

Overheating Analysis

Boyton Road



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Document information

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Overheating Analysis

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Executive summary

Overview

As per GLA guidance, this report has assessed the proposed scheme in accordance with CIBSE TM59 requirements relating to overheating and Part O Overheating Mitigation. Results are provided which show how the occupied spaces perform against the thermal comfort standards for overheating.

The scheme has implemented passive design measures and the modelling results indicate that the scheme is compliant with the overheating requirements mentioned above for 2020s DSY1 (further details about the results of this analysis are provided in the conclusion section page 10).

The proposal maximises passive design measures by responding to the local context in the following ways:

- Energy efficient lighting and appliances have been recommended to reduce internal heat gains.
- The building fabric will be insulated over and above the standards set out by Building Regulations and reduced solar gains from a glazing solar factor of 0.45 will help to keep heat out of the building.
- Fixed shading and overhangs as per architectural drawings.
- Mechanical ventilation with heat recovery and summer bypass to provide fresh air and purging of heat.
- Natural ventilation to supply fresh air to the building through openable windows including night-time (as per ventilation rates section of this report).

Note that the analysis was performed assuming that opening windows were controlled based on the level of occupancy and the operative indoor temperature of the space. To achieve the thermal comfort levels shown in this report the level of occupant control for the opening windows would need to be optimum i.e., fully responsive to indoor temperature.

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Introduction

Eight Versa has been appointed in order to undertake an overheating analysis of Boyton Road to provide design stage guidance and maximise occupant comfort levels. Consequently, thermal modelling has been undertaken to demonstrate compliance with Part O and CIBSE TM59 requirements. The current proposal is to minimise overheating risk by following the Cooling Hierarchy.

Building Summary

Redevelopment of the car park adjacent Wat Tyler House to provide 15 new Council rent homes in a part-4, 5 and 7-storey building. Provision of associated amenity space, cycle and refuse/recycling stores, a wheelchair parking space on Boyton Road and enhancement of existing communal areas and play space to the rear on the Campsbourne Estate.

The proposal is located on the land adjacent to Wat Tyler House, on Boyton Road, Hornsey, London, N8 7AU, in the London Borough of Haringey. The development has an internal GIA of approximately 950 sqm.

Planning Context

The London Borough of Haringey invites developments to undertake dynamic thermal modelling (Haringey's Key Overheating Planning Application Requirements) to ensure that the development does not overheat following the policy set out in the London Plan and GLA guidance.

Part O Overheating Mitigation

Approved document Part O covers the overheating mitigation requirements of the building regulations as set out in Part O of Schedule 1 to the Building Regulations.

The scheme is required to comply with Part O. Overheating mitigation:

1. Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to:
 - a. limit unwanted solar gains in summer
 - b. provide an adequate means to remove heat from the indoor environment.
2. In meeting the obligations in paragraph (1)
 - a. account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence, and
 - b. mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it

In line with Part O, there are 2 possible approaches, the simplified method and the Dynamic thermal modelling. The Dynamic thermal modelling approach has been used in this assessment.

Methodology

The methodology used within this report has been to establish the thermal comfort levels in the occupied spaces through using dynamic simulation modelling and respond with suitable passive design measures to mitigate solar gains, provide adequate ventilation, and increase thermal mass. National regulations have set high standards and numerous iterations have been undertaken to determine suitable fabric improvements. All assumptions in the modelling are provided in the model inputs section of this report.

Criteria for defining overheating

According to the Local planning policy and Part O, the scheme is required to achieve compliance with CIBSE TM59 for DSY1 (2020s weather pattern high emissions, 50 percentile).

CIBSE TM59: 2017 - Design methodology for the assessment of overheating risk in homes, has the following three criteria to reduce the risk of overheating:

1. For living rooms, kitchen and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours (Same as Criterion 1 of TM52).
2. For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of the annual hours (1% of the annual hours between 22:00 and 07:00, equivalent to 32 hours).
3. For communal corridors, the operative temperature should not exceed 28 °C for more than 3% of the annual hours.

