Overheating Assessment

Stable Block

Harefield Grove, Hillingdon, London

Prepared by: Stroma Built Environment
On Behalf of: Comer Homes Group
01/09/2023
Ref OPP-089359-OHA-V1

Executive Summary

This report outlines the results of the dynamic thermal modelling assessment undertaken for all 29 apartments at the proposed Stable Block, Harefield Grove. All apartments have been selected on the basis of ensuring full representation of the site, rather than only the worst case units. This is to ensure that the assessment is representative of the building as a whole.

The simulated adopted overheating strategy shows that the design shall result in compliant levels of thermal comfort throughout the scheme. Large openings, solar control glass, overhanging balconies and secure louvred shutters are all key aspects of why compliance is achieved.

It must be understood that the window design had not been finalised at the time of drafting of this report. Therefore, the window opening proportions have been assumed, based on conversation with the architect and client. Also assumed are the technical specifications of the security louvred shutters, to be fitted to all windows accessible from the outside, in order to allow secure night ventilation. All assumed parameters are stated clearly within the report, and the equivalent areas of opening must be met or exceeded within the design in order to ensure validity of this assessment. The assumptions and parameters used can be found in the relevant sections of the report.

In line with the GLA cooling hierarchy, the adopted overheating strategy has prioritised passive measures, and therefore active cooling is not proposed.

From the simulations undertaken, it is concluded that the current design, as outlined within this report, is compliant with all regulatory and planning requirements with regard to mitigating overheating risk. Including but not limited to, the Part O requirements of the Building Regulations, and cooling hierarchy and assessment guidance of the GLA and London Borough of Hillingdon.

Contents

Introduction

This technical analysis has been prepared for Comer Homes Group by Stroma Built Environment, a construction consultancy specialising in sustainability, energy conservation and the application of renewable energy technologies.

The purpose of this report is to assess whether the apartments within the proposed design are likely to suffer from an excessive risk of summer overheating in the context of current guidance. To assess this risk, all apartments have been modelled and run through a dynamic thermal simulation, evaluating the performance of the building over the course of a hot year.

The primary regulation relevant to this site is the recent Part O:Overheating of the building regulations. However, additional requirements also apply with regard to the Local and London Plan Planning Policies. The relevant regulations and guidelines are explained in further detail in the relevant section of the report.

The thermal model created for the assessment has been produced in line with industry guidelines (CIBSE AM11) and the simulation was carried out using the "Integrated Environmental Solutions: Virtual Environment" (IES 'VE') 2023 software suite.

IES has been used to model the geometry of the site, and to simulate the internal environment of the buildings, the solar gains and the ventilation. The air movement portion of the analysis does not extend to full CFD (computational fluid dynamics) modelling which is beyond the scope of the software and this report.

Where specific performance and other data was not available due to the stage of design, default figures and reasonable assumptions have been used and detailed within this report.

Requirements & Calculation Methodology

Building Regulations Part O: Overheating (2021)

The current overheating criteria for dwellings are found within the Building Regulations Part O:2021, which identifies two methods to assess dwellings for overheating. This document is undertaken as an analysis to demonstrate compliance via Section 2: Dynamic Simulation Modelling.

The Part O criteria are based on guidance in the UK industry wide standard document 'CIBSE TM59: Design Methodology for the assessment of overheating in homes' and supplemented by methodology within 'CIBSE TM52: The Limits of Thermal Comfort', and key modelling parameters stipulated by within the Approved Document O (ADO) section 3.

CIBSE TM59 was published to specifically address overheating risk in dwellings, as opposed to TM52 which was developed to address thermal comfort in workplaces. The same underlying calculation methods of TM52 are used, but the criteria are superseded with standards deemed more relevant to residential occupation.

The methodology defined is based on the theory of adaptive comfort. This states that the acceptable temperature for occupants in a space "tracks" the mean indoor temperature over a preceding period. Due to the correlation between indoor and outdoor temperature in free-running buildings, this means that comfort temperature also varies with outdoor temperature. Technical details of the calculation methodology, including the equations used to determine the running mean and maximum acceptable temperatures, can be found within CIBSE TM52

CIBSE TM59 lays down different criteria for naturally and mechanically ventilated dwellings.

