



**Dynamic
Overheating Report**

Drapers' Almshouse Charity

Edmansons Close

Final

Mariam Habib
BEng, MSc (Hons)

August 2022

DOCUMENT CONTROL RECORD

REPORT STATUS: DRAFT

Version	Date	Reason for issue	Author	Checked by	Approved for Issue by Project Manager
v.1	02.08.22	Draft	M. Habib	K. Paxton	J. Peck
v.2	24.08.22	Final	M. Habib	K. Paxton	J. Peck

ABOUT HODKINSON CONSULTANCY

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.

This report may not be copied or reproduced in whole or in part for any purpose, without the agreed permission of Hodkinson Consultancy of Rickmansworth, Hertfordshire.

Executive Summary

This report details the methodology and findings of the overheating assessment of a sample of representative dwellings for the proposed development at Edmansons Close by Drapers' Almhouse charity in the London Borough of Haringey.

A dynamic overheating assessment has been undertaken for three representative new builds and a review of mitigation measures was undertaken for the refurbished dwellings on site.

Dwellings have been selected for the overheating assessment based on design characteristics that establish them as representative of the overall proposed scheme. This selection of dwellings includes consideration of varying floors and of different orientations.

For the purposes of this report, it is assumed that dwellings 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, enhanced mechanical ventilation rates have been explored as far as practicable to avoid the need for active cooling. Additionally, building design and window locations have been optimised to mitigate overheating.

The performance of the newly developed dwellings has been assessed against the guidelines from the new Approved Document O (2021) and the Chartered Institution of Building Services Engineers (CIBSE) guidance TM59 Design methodology for the assessment of overheating risk in homes (2017). This dynamic overheating assessment of representative dwellings demonstrates that an acceptable overheating risk is achieved.

The dwellings tested demonstrate compliance with the CIBSE TM59 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.

For the refurbished dwellings, mitigation measures were assessed based on feasibility and possible impacts and it was concluded that, for this development, adding internal blinds and increased air change rates are the most feasible measures to mitigate overheating on site.

CONTENTS

Executive Summary	2
1. INTRODUCTION	4
2. REQUIRED STANDARDS	6
3. DYNAMIC MODELLING APPROACH	8
4. OVERHEATING MITIGATION STRATEGY FOR NEW DWELLINGS	10
5. OVERHEATING MITIGATION STRATEGY FOR REFURBISHED DWELLINGS	14
6. CONCLUSION	16
APPENDICES	17
Appendix A Assessed Dwellings	18
Appendix B Design Modelling Inputs	20
Appendix C Result of DSY2 and DSY3 Weather Scenarios	22

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 Edmansons Close by Drapers' Almshouse charity in the London Borough of Haringey.

Site Location

- 1.2** The proposed development site at Edmansons Close is located on Bruce Grove, Tottenham in the London Borough of Haringey, as shown in Figure 1 below.
- 1.3** Bruce Grove (A10) runs from the northwest to the southeast of the site. The surrounding area consists predominantly of residential buildings.