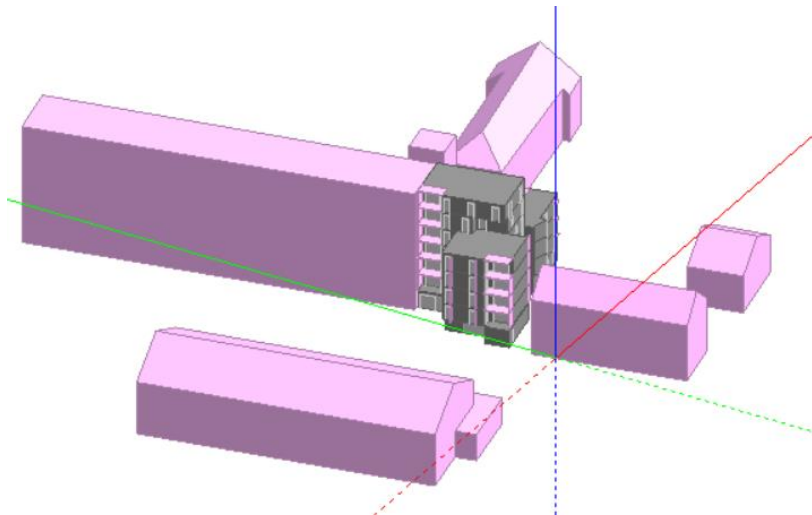
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Modelling Inputs

Simulation Software

An overheating analysis has been undertaken using Dynamic Simulation Modelling, Design Builder has been employed for this. Design Builder is a DCLG approved simulation environment that complies with the requirements of CIBSE Guide A. A screenshot of the model is shown below.



Weather File

The CIBSE Design Summer Year (DSY1), London Weather Centre (LWC), for the 2020s, high emissions, 50% percentile scenario, has been used for the purposes of this report. DSY2 and DSY3 have also been investigated.

The three DSYs represent summers with different types of hot events.

- DSY1 - Moderately warm summer
- DSY2 - Short intense warm spell
- DSY3 - Long, less intense warm spell

Building Fabric U-Values

Element	Proposed U-value (W/m ² K)
External walls	0.16
Corridor walls	0.16
Ground floors	0.10
Flat Roof	0.10
Openings	1.10 (g-value 0.45)

Internal Gains

Typical hours based, according to CIBSE TM 59 and CIBSE Guide A on the relative activity for class use, on weekdays and weekends throughout the year have been specified for lighting, equipment and occupancy.

Space	Occupancy people/m ²	Lighting W/m ²	Small power W/m ²
Bedroom	0.125	2	5
Kitchen / Living room	0.075	2	11

Distribution losses from the communal heating pipework on primary side have been assumed and attributed to communal corridors (8W/m).

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Passive Design

Cooling Hierarchy

Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

1. Minimise internal heat generation through energy efficient design
2. Reduce the amount of heat entering a building in summer through shading, albedo, fenestration, insulation and green roofs and walls
3. Manage the heat within the building through exposed internal thermal mass and high ceilings
4. Passive ventilation
5. Mechanical ventilation
6. Active cooling systems (ensuring they are the lowest carbon options).

Cooling Strategy

The cooling strategy is to implement energy efficient lighting and appliances to reduce internal heat gains; create a super-insulated fabric with shading devices and solar control glazing to keep the heat out.

Windows

Glazing will be a crucial aspect to ensure thermal comfort of the occupied spaces. In order to minimise solar gains, and consequently cooling demand, windows with a solar factor of 0.45 have been modelled for every glazed area.

Shading

Overhangs (balconies), side fins and external louvres on the ground floor have been specified as per architectural drawings and will reduce the solar heat gains, especially living rooms.

Thermal Mass

The development consists of a brick and block structure which will provide thermal mass. This will absorb heat energy during the day and release it at night, keeping spaces at a steadier temperature.

Mechanical Ventilation Rates

Mechanical ventilation has been specified. The system has to provide at least an air flow of 10l/s/person and 0.3 l/s/m² as per Part F.

Natural Ventilation Rates

Natural ventilation through openable windows has been adopted for this scheme. The ventilation rate has been calculated by the software according to the percentage of openable windows for each space and the varying environmental conditions throughout the year. The architectural drawings were followed to select each window openable area. Most windows were assumed to have an openable area of 60%.

In accordance with TM59 all windows are assumed to be fully opened when all the following conditions are satisfied:

1. Internal temperatures exceed 22 °C.
2. During occupied and non-occupied periods if any security issues were not identified

In accordance with Part O, the limits on the use of CIBSE's TM59 methodology are:

- When a room is occupied during the day (8am to 11 pm), openings are modelled to:
 - Start to open when the internal temperature exceeds 22 °C
 - Be fully open when the internal temperature exceeds 26 °C
 - Start to close when the internal temperature falls below 26 °C
 - Be fully closed when the internal temperature falls below 22 °C
- At night (11pm to 8am), openings are modelled as fully open if both of the following apply:
 - The opening is on the first floor or above and not easily accessible
 - The internal temperature exceeds 23 °C at 11pm
- When a ground floor or easily accessible room in unoccupied, both of the following apply:
 - In the day windows and doors should be modelled as open if this can be done securely
 - At night, windows and doors should be modelled as closed
- An entrance door should be included, which should be shut all the time.

