020s, high emissions, 50 % percentile scenario as required by CIBSE TM59 and TM52. All the spaces have been assessed against *'category I'* criteria of the adaptive method. This category is used for vulnerable people, who will be the future occupants of the proposed building.

3.8 The assessment of overheating risk has been undertaken using the DSY1 weather file, in accordance with the requirements of the London Plan. The final mitigation strategy for both residential elements and communal spaces has also been investigated under the more extreme DSY2 and DSY3 weather files and the results are presented in Appendix E.

Model geometry and local shading

3.9 Overshadowing from the building blocks has been taken into account during the simulation, based on the model geometry and the site orientation.

3.10 Solar control forms an integral part of overheating mitigation strategies. External shading in the form of balconies along with some pergola structures are proposed on certain facades of the proposals. The design of these are shown in Figure 5.

Figure 5: Revit model showing external shading on the development (DWA Architects, November 2021)

3.11 Horizontal shading devices such as balconies and overhangs are more efficient when applied in south oriented façades and during midday when the solar angle is high. Their role in reducing solar gains in the summer period is considered to be important. In this particular context (conservation area) the use of external shading has been deemed appropriate only on internal courtyard elevations in order to preserve the traditional character of the facades facing the surroundings as much as possible.

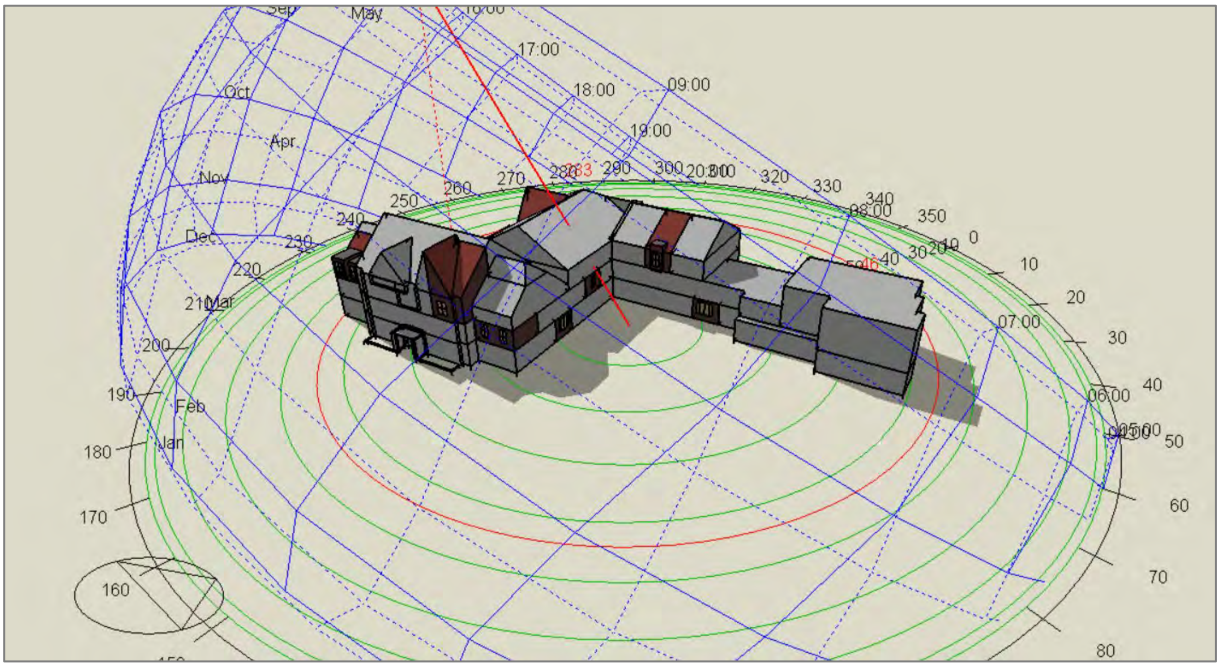

Figure 6: Sun path diagram shown within Design Builder for 21st June 12:00 noon BST.

4. OVERHEATING MITIGATION STRATEGY

Proposed mitigation measures

4.1 Noise appears not to be an issue for this site, and so it has been assumed that there are no limitations posed to utilise window openings. Table 1 below shows the window opening schedule for the residential elements and communal areas.