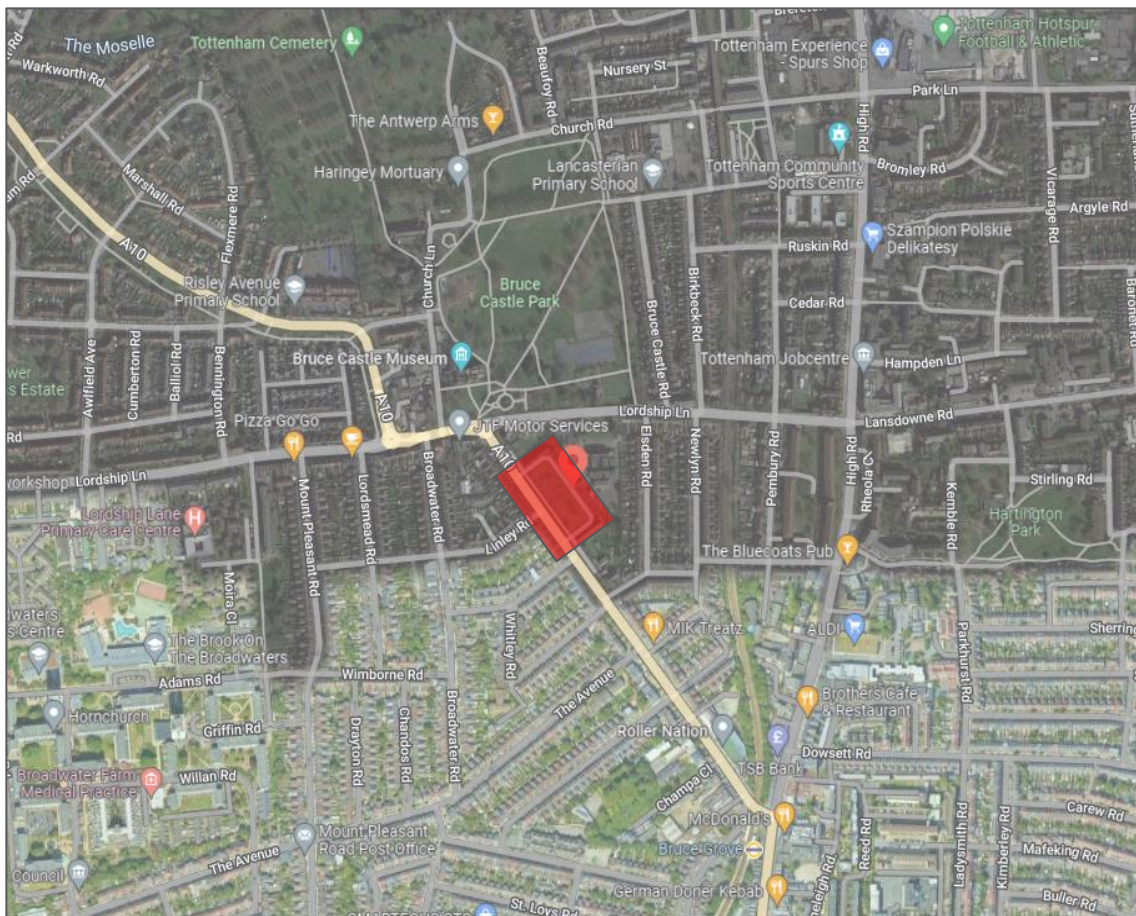


Figure 1: Site Location Google maps © 2022

Proposed Development

- 1.4 This analysis focuses on the new proposed dwellings within the development. The redevelopment is described as follows:

'Demolition of existing laundry building and 1970s infill building; alterations and extensions to 44 existing almshouses to create 8 x 1 bed, 12 x 2 bed and 6 x 3 bed units; alterations to existing Gatehouse to provide 1 x 2 bed unit; construction of 1 x new build 3 bed almshouse to replace 1970s infill building; construction of a new apartment building comprising 7 x studio units and 9 x 1 bed units; construction of 4 x new build 2 bed units within two new pavilions (2 units in each pavilion, 4 units in total); with landscaping; improvements to access; car parking; and ancillary development thereto.'

- 1.5 Figure 2 below indicates the proposed site plan.