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In line with requirement O1(2)(a), the building's overheating mitigation strategy for use by occupants should account for the following:

- a. Noise at night: As external noise was not considered to be an issue for this scheme, windows are not likely to remain closed at night allowing night-time ventilation to take place.
- b. Pollution: The scheme isn't located near any significant local pollution source.
- c. Security: Secure night-time vents have been specified for the ground floor apartments allowing night-time ventilation to take place securely during the sleeping hours.
- d. Protection from falling: Openings intended to be opened for long periods to reduce overheating risk have been designed to prevent occupants from falling and therefore meet requirements O1(2)(a).
- e. Protection from entrapment: The ground floor night-time vents have been designed not to allow body parts to become trapped and therefore meet requirement O1(2)(a).

Moreover, the scheme has been modelled with a discharge coefficient rate of 0.65 and a wind factor of 1.

Night-time ventilation has also been specified for the ground floor apartments through the ventilation panels and to the upper floor apartments through windows to reduce the overheating risk.

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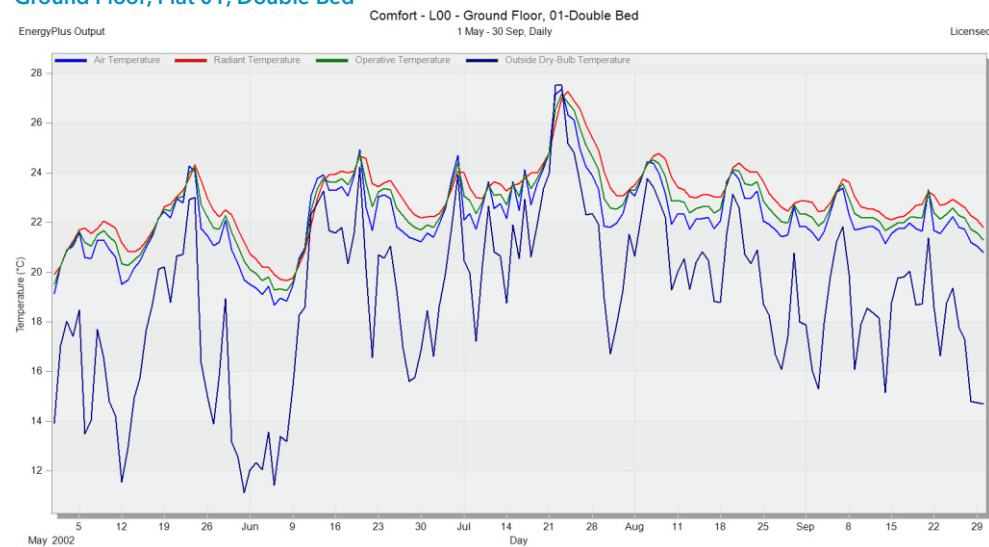
Summary of Results

Results

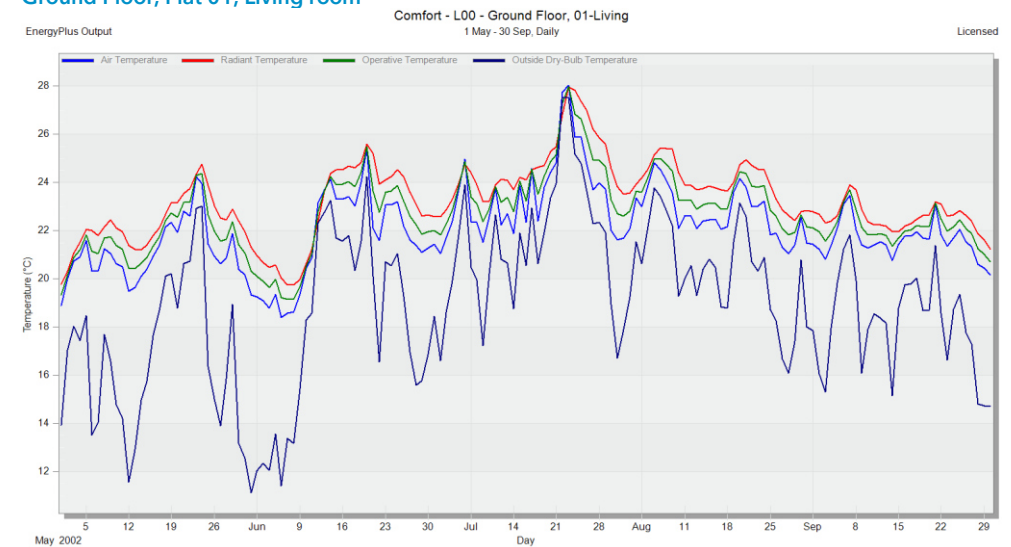
The graphs below present the outdoor, indoor mean air, indoor mean radiant and operative temperature for a sample of the worst performing rooms. A table confirming the results for all rooms is shown in Appendix C.