Table 1: Proposed natural ventilation strategy for spaces

Type of dwelling	Occupancy schedule	Window opening schedule
Residential spaces (TM59)	24/7 (allowing for daytime resting in addition to night-time use)	24/7
Communal areas (TM52)	09:00-22:00	09:00 – 22:00

4.2 The following passive design measures have been incorporated in order to reduce the risk of overheating to an acceptable level, as determined by CIBSE TM59 and CIBSE TM52:

> Highly efficient fabric envelope and high efficiency building services heating system, lighting and appliances are proposed in all spaces;

> High performance solar control glazing with a g-value of 0.3 to control solar gains;

> External shading is provided to some communal areas in the form of balconies and pergola structures; and

> A concrete floor slab within the apartment blocks provides some thermal capacity to absorb excessive heat within the building.

> A mechanical ventilation system will assist natural ventilation.

Results for TM59 overheating assessment

4.3 The results presented in Table 2 indicate that, based on the design modelling inputs in Appendix B, window opening schedules presented in Table 1 and passive overheating mitigation measures outlined above, all assessed rooms meet the CIBSE TM59 criteria and therefore demonstrate an acceptable level of overheating risk.

4.4 The overheating risk has also been investigated using the more extreme weather files DSY2 and DSY3 and the results are presented in Appendix E.

Table 2: TM59 Overheating Results for residential spaces (DSY1 2020s)

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3 %)	TM59 Criterion B: Bedroom temperature hours > 26 °C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
GF East Room	Bedroom	0.13	12.00	Pass
GF South Room	Bedroom	0.15	12.83	Pass
1F East Room	Bedroom	0.00	14.67	Pass
1F North Room	Bedroom	0.13	9.67	Pass
1F West Room	Bedroom	0.29	15.00	Pass
1F Southeast Room	Bedroom	0.00	15.83	Pass
2F North Room	Bedroom	0.00	9.17	Pass
2F South Room	Bedroom	0.00	24.67	Pass
2F South Room 2	Bedroom	0.00	20.67	Pass
2F Southwest Room	Bedroom	0.13	17.83	Pass
2F West Room	Bedroom	0.00	21.00	Pass

Results for TM52 overheating assessment

4.5 The following results presented in Table 3 indicate that, based on the design modelling inputs in Appendix D, window opening schedules presented in Table 1 and passive overheating mitigation measures outlined above, all assessed rooms meet the CIBSE TM52 criteria and therefore demonstrate an acceptable level of overheating risk.

4.6 The overheating risk has also been investigated using the more extreme weather files DSY2 and DSY3 and the results are presented in Appendix E.

Table 3: TM52 Overheating Assessment Results (DSY1 2020s)

Unit	TM52 Criterion 1: Hours of exceedance (pass ≤ 3 %)	TM52 Criterion 2: Weighted exceedance (<6C of occupied hr)	TM52 Criterion 3: Upper limit (<4C of occupied hour	Overall compliance with TM52
GF Central Hub	1.99	8.67	0.00	Pass
2F Dining Room	1.74	17.00	0.00	Pass
2F Lounge	1.59	8.00	0.00	Pass

5. FUTURE CLIMATE SCENARIOS

5.1 This report demonstrates that the proposed building is complaint with the 'moderately warm summer spell' (DSY1) for the 2020s period which represents the years 2011 up to 2040 (Tables 2 and 3). However, in the light of current climate change episodes with regards to global warming it is important to identify an overheating retrofit plan.

5.2 It is suggested that for future weather scenarios, the following retrofit measures could be adopted:

> Replacing glazed windows with ones that have a higher thermal performance, such as triple-glazed panes, and/or panes with a lower g-value;

> Installing solar reflective internal blinds to reduce solar gains;

> Ensuring the ceiling void is designed to accommodate additional ducting and allow the installation of active cooling to all spaces; and

> Planting additional trees and green areas to improve the external micro-climate and to provide shade to the building in the hottest months of the year.

6. CONCLUSION

6.1 This report details the findings and methodology of the dynamic overheating assessment of a sample of representative spaces for the proposed development at the former Mary Feilding Guild Care home in the London Borough of Haringey.