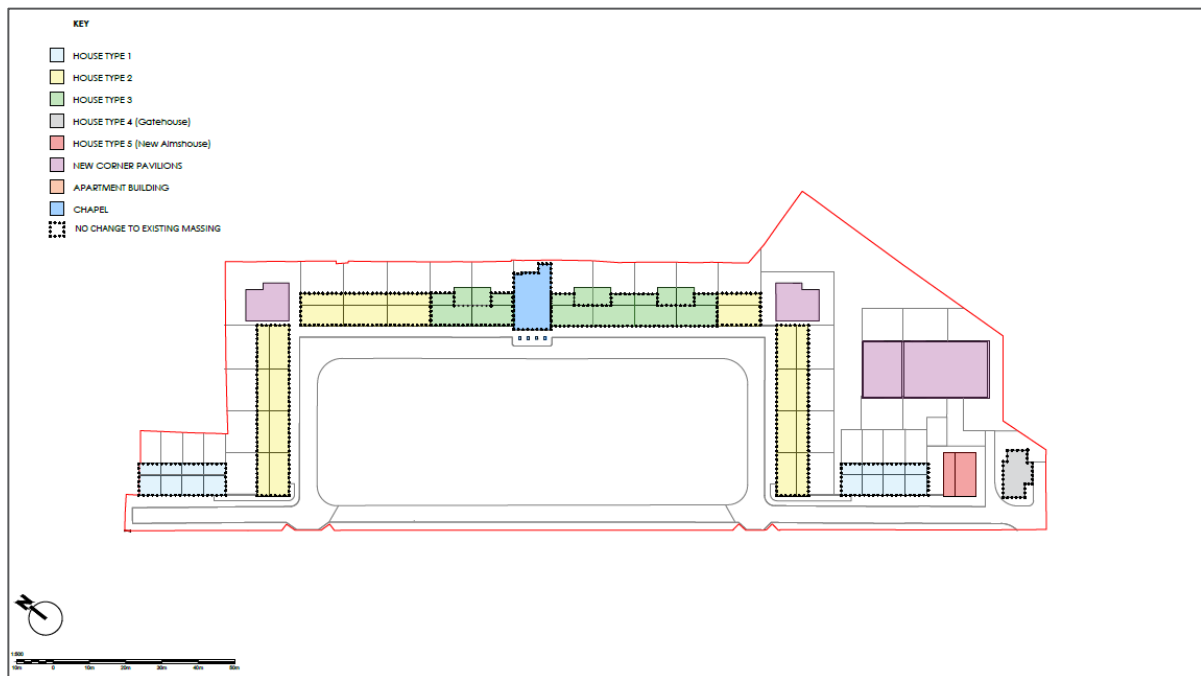


Figure 2: Proposed Site Layout – d+b studios (2022)

Overheating and Thermal Comfort

- 1.6 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.

- 1.7** Dynamic thermal simulations have been carried out for representative new dwellings, 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

Approved Document (O)

- 2.1** This section sets out the main requirements of the incoming Approved Document O for Overheating (2021).

Summary

- 2.2** The new Approved Document O (AD(O)) for overheating is the first set of building regulations to specifically cover overheating. It applies only to new residential buildings.
- 2.3** Compliance is based on meeting the following requirements:
- > Reasonable provision to limit unwanted solar gains in summer and to provide adequate means to remove excess heat;
 - > Taking account of safety, noise, pollution, protection of falling and entrapment when developing the strategy. Mechanical cooling should only be considered when feasible passive means are insufficient.
- 2.4** There are two methods for assessing dwellings under AD(O) – option 1 (simplified) and option 2 (dynamic thermal analysis). The simplified method requires a building to accommodate certain design limitations (such as maximum glazed areas and minimum ventilation provisions), whereas option 2 follows a similar pathway of the GLA requirements for major developments to demonstrate compliance with CIBSE TM59 criteria via dynamic modelling. New Approved Document O override certain TM59 aspects wherein changes have been made to the assumptions of window openability.
- 2.5** For dwellings with noise or pollution constraints, the only route for compliance is through dynamic modelling. If windows are designed to be primarily on restrictors, the simplified method will only account for the open area making it impossible to pass the ventilation criterion without exceeding the glazing criterion.
- 2.6** As part of the new AD(O), acceptable levels of noise risk for residents have been re-evaluated, meaning that at night, windows must remain shut if the noise levels average more than 40dB between 11pm and 7am. This may cause issues in creating an overheating mitigation strategy for dwellings that are at a high risk of noise, as they will not be able to utilise fully openable windows at night. An acoustician should provide a noise impact assessment prior to the start of the overheating

analysis to ensure that noise has been considered in the development of the overheating mitigation strategy.

- 2.7 AD(O) also states that transom heights should be 1.1m or higher if the windows are to be simulated as fully openable, which the updated model for this report has considered.

CIBSE TM59 (2017) Assessment Criteria

- 2.8 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.
- 2.9 The following criteria must be met in order to demonstrate compliance:
- > **Living rooms, kitchens and bedrooms:** The indoor operative temperature should not exceed the threshold comfort temperature by 1°C or more, for more than 3 % of occupied hours.
 - > **Bedrooms:** 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.
- 2.10 Whilst there is no mandatory target to meet for communal corridors, TM59 suggests a threshold temperature of 28°C to be exceeded for no more than 3% of the total annual hours.

Regional Planning Policy: The London Plan (2021)

- 2.11 The following key policy in the newly adapted version of the London Plan; although this policy is only relevant for new builds, the cooling hierarchy (Figure 1) is used to guide the adaptive measures for the refurbished dwellings on site.
- 2.12 **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 3):