In summary, all rooms meet TM59 requirements.

Ground Floor, Flat 01, Double Bed



Ground Floor, Flat 01, Living room



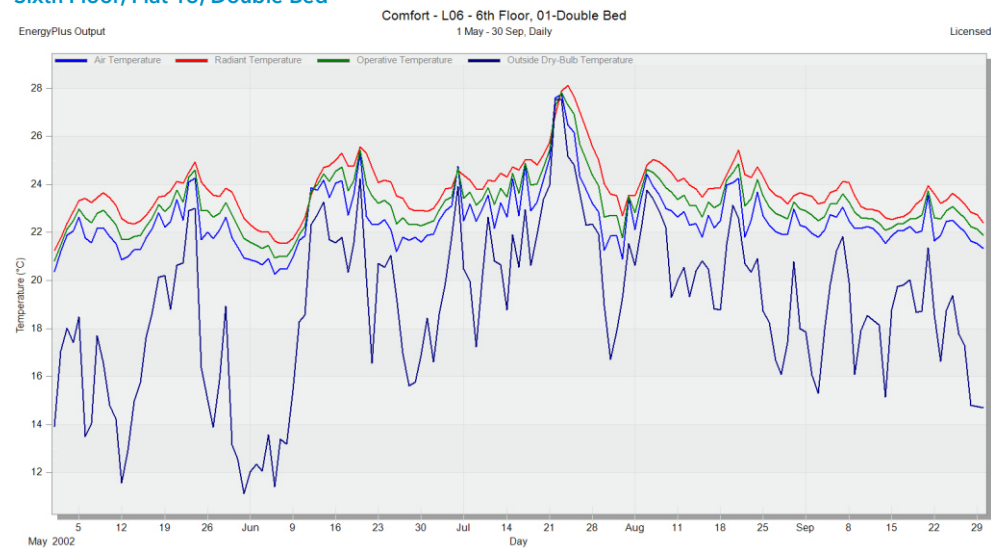
Overheating Analysis

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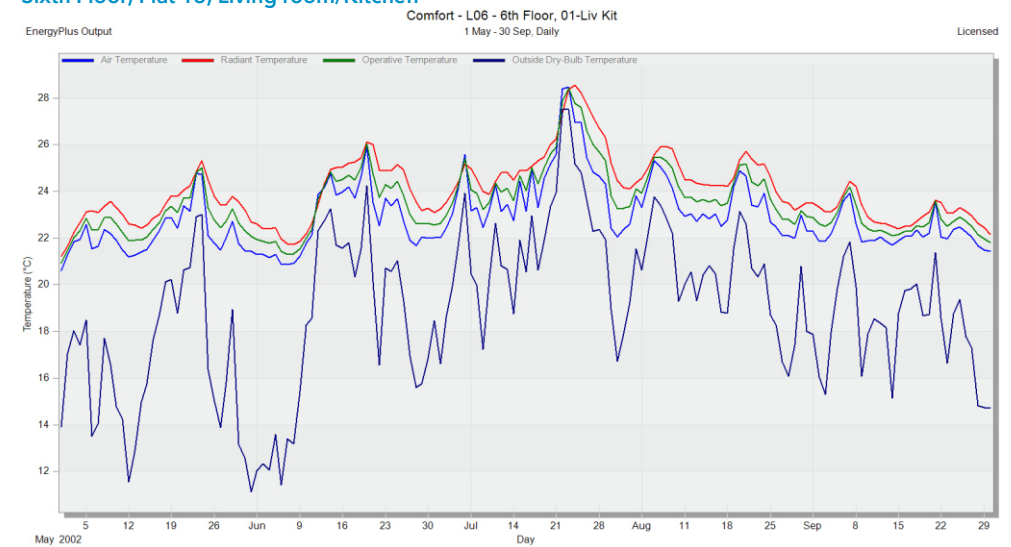
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Sixth Floor, Flat 15, Double Bed



Sixth Floor, Flat 15, Living room/Kitchen



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Conclusions

The proposal has responded to Part O and CIBSE TM59 requirements relating to overheating. The report has set out how the occupied spaces perform against strict thermal comfort standards for overheating. The scheme has implemented passive design measures and the modelling results indicate that the scheme is compliant with the overheating requirements as set out in Part O and CIBSE TM59 for the current weather file (2020 DSY1).