Naturally Ventilated Homes	Mechanically Ventilated Homes
Criterion 1 – Hours of Exceedance (He) (Applicable to all habitable spaces)	**Criterion 1 – Fixed Temperature Method (Applicable to all habitable spaces)**
The number of hours the room is deemed to be in an overheating condition should not exceed 3% of total hours between May-September	All occupied spaces should not exceed an operative temperature of 26°C for more than 3% of the annual occupied hours.
Criterion 2 – Overnight Comfort (Applicable to bedrooms only)	
Temperature in bedrooms between 22.00-07-00 should not exceed 26°C for more than 33 hours a year	

Section 3 of Part O also stipulates that the overheating strategy must be usable, and therefore outlines key simulation parameters that must be used, with regard to noise, pollution and security, as well as protection from falling and entrapment. Where applicable, these have been referenced later in the report.

London Plan Policy SI 4: Managing Heat Risk

The London Plan requires major development to minimise adverse impacts on the urban heat island effect, citing the below 'Cooling Hierarchy'

Step	Action
1	Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure. It is also expected that external shading will form part of major proposals.
2	Minimise internal heat generation through energy efficient design: For example, heat distribution infrastructure within buildings should be designed to minimise pipe lengths, particularly lateral pipework in corridors of apartment blocks, and adopting pipe configurations which minimise heat loss e.g. twin pipes.
3	Manage the heat within the building through exposed internal thermal mass and high ceilings: Increasing the amount of exposed thermal mass can help to absorb excess heat within the building. Efficient thermal mass should be coupled with night time purge ventilation.
4	Provide passive ventilation: For example, through the use of openable windows, shallow floorplates, dual aspect units or designing in the 'stack effect' where possible.
5	Provide mechanical ventilation: Mechanical ventilation can be used to make use of 'free cooling' where the outside air temperature is below that in the building during summer months. This will require a by-pass on the heat recovery system for summer mode operation.
6	Provide active cooling systems: The increased use of air conditioning systems is generally not supported, as these have significant energy requirements and, under conventional operation, expel hot air, thereby adding to the urban heat island effect. However, once passive measures have been prioritised if there is still a need for active cooling systems, such as air conditioning systems, these should be designed in a very efficient way and should aim to reuse the waste heat they produce.

The London Plan & London Borough of Hillingdon guidance states that an overheating assessment should be undertaken in line with CIBSE TM59, which is the same requirement as the regulatory Part O Assessment. Therefore, only one set of calculations has been provided in order to fulfil both sets of requirements.

Overheating Risk in Communal Corridors – CIBSE TM59: 2017

CIBSE TM59 : 2017 provides a methodology and suggested criteria for assessing residential communal corridors for overheating risk.

The suggested criteria is as follows:

a) Criteria 1 – number of hours operative temperature exceeds 28°C

If an operative temperature of 28°C is exceeded for more than 3% of the total annual hours, then this should be identified as a significant risk within the report.

Development Proposals

Development Overview

The development site is located at Harefield Grove, Hillingdon.

The proposed development comprises 3 distinct areas. The refurbishment of an existing mansion house to provide 6 apartments. The erection of a new apartment 'stable block' to provide 29 apartments and 4 new detached homes through a mixture of new build and conversions.

The overheating requirements of Part O of the Building regulations applies only to new-build dwellings. This report relates only the Stable Block (29 apartments). All new build dwellings will be expected to pass the Part O Building Regulations either through the Simplified Method or Dynamic Simulation Modelling.

Arial snapshot of Stable Block.

Adopted Conditioning Strategy

The cooling strategy to be employed shall be natural cooling via openable windows.

Part O of the Building Regulations places major emphasis on ensuring that the overheating strategy is usable. To this end, restrictions on window openings are mandated, based on numerous factors such as noise levels, air quality, and whether or not the windows can be left open securely at night. Noise and air quality are not major concerns at the site location. However, many apartments (eg ground floors) have windows that are easily accessible from the outside, and therefore, if security devices were not installed, these windows would be prohibited from opening during the overnight period.

Therefore, the adopted strategy is proposing louvred shutters to all windows that are accessible from the outside. These shutters shall be lockable in order to allow secure operation of the window.

The technical design of the windows and shutters has not yet been undertaken. Therefore, assumptions have been used within this report that must be confirmed during the detailed design. Should the detailed design significantly differ from the assumptions here, it would be recommended for the overheating assessment to be recommissioned.