6.2 The assessed spaces have been selected for the overheating assessment based on design characteristics that establish them as representative of the overall proposed scheme. This selection includes consideration of varying floors, different orientations and both single and aspect spaces.

6.3 For the purposes of this report, it is assumed that spaces will utilise openable windows as the primary means of ventilation, with a background mechanical ventilation system. Passive measures such as high efficiency building fabric, solar control glazing and use of external shading in the form of balconies or structural shadings have been explored as far as practicable to avoid the need for active cooling.

6.4 The performance of the bedrooms and communal spaces have been assessed against the Chartered Institution of Building Services Engineers (CIBSE) guidance TM59 Design methodology for the assessment of overheating risk in homes (2017) and TM52 The limits of thermal comfort: Avoiding overheating in European buildings (2013) respectively. This dynamic overheating assessment of representative spaces demonstrates that an acceptable overheating risk is achieved.

6.5 All bedrooms tested demonstrate compliance with the CIBSE TM59 overheating assessment criteria and the communal areas against the TM52 overheating assessment criteria under the mandatory weather file (DSY1 for the 2020s, high emissions, 50% percentile scenario). The results are based on key design features and passive mitigation measures following the London Plan cooling hierarchy.

Table 4: Design features incorporated in accordance with the London Plan cooling hierarchy

Cooling hierarchy	Design feature	Discussion
1. Reduce amount of heat entering the building	Efficient building fabric and air tightness standards	In line with energy strategy (model inputs provided in Appendix B and D)
	Solar control glazing with a g-value of 0.3	A low G-value reduces solar gain, but has implications on CO_2 emissions, fabric energy efficiency and internal daylight levels and has therefore been optimised to balance all aspects as far as possible

Table 4: Design features incorporated in accordance with the London Plan cooling hierarchy		
Cooling hierarchy	**Design feature**	**Discussion**
	External shading provided by balcony overhangs and structural shading	In line with design proposals
2. Minimise internal heat generation	Energy efficient design of building services	In line with energy strategy (model inputs provided in Appendix B and D)
3. Manage the heat	Concrete floor slab between spaces in apartment blocks	The thermal mass of this will help reduce the risk of overheating by absorbing heat during the daytime
4. Passive ventilation	Openable windows used as the primary means of ventilation for overheating (window opening schedule provided in Table 1)	Windows are simulated to be open when the internal temperature exceeds 22 °C and the external temperature is lower than the internal temperature
5. Mechanical ventilation	Background mechanical ventilation rate set at 1 ACH for bedrooms. Communal spaces used a mechanical ventilation rate of 5 l/s m^2.	As agreed by HWM Building Services (M&E engineer)
6. Active cooling	No requirement for active cooling	

APPENDICES

Appendix A
Assessed bedroom spaces

Appendix B
Design modelling inputs for bedroom spaces

Appendix C
Assessed communal areas

Appendix D
Design modelling inputs for communal areas

Appendix E
Results of DSY2 and DSY3 weather scenarios

Appendix A
Assessed bedroom spaces

Figure A.1: Ground floor assessed residential spaces (GF East Room: single aspect; GF South Room: single aspect)

Figure A.2: First floor assessed residential spaces (1F North Room: single aspect; 1F East Room: single aspect; 1F Southeast Room: dual aspect; 1F West Room: single aspect)

Figure A.3: Second floor assessed residential spaces (2F North Room: single aspect; 2F South Room: single aspect; 2F South Room 2: single aspect; 2F Southwest Room: dual aspect; 2F West Room: single aspect)