The proposal maximises passive design measures by responding to the local context in the following ways:

- Energy efficient lighting and appliances have been recommended to reduce internal heat gains.
- The building fabric will be insulated over and above the standards set out by Building Regulations and reduced solar gains from a glazing solar factor of 0.45 will help to keep heat out of the building.
- Fixed shading and overhangs as per architectural drawings.
- Mechanical ventilation with heat recovery and summer bypass to provide fresh air and purging of heat.
- Natural ventilation to supply fresh air to the building through openable windows including night-time (as per ventilation rates section of this report).

The overheating risk has also been investigated for 2020s DSY2 and DSY3.

- All habitable rooms (living rooms and bedrooms) meet criterion 1 of CIBSE TM59 related to the occupied hours overheating.
- All communal corridors meet criterion 3 of CIBSE TM59 for DSY2 but some marginally fail for DSY3.
- Criterion 2 is assessing the night-time overheating in bedrooms against a fixed threshold of 26°C. All bedrooms (representing 52.1% of the assessed rooms) have more than 32 hours above 26°C. Further measures were investigated such as decreasing the g-value to 0.20 and adding fixed external shading to limit solar gains during daytime and thus avoid starting the night with elevated temperatures. However, due to the nature of the overheating (that is occurring during the night) and the restrictions on opening windows at night from Part O (imposing for the windows to be modelled as closed at night if the internal temperature exceeds 23°C at 11pm), these measures will not be enough to reduce significantly the overheating hours at night (see Appendix D). Another measure would be to increase the ventilation rate through larger openable areas, but this isn't possible due to privacy, security and acoustic issues.
- It should be noted that all habitable rooms meet criterion 1 (day-time) for DSY2 and DSY3 so this should be acceptable.

Note that the analysis was performed assuming that opening windows were controlled based on the level of occupancy and the operative indoor temperature of the space. To achieve the thermal comfort levels shown in this report the level of occupant control for the opening windows would need to be optimum i.e., fully responsive to indoor temperature.

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Appendix A

Appendix A

Appendix A - Heat gain Profile

Number of people	Description	Peak load (W)		Period																							
		Sensible	Latent	Hour-ending																							
				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
				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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1-bed: 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-bed: 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-bed: 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-bed: 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-bed: 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-bed: 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-bed: 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-bed: 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-bed: 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	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	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	1	1	1	1	1	1	0	

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Appendix B

Appendix B

Appendix B – Compliance checklist in line with Part O

Part 1 – Building details and declarations

1.1 Building and site details	
Residential building name/number	Land adjacent to Wat Tyler House
Street	Boyton Road
Town	Hornsey, London
County	Greater London
Postcode	N8 7AU
Proposed building use/type of building	Residential
Are there any security, noise or pollution issues?	No
1.2 Designer's details	
Designer's name	Kiran Curtis
Company	KC+A architects
Address line 1	Kemp House 152 -
Address line 2	160 City Road
Postcode	London EC1V 2NX
Telephone number	+44 (0)20 7336 0999
Email address	kiran@kcaarchitects.co.uk

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Part 2b – Dynamic thermal modelling method

2b.1 Modelling details	
Dynamic software name and version	Design Builder v7.1.0.090
Weather file location used, including any additional, more extreme weather files	London_LWC_DSY1_2020High50 London_LWC_DSY2_2020High50 London_LWC_DSY3_2020High50
Number of sample units modelled, including an explanation of why the size/selection has been chosen	15 flats (whole scheme)
2b.2 Modelled occupancy	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?(1)	Yes
Details of the occupancy profiles used	As per CIBSE TM59, See Appendix A
Details of the equipment profiles used	As per CIBSE TM59, See Appendix A
Details of the opening profiles used	Ground floor: ON 24/7 for secured ventilation panels and ON during the day only (8-11am) for windows First floor and above: ON 24/7
2b.3 Modelled overheating mitigation strategy	
Free areas	60% (mostly)
Infiltration and mechanical flow rates	Infiltration: 3 m ³ /hm ² at 50 Pa Mechanical ventilation: 10l/s/person and 0.3 l/s/m ²
Window g-value	0.45
Shading strategy	External louvres on the ground floor, Overhangs, side fins for the floors above
Mechanical cooling	No