Basis of Assessment

In accordance with current GLA guidance, and Approved Document O of the Building Regulations, the basis of assessment and any assumptions made are detailed herewith.

The assessment has been undertaken on the basis of a natural cooling strategy, and therefore utilises the natural cooling criteria of TM59. Window restrictions have been made per the requirements of the Part O methodology and guidance, as as a regulatory requirement, this is deemed the highest priority standard.

Analysis Software

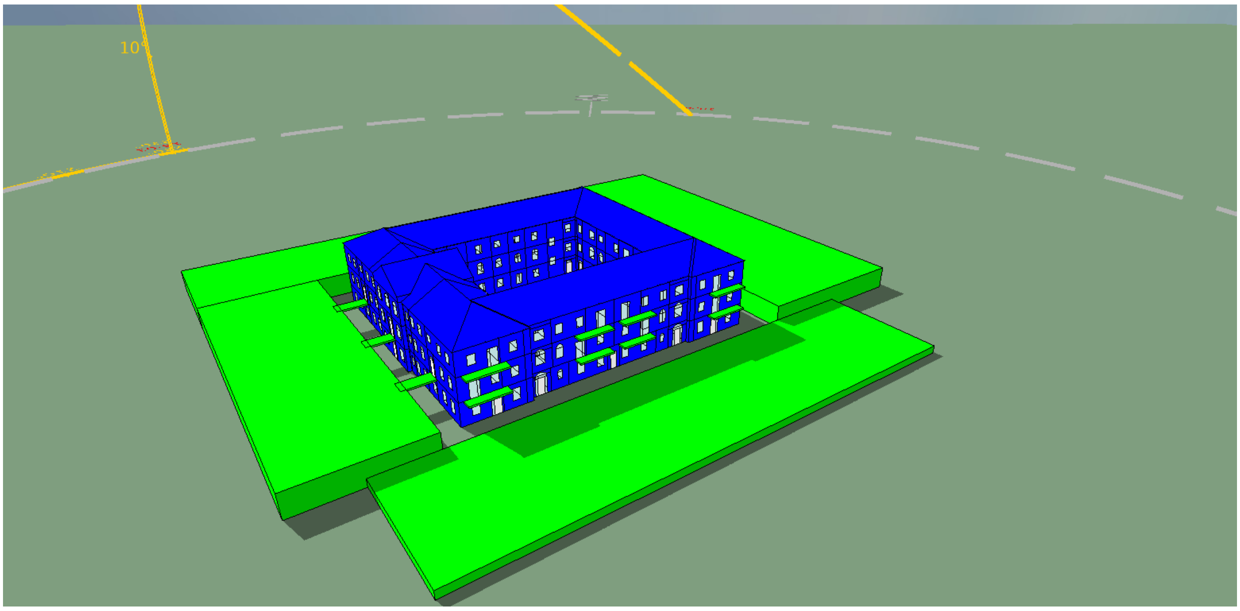
This analysis has been undertaken using Government approved Virtual Environment software by IES (IES-VE), which provides full dynamic analysis against the relevant weather data for the location.

A 3-dimenstion model has been constructed in accordance with CIBSE AM11 using the ModelIT model and architectural CAD drawings. A detailed solar calculation has been undertaken using IES-Suncast, and ventilation via wind pressure and buoyancy is calculated using bulk airflow analysis module IES-MacroFlo.

All modelling has been undertaken by an accredited level 5 Energy Assessor and CIBSE Low Carbon Consultant.