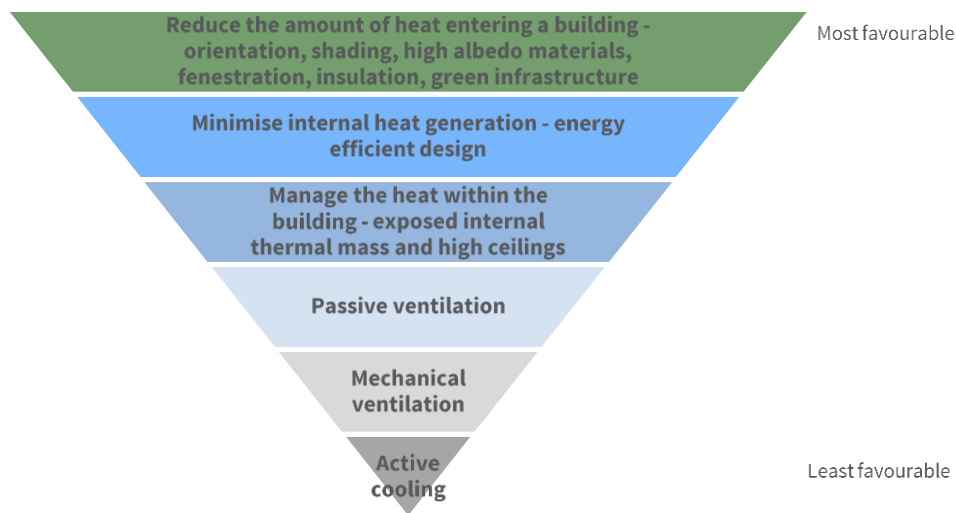


Figure 3: Cooling Hierarchy (London Plan 2021)

- 2.13** 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.

3. DYNAMIC MODELLING APPROACH

- 3.1** Dynamic thermal modelling was undertaken using DesignBuilder Software (v.7) for the new build dwellings on site. The performance of the units has been assessed under CIBSE TM59 guidance and the guidelines from the new Approved Document (O).
- 3.2** Approved Document O override certain TM59 aspects wherein changes have been made to the assumptions of window openability. The new AD(O) reduces temperature-based changes to the model, rather, focusing on the occupant behaviour to provide a more realistic set of results for overheating.

Unit Selection

- 3.3** Three representative dwelling units from the new proposed dwellings on site have been assessed. The selection of the units for overheating risk assessment was based on the following design characteristics:
- > Worst-case orientations;
 - > Typology (apartment, house).

- 3.4** The location and the internal layouts of the homes selected for assessment are presented in Appendix A. Design modelling inputs for the assessed dwellings can be found in Appendix B.

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.
- 3.8** The assessment of overheating risk has been undertaken using the DSY1 weather file, in accordance with the requirements of TM59 and the London Plan. The final mitigation strategy has also been tested under the more extreme DSY2 and DSY3 weather files and the results are presented in Appendix C.

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 is applied across many of the façades as part of the design proposals. These were incorporated in the simulation model as shown in Figure 4.

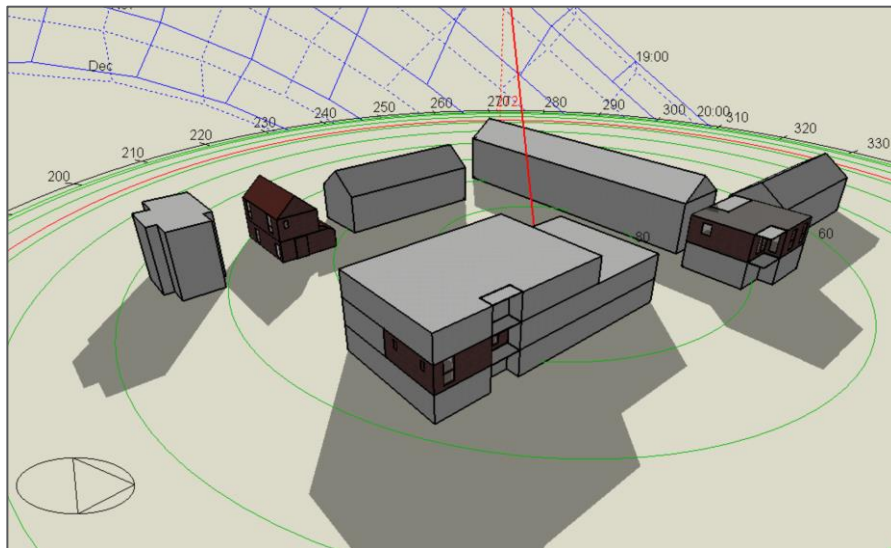


Figure 4: Simulation model from DesignBuilder for July 15 17:00.

- 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.

4. OVERHEATING MITIGATION STRATEGY FOR NEW DWELLINGS

Proposed Measures

- 4.1** 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 (refer to Table 1 for a more detailed breakdown:
- > Highly efficient fabric envelope and high efficiency building services heating system, lighting and appliances are proposed in all dwellings to reduce internal gains;
 - > High performance solar control glazing with a g-value of 0.4. This has been balanced to mitigate overheating risk whilst achieving fabric energy efficiency targets and natural daylight provision:
 - > External shading is provided to some windows in form of balconies and increased reveal depths of 250mm; and
 - > Enhanced mechanical ventilation rates of 2ach.