2b.4 Modelling results	
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6?	Yes
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	Limiting solar gains by fixed shading devices (overhangs, balconies, fins and external louvres on the ground floor) and glazing design (g-value of 0.45). Removing excess heat by natural ventilation through openable windows including night-time through ventilation panels, and mechanical ventilation
2b.5 Thermal modeller's declaration	
Has the building construction proposal been modelled accurately?	Yes
Thermal modeller's name	Agathe Revil
Thermal modeller's organisation	Eight Versa
Thermal modeller's signature	AR
Registration number (if applicable)	N/A
Date of design	13/06/2022

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Appendix C

Appendix C
Appendix C – Results tables

Appendix C - Results

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Block / Floor / Room / Unit	DSY1				DSY2				DSY3			
	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance
Ground floor - 01 DoubleBed	0.0	18	N/A	Pass	0.5	64	N/A	Fail	0.0	72	N/A	Fail
Ground floor - 01 Kitchen	0.0	N/A	N/A	Pass	1.1	N/A	N/A	Pass	0.9	N/A	N/A	Pass
Ground floor - 01 Living	0.2	N/A	N/A	Pass	1.1	N/A	N/A	Pass	1.0	N/A	N/A	Pass
Ground floor - 01 SingleBed1	0.0	18	N/A	Pass	0.5	64	N/A	Fail	0.1	73	N/A	Fail
Ground floor - 01 SingleBed2	0.0	17	N/A	Pass	0.2	53	N/A	Fail	0.0	50	N/A	Fail
Ground floor - 02 DoubleBed	0.0	25	N/A	Pass	0.4	71	N/A	Fail	0.0	88	N/A	Fail
Ground floor - 02 LivKit	0.1	N/A	N/A	Pass	1.0	N/A	N/A	Pass	0.8	N/A	N/A	Pass
First floor - 01 DoubleBed1	0.0	24	N/A	Pass	0.3	59	N/A	Fail	0.0	69	N/A	Fail
First floor - 01 DoubleBed2	0.0	29	N/A	Pass	0.2	62	N/A	Fail	0.1	52	N/A	Fail
First floor - 01 LivKit	0.3	N/A	N/A	Pass	1.3	N/A	N/A	Pass	1.6	N/A	N/A	Pass
First floor - 02 DoubleBed	0.0	19	N/A	Pass	0.5	61	N/A	Fail	0.0	67	N/A	Fail
First floor - 02 LivKit	0.3	N/A	N/A	Pass	1.2	N/A	N/A	Pass	1.6	N/A	N/A	Pass
First floor - 03 DoubleBed	0.0	16	N/A	Pass	0.5	57	N/A	Fail	0.1	56	N/A	Fail
First floor - 03 LivKit	0.2	N/A	N/A	Pass	1.1	N/A	N/A	Pass	1.4	N/A	N/A	Pass
First floor - 03 SingleBed	0.0	18	N/A	Pass	0.6	64	N/A	Fail	0.5	78	N/A	Fail

Appendix C - Results

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Block / Floor / Room / Unit	DSY1				DSY2				DSY3			
	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance
Second floor - 01 DoubleBed1	0.0	25	N/A	Pass	0.3	58	N/A	Fail	0.0	70	N/A	Fail
Second floor - 01 DoubleBed2	0.0	29	N/A	Pass	0.3	61	N/A	Fail	0.1	51	N/A	Fail
Second floor - 01 LivKit	0.3	N/A	N/A	Pass	1.3	N/A	N/A	Pass	1.8	N/A	N/A	Pass
Second floor - 02 DoubleBed	0.0	19	N/A	Pass	0.6	61	N/A	Fail	0.1	66	N/A	Fail
Second floor - 02 LivKit	0.3	N/A	N/A	Pass	1.3	N/A	N/A	Pass	1.9	N/A	N/A	Pass
Second floor - 03 DoubleBed	0.0	18	N/A	Pass	0.6	58	N/A	Fail	0.2	57	N/A	Fail
Second floor - 03 LivKit	0.3	N/A	N/A	Pass	1.2	N/A	N/A	Pass	1.5	N/A	N/A	Pass
Second floor - 03 SingleBed	0.0	21	N/A	Pass	0.7	65	N/A	Fail	0.7	80	N/A	Fail
Third floor - 01 DoubleBed1	0.0	20	N/A	Pass	0.3	57	N/A	Fail	0.0	70	N/A	Fail
Third floor - 01 DoubleBed2	0.0	30	N/A	Pass	0.3	60	N/A	Fail	0.1	49	N/A	Fail
Third floor - 01 LivKit	0.3	N/A	N/A	Pass	1.3	N/A	N/A	Pass	1.7	N/A	N/A	Pass
Third floor - 02 DoubleBed	0.0	19	N/A	Pass	0.6	62	N/A	Fail	0.2	66	N/A	Fail
Third floor - 02 LivKit	0.4	N/A	N/A	Pass	1.4	N/A	N/A	Pass	2.0	N/A	N/A	Pass
Third floor - 03 DoubleBed	0.0	18	N/A	Pass	0.6	58	N/A	Fail	0.2	57	N/A	Fail
Third floor - 03 LivKit	0.3	N/A	N/A	Pass	1.2	N/A	N/A	Pass	1.6	N/A	N/A	Pass
Third floor - 03 SingleBed	0.0	21	N/A	Pass	0.7	65	N/A	Fail	0.7	80	N/A	Fail
Fourth floor - 01 DoubleBed	0.0	20	N/A	Pass	0.6	63	N/A	Fail	0.3	69	N/A	Fail
Fourth floor - 01 LivKit	0.4	N/A	N/A	Pass	1.4	N/A	N/A	Pass	2.0	N/A	N/A	Pass
Fourth floor - 02 DoubleBed	0.0	16	N/A	Pass	0.6	56	N/A	Fail	0.2	56	N/A	Fail
Fourth floor - 02 LivKit	0.3	N/A	N/A	Pass	1.1	N/A	N/A	Pass	1.4	N/A	N/A	Pass
Fourth floor - 02 SingleBed	0.0	19	N/A	Pass	0.7	64	N/A	Fail	0.7	80	N/A	Fail