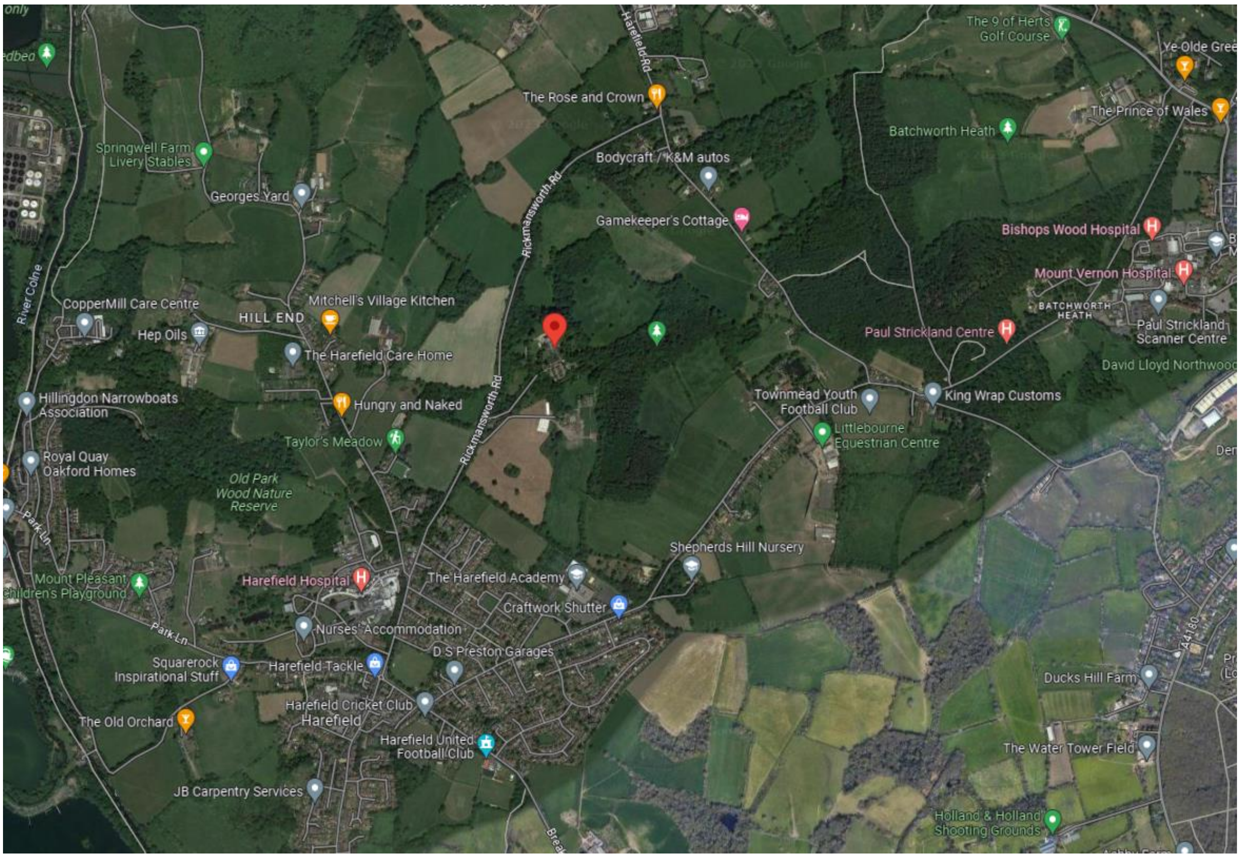
In order to conclusively evaluate the development, all apartments have been selected for assessment via the TM59 methodology.

The following images show the model as constructed within the Virtual Environment (VE). In addition to the apartments, the core areas have also been included, per the guidance within CIBSE:TM59



Site Location and Weather Data

The development is located at Harefield Grove, Hillingdon



In accordance with CIBSE TM49 guidance; given the rural/peri-urban surroundings, the dynamic simulation has been undertaken against the London Gatwick Weather Centre (LGW) 2020DSY1 High 50 Weather data.

Further details of the assigned weather data can be found within appendix A of this report.

Internal Gains and Occupancy Profiles

Internal gains and occupancy profiles are taken as the standard templates as defined within CIBSE TM59: 2017. Please refer to Appendix B for a summary of this input data.

Where a utilities cupboard is shown within the respective apartment layout, this is assumed to contain a district heating Heat Interface Unit (HIU) providing a constant gain of 78W to the space.

Distribution pipes within corridor voids have been simulated at 10W/m2 of corridor where pipes are expected to be present, owing to lack of information at this stage of design. This results in an approximate 100W constant gain into the ceiling void of each core space

Thermal Envelope

The thermal envelope specification analyzed is taken from the current energy strategy and Part L1 compliance calculations as outlined in the table below. The construction types have not been provided at this stage and are assumed

Element	Construction	g-value (EN:410)	U-value ($W/m^2.K$)	TM C_m ($kJ/m^2.K$)
External Walls	Traditional Masonry assumed	-	0.18	150 (Medium)
Intermediate Floors	200mm RC slab with 50mm levelling screed. Synthetic floor finish and suspended 12.5mm plasterboard ceiling.	-	N/A	50 (Light)
Internal Walls	12.5mm plasterboard on either side of metal or timber studwork.	-		9 (V.light)
Core Walls	Block Internal Partition/Party Walls			160 (Medium)
Roofs	Traditional Pitched roof with insulation at joists	-		80 (Light)
Glazing	High performance double glazing	0.50	1.40	

The glazing specification has been assigned globally. However, this can be rationalised, i.e. lesser solar control applied on the northern façade. It should also be noted that all specification is subject to review, and as such U-Values, & G-Values be investigated further throughout the design stage.