4.2 The following design measures, developed in conjunction with d+b studios, have also been incorporated into the design to mitigate overheating

- > Since the new dwellings are part of an existing development, keeping the character of the design is crucial, therefore adding external elements such as overhangs or external shutters was not ideal.
- > Dwellings have been designed to ensure that exposed East-facing bedrooms have an extra window that would allow for cross ventilation.

Table 1: Design features incorporated in accordance with the London Plan cooling hierarchy for the new buildings on site

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)
	Solar control glazing with G-value of 0.4 (frame factor of 0.8)	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	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)
3. Manage the heat	Concrete floor slab between dwellings in apartment blocks	The thermal mass of this will help reduce the risk of overheating by absorbing heat during the daytime even if it isn't exposed

Table 1: Design features incorporated in accordance with the London Plan cooling hierarchy for the new buildings on site

Cooling hierarchy	Design feature	Discussion
4. Passive ventilation	Openable windows used as the primary means of ventilation for overheating since facades with operable windows do not have any noise restrictions (window opening schedule provided in Table 3)	Windows are simulated to gradually open when the internal temperature exceeds 22 °C and the external temperature is lower than the internal temperature, to be fully open when internal temperatures reach 26°C. As per the new AD(O), if at 11:00pm bedroom temperatures exceeds 23°C windows are simulated open through the night, if the temperature is below 23°C windows will be simulated shut.
5. Mechanical ventilation	Background mechanical ventilation rate exceeding minimum Part F	2ach for all assessed dwellings as shown in Appendix B (Table B.3)
6. Active cooling	N/A	No requirement for active cooling

Natural ventilation strategy

4.3 Table 1 outlines the window opening schedule for the proposed development

Table 1: Proposed natural ventilation strategy for dwellings

Façade	Room	Occupancy schedule (TM59)	Window opening schedule
All dwellings	Kitchen / Living areas	09:00-22:00	09:00-22:00
	Bedrooms	24/7 (allowing for use as home office or daytime resting in addition to night-time use)	24/7 (refer to point 4.4)

- 4.4** Windows are simulated to gradually open when the internal temperature exceeds 22 °C and the external temperature is lower than the internal temperature, to be fully open when internal temperatures reach 26°C. As per the new AD(O), if at 11:00pm bedroom temperatures exceeds 23°C windows are simulated open through the night, if the temperature is below 23°C windows will be simulated shut.

Results

- 4.5** The following results presented in Table 2 indicate that, based on the design modelling inputs in Appendix B, window opening schedules presented in Table 1 and overheating mitigation measures outlined above, all assessed rooms meet the CIBSE TM59 criteria and therefore demonstrate an acceptable level of overheating risk.
- 4.6** Where a marginal fail is shown, this indicates that results under criterion B are only marginally above 32 hours, with an exceedance of less than 1 hour. Due to limitations and the potential for minor inaccuracies when modelling in software, it is generally accepted that such a deviation may be caused due to these inaccuracies and thus the overheating risk is acceptable.
- 4.7** The overheating risk has also been investigated using the more extreme weather files DSY2 and DSY3 and the results are presented in Appendix C.

Table 2: TM59 overheating results for dwellings under 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	
House 5	Kitchen	0.20	N/A	Pass
	Living	0.37	N/A	Pass
	Bedroom1	0.15	32.17	Marginal Pass
	Bedroom2	0.28	29.17	Pass
Corner Pavilion	Bedroom1	0.00	30.67	Pass
	Bedroom2	0.25	23.17	Pass
	LKD	1.05	N/A	Pass
Apartment Building	Bedroom	0.14	32.83	Marginal Pass
	LKD	0.37	N/A	Pass

- 4.8** Therefore, the overheating risk is deemed to be acceptable, as there is only marginal exceedance of CIBSE TM59 requirements.
- 4.9** The overheating risk has also been investigated using the more extreme weather files DSY2 and DSY3 and the results are presented in Appendix C, Tables C.1 and C.2. Results show a maximum exceedance of the recommended 26 degrees in bedrooms for 3% of annual sleeping hours.

5. OVERHEATING MITIGATION STRATEGY FOR REFURBISHED DWELLINGS

- 5.1** The existing Almhouses in Edmansons Close are listed as historical buildings so major adjustments cannot be made to the building façade.
- 5.2** Additional mitigation measures in line with the London plan have been described below in Table 3 highlighting their feasibilities in order to minimise the need for active cooling.