Appendix B
Design modelling inputs for bedroom spaces

Table B.1: Baseline dynamic thermal modelling design assumptions			
Data Input			**Discussion**
Weather data	**Location**	CIBSE London Heathrow Design Summer Years (DSYs) for 2020s, high emissions, 50% percentile scenario	*Geographically closest and most representative industry-standard CIBSE weather data file*
Building Fabric Construction details	**External walls**	0.18 W/m²K	*As per the Energy Statement*
	Roofs	0.15 W/m²K	*As per the Energy Statement*
	Ground floor	0.12 W/m²K	*As per the Energy Statement*
	Ceilings/floors	Assumed to be adiabatic between adjacent floors	*Concrete slabs will add to the thermal capacity of the building When dwelling units above / below heat loss is assumed to be zero*
	Party walls between units and houses	Assumed to be adiabatic between adjacent spaces	*Walls adjacent to other units are assumed to be lightweight partitions Adjacent units have been included in the dynamic simulation calculations*
	Partitions within units	Steel-stud partitions	*Assumed thicknesses as per drawings (DWA Architects, 2021)*
	Internal doors	0.90 m width	*As per drawings (DWA Architects, November 2021)*
Windows	**Windows and Glazed Doors**	U value 1.3 W/m²K G-value 0.3	*As per the Energy Statement*
	Reveal depth	External reveal: 113mm	*As measured from drawings (DWA Architects, November 2021)*
Infiltration	**Air Tightness**	5.0 m³/hr-m² @ 50 pascals	*As per the Energy Statement*

The following occupancy schedules and internal gains assumptions have been used, in accordance with CIBSE TM59 guidance.

Table B.2: Occupancy and equipment gains for spaces (CIBSE TM59)		
Unit/room type	**Occupancy**	**Equipment Load**
Single bedroom	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
Assessed communal areas

Figure C.1: Ground floor assessed communal areas (Central Hub)

Figure C.2: Second floor assessed communal areas (Lounge and Dining Room)

Appendix D

Design modelling inputs for communal areas

Table D.1: Dynamic Thermal Modelling Inputs

Data Input				Discussion
Weather Data		CIBSE Design Summer Years (DSY 1) for London Heathrow		*Geographically closest industry-standard CIBSE weather data file.*
		Projected Weather: CIBSE Design Summer Years (DSY 1) for London Heathrow 2020s (50%percentile -high emission)		*In line with London Plan requirements.*
Construction Details	**External Walls**	**Wall U-value**	0.18 W/m^{2}K	*As per the Energy Statement*
	Roof	**Roof U-Value**	0.15 W/m^{2}K	
	Floors	**Ground/Exposed Floor U-value**	0.12 W/m^{2}K	
Glazing	**Windows and glazed external doors**	**U-value**	1.3 W/m^{2}K	
		G-value	0.3	
		External Reveal Depth: 113mm		*As measured in planning drawings. (RWA Architects, November 2021)*
Natural Ventilation	**Airtightness / Infiltration**	5.0 m^3/hr-m2 @ 50 Pa		
Mechanical Ventilation	**Mechanical supply and extract where relevant**	**Minimum air supply**: 10.00 l/s per person **Mech. Ventilation**: 5.0 l/s/m^2		*Assumption based on best practice guidance CIBSE Guide A: Environmental Design (Table 1.5) and confirmed with M&E engineer (HWM Building Services)*
Internal gains	**Lighting and Equipment**	**Lighting:** 7.5 W/m^2 **Equipment:** 5.0 W/m^2		*As per NCM profile (refer to Tables D.3 and D.4)*
Heating System	**Temperature Settings**	**Setpoint Temperature:** 20°C **Setback Temperature:** 10°C		*As per NCM profile (refer to table D.5)*

Table D.2: Occupancy schedule (NCM profiles)

Assembly Areas (Central Hub and Lounge)			Eating/drinking area (Dining Room)		
			Summer Weekdays/ Weekends/ Holiday Schedule	00:00-06:00	0%
				06:00-07:00	50%
Summer Weekdays/ Weekends/ Holiday Schedule	00:00-09:00	0%		07:00-09:00	100%
	09:00-17:00	100%		09:00-12:00	50%
	17:00-24:00	0%		12:00-14:00	100%
				14:00-18:00	50%
				18:00-20:00	100%
Winter Schedule	00:00-24:00	0%		20:00-21:00	50%
				21:00-24:00	0%
			Winter Schedule	00:00-24:00	0%

Table D.3: Internal Lighting Gains Schedule

Assembly Areas (Central Hub and Lounge)			Eating/drinking area (Dining Room)		
			Weekdays Schedule	00:00-06:00	0%
All Days Schedule	00:00-09:00	0%		06:00-21:00	100%
	09:00-17:00	100%		21:00-24:00	0%
	17:00-24:00	0%	Weekend/Holiday Schedule	00:00-06:00	0%
				06:00-21:00	100%
Winter Schedule	00:00-24:00	0%		21:00-24:00	0%
			Winter Schedule	00:00-24:00	0%