Shading Elements

The effects of solar shading on transmitted gain levels have been assessed dynamically using the Suncast software module.

External

Façade design incorporates several elements of external shading to reduce levels of transmitted solar gain including balcony projections and natural geography.

Glazing

Spectrally selective glass coatings limit the solar gain into the apartments by 'filtering' the solar radiation, whilst lowE coating will help reflect long wave IR radiation (heat) back into the apartments during the heating season. A glass solar g-value of 0.50 is applied to all glazing, which is a mild solar control which can keep visible light transmittances of up to 70%

Internal Blinds

In accordance with Part O of the Building Regulations, internal blinds or curtains have not been simulated within the model. It should be noted that in reality, residents shall be able to install blinds and/or curtains to further reduce overheating risk and cooling demand.

Internal Shutters

The design is to incorporate internal louvred shutters (venetian or similar) to all windows that are accessible from the outside. These shutters are to be lockable in the 'shutter closed, louvre slats fully open' position, in order to allow night ventilation to the space whilst preventing ingress from the outside for an opportunistic burglar.

The shutters have not yet been designed. Therefore, for the purposes of this assessment, when closed (with the louvres open) the shutters are simulated to restrict airflow through the window by 30% (70% free area)

Ventilation Strategy

Natural ventilation is provided to apartments via opening windows and shall comprise of casement windows and balcony doors which will be controlled manually. It must be noted that at this stage, no window design information has been provided, and therefore the opening areas are assumed.

All windows have been assumed a maximum equivalent opening area of 65% of their structural opening. It must be understood that the 'equivalent opening area' of a ventilator is a measure of its aerodynamic performance, and is not the same as 'free area'. However the window design is progressed, it should aim to exceed this equivalent area with the window fully open

Balcony doors have been modelled as side hung, and openable to 90°, resulting in an equivalent area of circa 80%. Doors are assumed always closed overnight.

In line with Part O, openable windows are simulated as open when the following conditions are satisfied:

- Room is occupied (as per TM59 standard occupancy)
- Internal Temp is greater than 22°C (Ramped opening 22-26 per TM59/Part O)
- The windows to remain open all night, (from 23:00-08:00), if the room temperature is above 23°C at 23:00. This is to reflect the fact that occupant will not usually get up during the night to open or close a window.

Part O also stipulates minimum guarding heights for upper floor windows, which is 1.1m with a +0mm/-100mm tolerance. For the purposes of this assessment, it is assumed that all upper floor windows shall be guarded to the heights required by Part O

Corridors shall also benefit from openable windows, to be operated manually by the residents. For the purposes of this assessment, core area windows are assumed openable to the same parameters as the apartment windows.

In addition to opening windows, mechanical ventilation with heat recovery shall also be provided to all apartments. Flow rates have not been designed at this stage, therefore this is set within the model as providing background ventilation in line with the requirements of Part F of the building regulations.

Results

Overview

The following simulation results outline the risk of summer time overheating against the CIBSE TM59 criteria and Part O of the Building Regulations.

Assessed rooms are the 'occupied spaces' and exclude bathrooms, circulation areas, utility areas, and storage cupboards etc. However, these areas are included within the model to account for the full geometry of each apartment and to represent internal heat transfer between rooms.

Summary Results

Criteria	Results Summary (# of Compliant Rooms	Results Summary (% of Compliant Rooms
Criterion 1 – Hours of Exceedance The number of hours the room is deemed to be in an overheating condition should not exceed 3% of total hours between May-September	84 of 84 Rooms	100%
Criterion 2 – Overnight Comfort Temperature in bedrooms between 22.00-07-00 should not exceed 26°C for more than 33 hours a year	55 of 55 Rooms	100%

The results show that in this scenario, all spaces would meet the Part O/Cibse TM59 / GLA thermal comfort criteria.