Table 3: Design features considered in accordance with the London Plan cooling hierarchy for the refurbished dwellings

Cooling hierarchy	Design feature	Benefits	Drawbacks	Option
1. Reduce amount of heat entering the building	Internal blinds	Minimizes solar gains on all facades	Requires occupant control	✓
	Overhangs	Minimizes solar gains on the southern façade, fixed so doesn't rely on occupant control	Major impact on façade design	X
	External shutters/blinds	Minimizes solar gains on all facades	Major impact on façade design	X
2. Minimise internal heat generation	Energy efficient Lighting	LED lighting	N/A	✓

Table 3: Design features considered in accordance with the London Plan cooling hierarchy for the refurbished dwellings

Cooling hierarchy	Design feature	Benefits	Drawbacks	Option
3. Manage the heat	Concrete floor slab between dwellings in apartment blocks	The thermal mass of this will help reduce the risk of overheating by absorbing heat during the daytime even if it isn't exposed	N/A	✓
4. Passive ventilation	Operable windows	Can be used on site as the primary means of ventilation for all dwellings	Some bedrooms in existing House type 1 may need to keep windows closed through the night due to noise issues. Overheating can be mitigated in these instances by keeping bedroom doors closed at night	✓
	Lots of Dual aspect units	Allow for cross ventilation throughout the day	N/A	✓
5. Mechanical ventilation	Trickle vents	Using trickle vents to support existing MEV systems	Minor changes to façade or window frames	To be confirmed by heritage consultants
	MVHR	More efficient air ventilation system and higher occupant comfort	Requires larger duct sizing and implies additional operational costs to occupants	X

5.3 New mitigation measures that are deemed feasible for these refurbished dwellings include adding internal blinds, upgrading the lighting to LED, and increased air change rates through the use of trickle vents.

6. CONCLUSION

- 6.1 This report details the methodology and findings of the overheating assessment of a sample of representative dwellings for the proposed development at Edmansons Close by Drapers' Almhouse charity in the London Borough of Haringey.
- 6.2 A dynamic overheating assessment has been undertaken for three representative new builds and a review of mitigation measures was undertaken for the refurbished dwellings on site.
- 6.3 Dwellings have been selected for the overheating assessment based on design characteristics that establish them as representative of the overall proposed scheme. This selection of dwellings includes consideration of varying floors and of different orientations.
- 6.4 For the purposes of this report, it is assumed that dwellings 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, enhanced mechanical ventilation rates have been explored as far as practicable to avoid the need for active cooling. Additionally, building design and window locations have been optimised to mitigate overheating.
- 6.5 The performance of the newly developed dwellings has been assessed against the guidelines from the new Approved Document O (2021) and the Chartered Institution of Building Services Engineers (CIBSE) guidance TM59 Design methodology for the assessment of overheating risk in homes (2017). This dynamic overheating assessment of representative dwellings demonstrates that an acceptable overheating risk is achieved.
- 6.6 The dwellings tested demonstrate compliance with the CIBSE TM59 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.
- 6.7 For the refurbished dwellings, mitigation measures were assessed based on feasibility and possible impacts and it was concluded that, for this development, adding internal blinds and increased air change rates are the most feasible measures to mitigate overheating on site.