Appendix C - Results

Overheating Analysis

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Block / Floor / Room / Unit	DSY1				DSY2				DSY3			
	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance
Fifth floor - 01 DoubleBed	0.0	19	N/A	Pass	0.6	62	N/A	Fail	0.5	63	N/A	Fail
Fifth floor - 01 KitchLiving	0.3	N/A	N/A	Pass	1.4	N/A	N/A	Pass	1.9	N/A	N/A	Pass
Sixth floor - 01 DoubleBed	0.0	21	N/A	Pass	0.7	72	N/A	Fail	0.5	88	N/A	Fail
Sixth floor - 01 LivKit	0.2	N/A	N/A	Pass	1.1	N/A	N/A	Pass	1.3	N/A	N/A	Pass
Sixth floor - 01 SingleBed	0.0	18	N/A	Pass	0.6	56	N/A	Fail	0.3	56	N/A	Fail
Ground floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	2	Pass	N/A	N/A	1	Pass
First floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	0	Pass	N/A	N/A	0	Pass
Second floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	0	Pass	N/A	N/A	0	Pass
Third floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	1	Pass	N/A	N/A	1	Pass
Fourth floor - Communal Corridor	N/A	N/A	1	Pass	N/A	N/A	2	Pass	N/A	N/A	3	Fail
Fifth floor - Communal Corridor	N/A	N/A	1	Pass	N/A	N/A	3	Pass	N/A	N/A	4	Fail
Sixth floor - Communal Corridor	N/A	N/A	1	Pass	N/A	N/A	3	Pass	N/A	N/A	4	Fail
Total Rooms	48				48				48			
Pass	48			100.0%	23			47.9%	20			41.7%
Fail	0			0.0%	25			52.1%	28			58.3%

Overheating Analysis

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Appendix D

Appendix D

Appendix D - Results tables - Mitigation measures for DSY2 and DSY3

Appendix D - Results

Overheating Analysis

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Block / Floor / Room / Unit	DSY2				DSY3			
	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance
Ground floor - 01 DoubleBed	0.4	60	N/A	Fail	0.0	63	N/A	Fail
Ground floor - 01 Kitchen	1.0	N/A	N/A	Pass	0.2	N/A	N/A	Pass
Ground floor - 01 Living	0.9	N/A	N/A	Pass	0.4	N/A	N/A	Pass
Ground floor - 01 SingleBed1	0.4	60	N/A	Fail	0.0	62	N/A	Fail
Ground floor - 01 SingleBed2	0.2	50	N/A	Fail	0.0	46	N/A	Fail
Ground floor - 02 DoubleBed	0.3	67	N/A	Fail	0.0	77	N/A	Fail
Ground floor - 02 LivKit	0.8	N/A	N/A	Pass	0.1	N/A	N/A	Pass
First floor - 01 DoubleBed1	0.2	56	N/A	Fail	0.0	63	N/A	Fail
First floor - 01 DoubleBed2	0.2	58	N/A	Fail	0.0	44	N/A	Fail
First floor - 01 LivKit	1.1	N/A	N/A	Pass	0.7	N/A	N/A	Pass
First floor - 02 DoubleBed	0.5	55	N/A	Fail	0.0	57	N/A	Fail
First floor - 02 LivKit	1.1	N/A	N/A	Pass	0.5	N/A	N/A	Pass
First floor - 03 DoubleBed	0.4	53	N/A	Fail	0.0	47	N/A	Fail
First floor - 03 LivKit	1.0	N/A	N/A	Pass	0.5	N/A	N/A	Pass
First floor - 03 SingleBed	0.6	55	N/A	Fail	0.2	60	N/A	Fail