Communal Corridor Overheating Risk

Criteria	Results Summary (# of Compliant Rooms	Results Summary (% of Compliant Rooms
Criteria 1 –hours operative temperature exceeds 28°C If an operative temperature of 28°C is exceeded for more than 3% of the total annual hours, then this should be identified as a significant risk within the report.	12 of 12 Corridors	100%

All assessed corridors meet the recommended comfort levels, based on the ventilation and control assumptions noted in this report.

Conclusions

This report outlines the results of the dynamic thermal modelling assessment undertaken for the proposed Stable Block development.

The simulated adopted overheating strategy shows that the design shall result in compliant levels of thermal comfort throughout the scheme, based on the assumptions and specifications listed in this report.

The key measures allowing a pass of the methodology shall be maximizing the openable areas of glazing, and ensuring that the windows can be left open overnight to purge heat. Therefore, the assumptions made within this report with regard to the performance of the shutters and equivalent areas of window openings should be met or exceeded to ensure compliance.

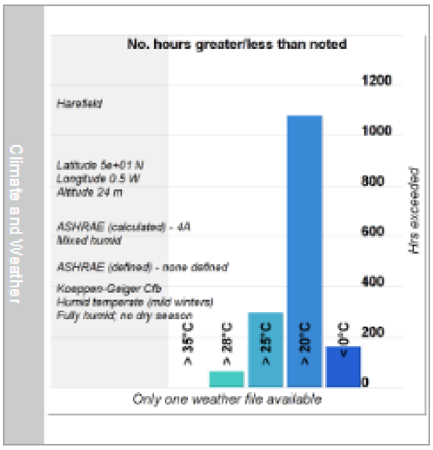
In line with the GLA cooling hierarchy, the adopted cooling strategy is wholly passive, and no mechanical cooling is proposed.

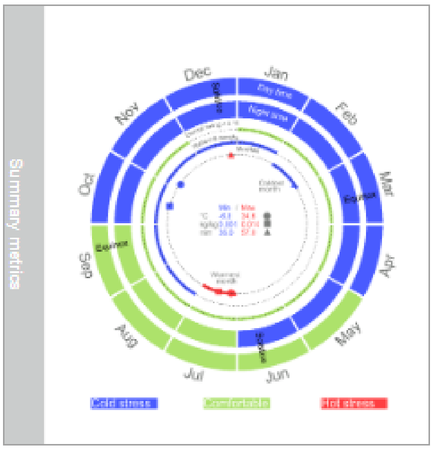
Appendix D contains the Part O declaration, which shall need to be completed by the building designer and submitted to Building Control pre-commencement.

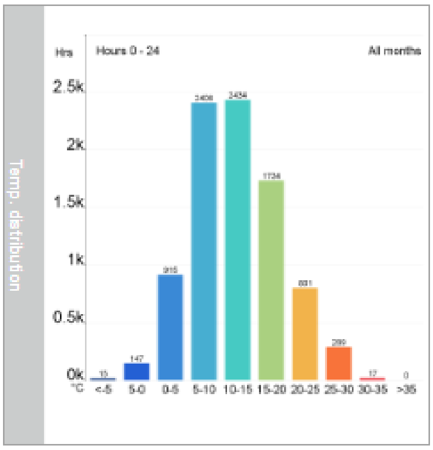
From the simulation undertaken, it is concluded that the current scheme can be compliant with all regulatory and planning requirements with regard to mitigative overheating risk. Including but not limited to the Part O requirements of the building regulations, and cooling hierarchy and assessment guidance of the GLA and London Borough of Hillingdon. Whilst the design is shown to be compliant, it must be understood that key parameters are assumed due to lack of available design information, and therefore must be confirmed and potentially re-assessed to ensure compliance.

Appendix A: Climate Data

Climate metrics







Harefield

ASHRAE 90.1[1] (calculated)	**4A**	**Mixed humid**
ASHRAE 90.1[1] (defined)	**none defined**	
Koeppen-Geiger[1]	**Cfb**	**Humid temperate (mild winters), Fully humid; no dry season, Warm summer (marine), Mild winters with heavy precipitation, warm/short/dry summers, on western continental coasts**

Chosen weather file is **London_GTW_DSY1_2020High50.epw**
Rainfall location: **London -Heathrow, United Kingdom**
Winter is potentially most dominant - the design must minimise heating energy.
Latitude is mid - solar radiation on south/east/west walls is significant. Solar radiation on roofs is significant.
Summer is warm. Summer also has a large diurnal range. Summer also has cool summer nights.
Winter is mild.
Winter prevailing winds typically from the north. Summer prevailing winds typically from the south. Wind patterns: Typically westerly winds.