APPENDICES

Appendix A

Assessed Dwellings

Appendix B

Design Modelling Inputs

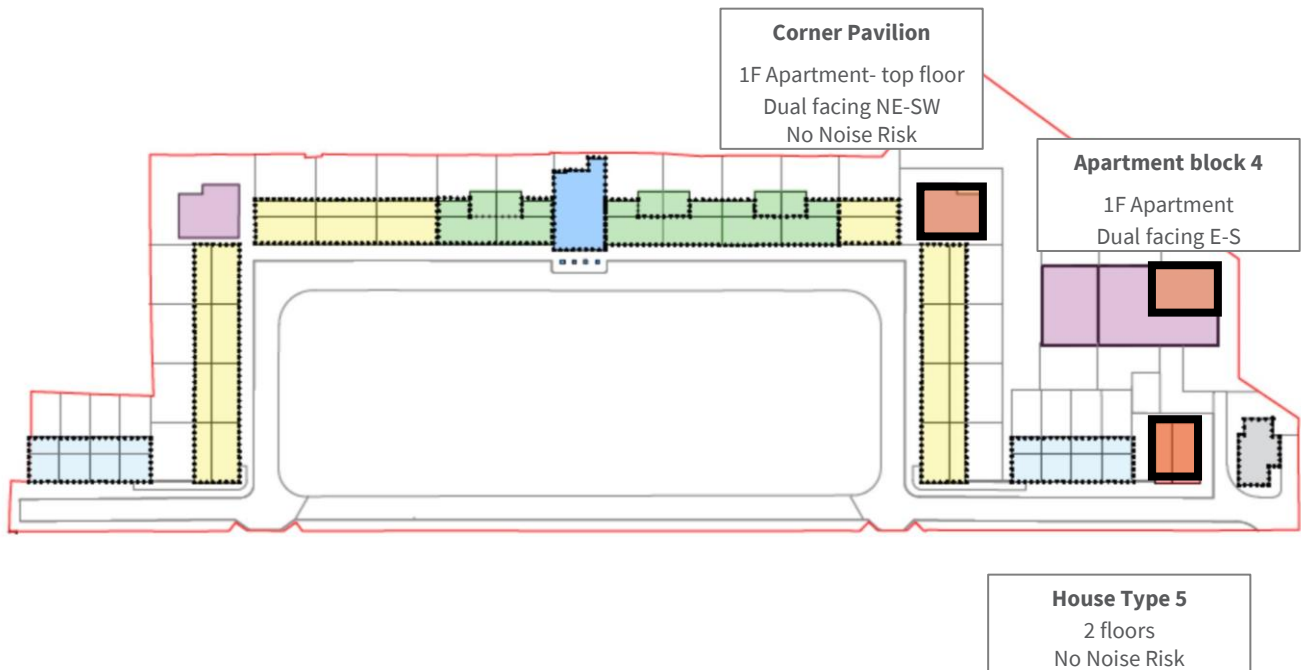
Appendix C

Results of DSY2 and DSY3 Weather Scenarios

Appendix A

Assessed Dwellings

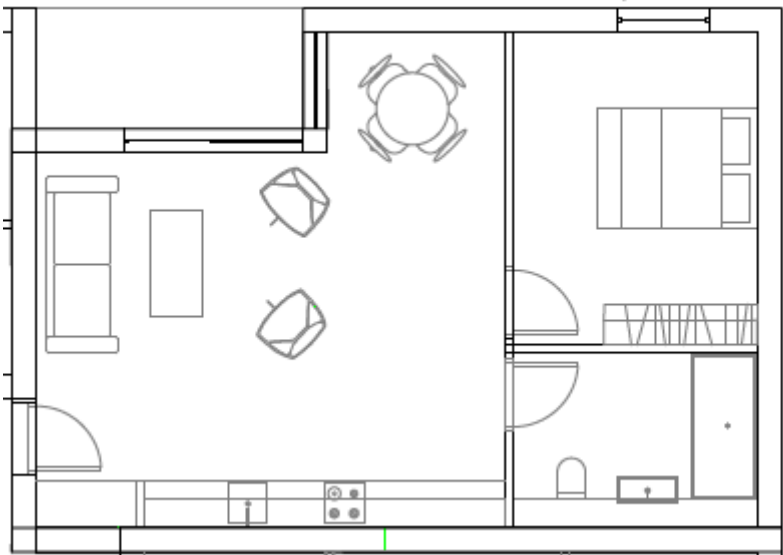
Site plan



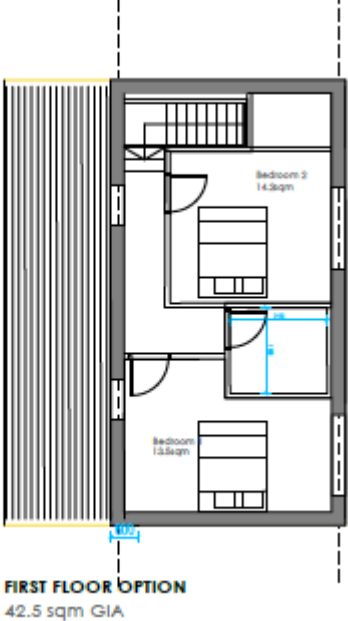
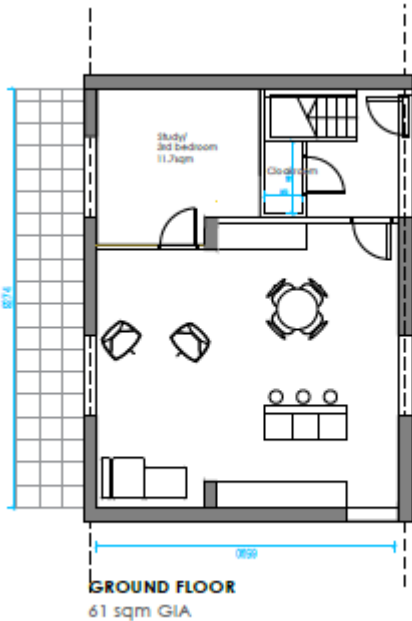
Corner Pavilion



Apartment block 4



House type 5



Appendix B

Design Modelling Inputs

The following modelling inputs have been included in the baseline dynamic thermal simulation.