Table D.4: Internal Equipment Gains Schedule

Assembly Areas (Central Hub and Lounge)			Eating/drinking area (Dining Room)		
			Weekdays Schedule	00:00-07:00	5%
Summer Weekdays/Weekends/Holiday Schedule	00:00-09:00	5%		07:00-21:00	100%
	09:00-17:00	100%		21:00-24:00	5%
	17:00-24:00	5%	Weekend/Holiday Schedule	00:00-07:00	5%
				07:00-21:00	100%
Winter Schedule	00:00-24:00	0%		21:00-24:00	5%
			Winter Schedule	00:00-24:00	0%

Table D.5: Heating System Schedule

Assembly Areas (Central Hub and Lounge)			Eating/drinking area (Dining Room)		
Summer Weekdays/ Weekends/ Holiday Schedule	00:00-07:00	10°C	Summer Weekdays/ Weekends/ Holiday Schedule	00:00-04:00	10°C
	07:00-17:00	20°C		04:00-21:00	20°C
	17:00-24:00	10°C		21:00-24:00	10°C
Winter Schedule	00:00-24:00	20°C	Winter Schedule	00:00-24:00	20°C

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Appendix E
Results of DSY2 and DSY3 weather scenarios

Table E.1: TM59 Overheating Assessment Results (DSY2 2020s)

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3 %)	TM59 Criterion B: Bedroom temperature hours > 26 °C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
GF East Room	Bedroom	0.72	37.33	Fail
GF South Room	Bedroom	0.89	39.33	Fail
1F East Room	Bedroom	0.10	51.17	Fail
1F North Room	Bedroom	0.64	29.67	Pass
1F West Room	Bedroom	1.27	39.33	Fail
1F Southeast Room	Bedroom	0.40	51.50	Fail
2F North Room	Bedroom	0.02	41.00	Fail
2F South Room	Bedroom	0.27	61.50	Fail
2F South Room 2	Bedroom	0.13	59.00	Fail
2F Southwest Room	Bedroom	0.89	52.50	Fail
2F West Room	Bedroom	0.12	60.17	Fail

Table E.2: TM59 Overheating Assessment Results (DSY3 2020s)

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3 %)	TM59 Criterion B: Bedroom temperature hours > 26 °C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
GF East Room	Bedroom	0.72	54.67	Fail
GF South Room	Bedroom	0.79	50.83	Fail
1F East Room	Bedroom	0.00	72.83	Fail
1F North Room	Bedroom	0.92	39.67	Fail
1F West Room	Bedroom	1.78	53.33	Fail
1F Southeast Room	Bedroom	0.00	62.17	Fail
2F North Room	Bedroom	0.00	56.00	Fail
2F South Room	Bedroom	0.00	77.33	Fail
2F South Room 2	Bedroom	0.00	77.17	Fail

Table E.2: TM59 Overheating Assessment Results (DSY3 2020s)

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3 %)	TM59 Criterion B: Bedroom temperature hours > 26 °C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
2F Southwest Room	Bedroom	0.71	61.50	Fail
2F West Room	Bedroom	0.00	79.83	Fail

Table E.3: TM52 Overheating Assessment Results (DSY2 2020s)

Unit	TM52 Criterion 1: Hours of exceedance (pass ≤ 3 %)	TM52 Criterion 2: Weighted exceedance (<6C of occupied hr)	TM52 Criterion 3: Upper limit (<4C of occupied hour	Overall compliance with TM52
GF Central Hub	3.06	18.17	1.17	Fail
2F Dining Room	3.17	31.50	1.67	Fail
2F Lounge	2.70	16.67	0.83	Fail

Table E.4: TM52 Overheating Assessment Results (DSY3 2020s)

Unit	TM52 Criterion 1: Hours of exceedance (pass ≤ 3 %)	TM52 Criterion 2: Weighted exceedance (<6C of occupied hr)	TM52 Criterion 3: Upper limit (<4C of occupied hour	Overall compliance with TM52
GF Central Hub	5.28	10.00	0.00	Fail
2F Dining Room	5.44	20.67	0.00	Fail
2F Lounge	4.62	9.83	0.00	Fail