Temperature[2]:

Warmest month Jul
Max annual temperature (Jul) 34.6 °C
Warmest six months Jul Aug Sep Jun May Oct
Coldest month Feb
Min annual temperature (Nov) -6.8 °C
Coldest six months Feb Jan Nov Dec Apr Mar
Number of months warmer than 10.0°C mean = 6

Diurnal temperature swing[3]:

0 months swing > 20 °C, of which **0** are in the warmest 6M
0 months swing 15 to 20 °C, of which **0** are in the warmest 6M
4 months swing 10 to 15 °C, of which **4** are in the warmest 6M
7 months swing 5 to 10 °C, of which **2** are in the warmest 6M
1 months swing < 5 °C

Moisture and humidity[4]:

Max. moisture content 0.014 kg/kg
Min. moisture content 0.001 kg/kg
Mean moisture content 0.007 kg/kg
Mean relative humidity 76.6 %

Wind[5]:

Annual mean speed 3.3 m/s
Annual mean direction E of N 242.3°

Precipitation[6]:

Annual rainfall 611.0 mm
Driest month Feb with 36.0 mm rainfall
Wettest month Dec with 57.0 mm rainfall
Wettest summer month Oct
Wettest winter month Dec
Driest summer month Jul
Driest winter month Feb
Wettest six months Dec Nov Oct Aug Sep Jan

Solar energy[7]:

Annual hourly mean global radiation(a) 123.6 W/m^2
Mean daily global radiation(b) 2955.6 Wh/m^2
Annual solar resource(c) 1082.4 kWh/m^2.yr
Annual mean cloud cover(d) 5.2 oktas

Degree days[8]:

HDD(18.3) = 2368.3
CDD(10.0) = 1303.9

The climate report provides the headlines you need to know about the weather file you have selected

1. The Ashrae 90.1 climate classes are based around the Koeppen-Geiger classification system, but provide better definition in temperate and maritime zones. See also Koeppen Geiger and Kottek, Greiser,Beck, Rudolf and Rubel. Both the climate zone defined by ASHRAE and the climate zone calculated from the assigned weather data are displayed. The analysis in this report is based on the calculated climate zone.

2. Note the coincidence of wet or dry seasons and warm or cold seasons e.g. Wet summers, dry summers, wet winters etc

3. A good diurnal swing (monthly mean of the daily swing) during the warmest months indicates the potential for passive night time cooling and the use of thermal mass

4. Moisture content the nominal comfort range is 0.004-0.012 kg/kg If moisture content is 0.020 kg/kg or above either all year or in summertime it is an issue. High humidity high temp. cause comfort stress.

5. Wind speeds:
less than 1.5 ms light and calm
1.5-8 ms breeze
8-14 ms strong breeze
greater than 14 ms gale and above

6. Typically what does annual rainfall mean:
Wet 1700mm
Temperate 500 to 1500mm
Dry 300mm
Desert 100mm

7. Globally what is the approximate range?
a. 100 to 250
b. 2000 to 6500
c. 800 to 2200
d. 1.5 to 8

8. Globally what is the range?
HDD 0 to 8000
CDD 0 to 6500

Appendix B: Occupancy & Gain Profiles

Table 2 Occupancy and equipment gain descriptions

Unit/ room type	Occupancy	Equipment load
Studio	2 people at 70% gains from 11 pm to 8 am 2 people at 100% gains from 8 am to 11 pm	Peak load of 450 W from 6 pm to 8 pm*. 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
1-bedroom apartment: living room	1 person at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
1-bedroom apartment: kitchen	1 person at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room	2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
2-bedroom apartment: kitchen	2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
3-bedroom apartment: kitchen	3 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm base load of 50 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gains in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom (too small to accommodate double bed)	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours
Communal corridors	Assumed to be zero	Pipework heat loss only; see section 3.1 above

* All times in GMT

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Appendix C: Full Results Tables