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	<i>Geographically closest and most representative industry-standard CIBSE weather data file</i>
Building Fabric Construction details	External walls	0.18 W/m ² K	<i>As per the Energy Statement (Hodkinson Consultancy, June 2022)</i>
	Roofs	0.10 W/m ² K	<i>As per the Energy Statement (Hodkinson Consultancy, June 2022)</i>
	Ground floor	0.10 W/m ² K	<i>As per the Energy Statement (Hodkinson Consultancy, June 2022)</i>
	Ceilings/floors	Assumed to be adiabatic between adjacent floors	<i>Concrete slabs will add to the thermal capacity of the building When dwelling units above / below heat loss is assumed to be zero</i>
	Party walls between units and houses	Assumed to be adiabatic between adjacent dwellings	<i>Walls adjacent to other units are assumed to be lightweight partitions Adjacent units have been included in the dynamic simulation calculations</i>
	Partitions within units	MATERIAL partitions	<i>Assumed thicknesses as per drawings</i>
	Internal doors	0.XX m width	<i>As per drawings (d+b studios, 2022)</i>
Windows	Windows and Glazed Doors	U value 1.1 W/m ² K G Value 0.4	<i>As per the Energy Statement (Hodkinson Consultancy, June 2022)</i>
	Reveal depth	External reveal: 250 mm	<i>As per the agreement with d+b studios.</i>
	Discharge Coefficient	Discharge coefficient: 0.55-0.61	<i>Calculated from window dimensions as per drawings (d+b studios, 2022)</i>
Infiltration	Air Tightness	3.0 m ³ /hr-m ² @ 50 pascals	<i>As per the Energy Statement (Hodkinson Consultancy, June 2022)</i>

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 dwellings (CIBSE TM59)		
Unit/room type	Occupancy	Equipment Load
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
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
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
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	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
Utility cupboard	N/A	10 W on 24/7

A mechanical ventilation system should be provided which can achieve background mechanical ventilation rates exceeding minimum Part F requirements. For House type 5 the 2ach are required for bedrooms only.

Table B.3: Mechanical ventilation rates for dwellings			
Dwelling	House type 5	Corner Pavilion	Apartment Building
Floor area / m ²	103.5	64	50.12
Storey height / m	2.4	2.4	2.4
Volume / m ³	248.4	153.7	120.3
Air change rate / ach	2.0	2.0	2.0
Boost rate / l/s	138	85	67

Appendix C

Result of DSY2 and DSY3 Weather Scenarios

The dynamic overheating assessment has also been run under the more extreme DSY2 and DSY3 weather files, with results presented in Tables C.1 and C.2.

TM59 states that compliance should be met for the DSY1 weather scenario, and that additional testing can be undertaken using the 2020 versions of DSY2 and DSY3. However, it is acknowledged that meeting the CIBSE compliance criteria is challenging for the DSY2 and DSY3 weather files.

The overheating mitigation strategy presented within the main body of this report demonstrates the passive measures that have been implemented to reduce the risk of overheating as far as practicable. In the future, residents could use further adaptation measures to combat any additional overheating risk such as the use of fans or blinds. It is worth noting that although all bedrooms fail criteria B, the majority of zones comply with criteria A which uses a more adaptive approach to assessing overheating.

Table C.1: Dwelling overheating results for DSY2 2020s – TM59

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	
House 5	Kitchen	1.33	N/A	Pass
	Living	1.57	N/A	Pass
	Bedroom1	0.81	62.00	Fail
	Bedroom2	1.13	56.17	Fail
Corner Pavilion	Bedroom1	0.24	60.33	Fail
	Bedroom2	0.93	46.67	Fail
	LKD	2.72	N/A	Pass
Apartment Building	Bedroom	0.72	58.67	Fail
	LKD	1.53	N/A	Pass

Table C.2: Dwelling overheating results for DSY3 2020s – TM59

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	
House 5	Kitchen	1.37	N/A	Pass
	Living	2.22	N/A	Pass
	Bedroom1	0.66	81.67	Fail
	Bedroom2	1.41	74.17	Fail
Corner Pavilion	Bedroom1	0.03	88.17	Fail
	Bedroom2	1.09	67.83	Fail
	LKD	4.54	N/A	Fail
Apartment Building	Bedroom	0.66	86.5	Fail
	LKD	2.33	N/A	Pass