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Block / Floor / Room / Unit	DSY2				DSY3			
	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance
Second floor - 01 DoubleBed1	0.3	56	N/A	Fail	0.0	64	N/A	Fail
Second floor - 01 DoubleBed2	0.2	58	N/A	Fail	0.0	42	N/A	Fail
Second floor - 01 LivKit	1.1	N/A	N/A	Pass	0.9	N/A	N/A	Pass
Second floor - 02 DoubleBed	0.5	54	N/A	Fail	0.0	55	N/A	Fail
Second floor - 02 LivKit	1.1	N/A	N/A	Pass	0.8	N/A	N/A	Pass
Second floor - 03 DoubleBed	0.5	53	N/A	Fail	0.0	50	N/A	Fail
Second floor - 03 LivKit	1.1	N/A	N/A	Pass	0.7	N/A	N/A	Pass
Second floor - 03 SingleBed	0.6	58	N/A	Fail	0.3	65	N/A	Fail
Third floor - 01 DoubleBed1	0.3	53	N/A	Fail	0.0	61	N/A	Fail
Third floor - 01 DoubleBed2	0.2	56	N/A	Fail	0.0	41	N/A	Fail
Third floor - 01 LivKit	1.1	N/A	N/A	Pass	0.8	N/A	N/A	Pass
Third floor - 02 DoubleBed	0.5	54	N/A	Fail	0.0	54	N/A	Fail
Third floor - 02 LivKit	1.1	N/A	N/A	Pass	0.9	N/A	N/A	Pass
Third floor - 03 DoubleBed	0.5	53	N/A	Fail	0.0	49	N/A	Fail
Third floor - 03 LivKit	1.1	N/A	N/A	Pass	0.8	N/A	N/A	Pass
Third floor - 03 SingleBed	0.6	57	N/A	Fail	0.3	66	N/A	Fail
Fourth floor - 01 DoubleBed	0.5	54	N/A	Fail	0.0	54	N/A	Fail
Fourth floor - 01 LivKit	1.1	N/A	N/A	Pass	0.9	N/A	N/A	Pass
Fourth floor - 02 DoubleBed	0.5	52	N/A	Fail	0.0	47	N/A	Fail
Fourth floor - 02 LivKit	1.1	N/A	N/A	Pass	0.7	N/A	N/A	Pass
Fourth floor - 02 SingleBed	0.6	55	N/A	Fail	0.2	64	N/A	Fail

Appendix D - Results

Overheating Analysis

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Block / Floor / Room / Unit	DSY2				DSY3			
	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance	Criterion 1 (%)	Criterion 2 (hr)	Criterion 3 (%)	Compliance
Fifth floor - 01 DoubleBed	0.6	53	N/A	Fail	0.1	50	N/A	Fail
Fifth floor - 01 KitchLiving	1.1	N/A	N/A	Pass	0.8	N/A	N/A	Pass
Sixth floor - 01 DoubleBed	0.6	59	N/A	Fail	0.1	66	N/A	Fail
Sixth floor - 01 LivKit	1.0	N/A	N/A	Pass	0.4	N/A	N/A	Pass
Sixth floor - 01 SingleBed	0.6	50	N/A	Fail	0.0	46	N/A	Fail
Ground floor - Communal Corridor	N/A	N/A	2	Pass	N/A	N/A	1	Pass
First floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	0	Pass
Second floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	0	Pass
Third floor - Communal Corridor	N/A	N/A	0	Pass	N/A	N/A	0	Pass
Fourth floor - Communal Corridor	N/A	N/A	2	Pass	N/A	N/A	2	Pass
Fifth floor - Communal Corridor	N/A	N/A	2	Pass	N/A	N/A	3	Pass
Sixth floor - Communal Corridor	N/A	N/A	2	Pass	N/A	N/A	2	Pass
Total Rooms	48				48			
Pass	23			47.9%	23			47.9%
Fail	25			52.1%	25			52.1%