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K) (Max3%)	Criterion 2 (Bedroom Nights max 32)
00_01_B1	0.2	13
00_01_B2	0.1	19
00_01_B3	0.2	18
00_01_KDL	0.3	#N/A
00_02_B1	0.2	11
00_02_B2	0.1	19
00_02_KDL	0.8	#N/A
00_03_B1	0.2	17
00_03_B2	0.1	12
00_03_B3	0.1	16
00_03_KDL	0.6	#N/A
00_04_B1	0.2	13
00_04_B2	0.1	22
00_04_KDL	0.7	#N/A
00_05_B1	0.1	17
00_05_KDL	0.1	#N/A
00_06_B1	0.1	23
00_06_KDL	0.1	#N/A
00_07_B1	0.1	17
00_07_B2	0.3	10
00_07_KDL	0.2	#N/A
00_08_B1	0.3	17
00_08_B2	0.1	15
00_08_B3	0.2	21
00_08_KDL	0.6	#N/A
00_09_B1	0.1	15
00_09_B2	0.1	17
00_09_KDL	0.4	#N/A
01_11_B1	0.3	28
01_11_KDL	0.7	#N/A
01_12_B1	0.4	24
01_12_B2	0.2	24
01_12_KDL	1.1	#N/A
01_13_B1	0.4	26
01_13_B2	0.2	20
01_13_B3	0.2	25
01_13_KDL	0.9	#N/A
01_14_B1	0.4	24
01_14_B2	0.2	28
01_14_KDL	0.8	#N/A
01_15_B1	0.2	25
01_15_KDL	0.7	#N/A
01_16_B1	0.2	27
01_16_KDL	0.8	#N/A
01_17_B1	0.4	19
01_17_B2	0.4	14
01_17_KDL	0.6	#N/A
01_18_B1	0.4	25
01_18_B2	0.4	23
01_18_B3	0.5	29
01_18_KDL	0.9	#N/A
01_19_B1	0.2	22
01_19_B2	0.2	27
01_19_KDL	0.7	#N/A
01_20_B1	0.3	28
01_20_KDL	0.7	#N/A
01_21_B1	0.3	32
01_21_KDL	1	#N/A
01_22_B1	0.3	23
01_22_B2	0.2	25
01_22_KDL	1.2	#N/A
01_23_B1	0.4	26
01_23_B2	0.2	19
01_23_B3	0.2	26
01_23_KDL	0.9	#N/A
01_24_B1	0.4	23
01_24_B2	0.2	29

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K) (Max3%)	Criterion 2 (Bedroom Nights max 32)
01_24_KDL	1	#N/A
01_25_B1	0.2	28
01_25_KDL	1.3	#N/A
01_26_B1	0.2	30
01_26_KDL	1.3	#N/A
01_27_B1	0.4	18
01_27_B2	0.3	14
01_27_KDL	0.8	#N/A
01_28_B1	0.5	24
01_28_B2	0.3	23
01_28_B3	0.4	30
01_28_KDL	1	#N/A
01_29_B1	0.3	25
01_29_B2	0.2	29
01_29_KDL	0.6	#N/A
01_30_B1	0.3	32
01_30_KDL	1	#N/A

Communal Corridors

Space Name	Criteria 1 (%Hrs >28°C)
00_Core1	0.3
00_Core2	0
00_Core3	0
00_Core4	0.1
01_Core1	0.2
01_Core1	0.2
01_Core2	0.3
01_Core2	0.5
01_Core3	0.2
01_Core3	0.4
01_Core4	0
01_Core4	0

Appendix D: Part O Declaration

2b.1 Modelling details – Report Version OPP-089359-OHA-V1	
Dynamic software name and version	IES Virtual Environment V2023.1.0.0
Weather file location used, including any additional, more extreme weather files	LGW
Number of sample units modelled, including an explanation of why the selection has been chosen	100%
2b.2 Modelled Occupancy	
Details of the occupancy profiles used	See Appendix B
Details of the equipment profiles used	See Appendix B
Details of the opening profiles used	See 'Ventilation' Section
2b.3 Modelled Overheating Strategy	
Free areas	See 'Ventilation' Section
Infiltration and mechanical flow rates	See 'Ventilation' Section
Window g-value	See 'Building Fabric' Section
Shading strategy	See 'Shading' Section
Mechanical cooling	none
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 of ADO:2021)	Yes
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	See 'Conclusions'
2.b.5 Designers Declaration	
Has the building construction proposal been modelled accurately?	
Designer's Name	
Designer's Organisation	
Designers Signature	
Registration No (if Applicable)	
Date of Design	