

Former Filling Station, 76 Mayes Road, Wood Green, London N22

Overheating Risk Assessment

Issue for S106 and Discharge of Planning Condition 30(a)

Issue P1 – 01 February 2022

FORMER FILLING STATION, 76 MAYES ROAD, WOOD
GREEN, LONDON N22

OVERHEATING RISK ASSESSMENT

ISSUE FOR S106 AND DISCHARGE OF PLANNING
CONDITION 30(A)

Quality Assurance Page

Issue	Date	Prepared By	Checked By	Approved By	Remarks
P1	01/021/2022	Mr R Mercer	Mr R Denteh	Mr R Wilkes	Issue for S106 and discharge of planning condition 30(a)

Table of Contents

Executive Summary..... 1

1 Introduction 2

2 Policy and Guidance 3

2.1 The London Plan (2021) 3

2.2 Draft Energy Assessment Guidance (2020) 3

2.3 TM59 Design Methodology for the Assessment of Overheating Risk in Homes (2017) 3

2.4 TM52 The Limits of Thermal Comfort: Avoiding Overheating in European Buildings (2013) 3

2.5 Building Regulations 3

2.6 Building Regulations (Draft for Consultation) 3

3 Consented Overheating Assessment..... 4

3.1 Units Assessed 4

3.2 Summary of Results 6

4 Residential Units Assessed..... 7

5 Assessment Methodology 10

5.1 Reduction of Internal Overheating 10

5.2 Overheating Criteria 10

5.3 Weather Data 10

5.4 Model Inputs 10

6 Overheating Modelling Results..... 12

6.1 2020 Weather Scenario 12

6.2 2050 Weather Scenario 12

6.3 2080 Weather Scenario 13

6.4 Results Summary 14

6.5 Mitigation 14

Executive Summary

This Overheating Risk Assessment has been prepared by Meinhardt (UK) Ltd on behalf of Weston Homes and is submitted to comply with the requirements of the S106 Agreement and to discharge Planning Condition 30(a) for the proposed development at the Former Filling Station, 76 Mayes Road, Wood Green, London N22, which was granted planning permission in May 2021 under the reference HGY/2020/0795.

The purpose of this report is to demonstrate that the overheating risk for the final 'as designed' scheme has been assessed and reduced in accordance with the consented Overheating Assessment produced by JAW Sustainability Version 02 dated 9th March 2020 and Addendum (referred to as the "consented overheating assessment" throughout this report).

Reduction of Internal Overheating

The London Plan Policy SI 4 requires that major development proposals reduce the potential for internal overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

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

The main passive design elements of the development were assessed and set as part of the original application, but a further review of the cooling hierarchy has been carried out as part of this assessment, and where possible adjustments made to further reduce the risk of overheating, such as to internal layouts and mechanical ventilation 'boost' air volumes.

Overheating Criteria

The Chartered Institution of Building Services Engineers (CIBSE) has produced guidance on assessing and mitigating overheating risk in new developments. TM 59 Design Methodology for the Assessment of Overheating Risk in Homes should be used for residential developments.

For compliance with CIBSE TM 59, the modelled apartments must pass both of the following two criteria:

- a) For living rooms, kitchens 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. (CIBSE TM52 Criterion 1: Hours of exceedance).
- b) 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 annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

CIBSE TM 49 guidance and Design Summer Year (DSY) datasets should be used to ensure that all new development is designed for the climate it will experience over its design life.

Developments should be assessed using DSY1 for the 2020s, high emissions, 50% percentile scenario. It is expected that the CIBSE compliance criteria is met for the DSY1 weather scenario.

Additional testing should be undertaken using the 2020 versions of the following more extreme design weather years:

- DSY2 – 2003: a year with a very intense single warm spell.
- DSY3 – 1976: a year with a prolonged period of sustained warmth.

It is acknowledged that meeting the CIBSE compliance criteria is challenging for the DSY 2 & 3 weather files, so full compliance with CIBSE criteria is not expected.

Overheating Modelling Results

Dynamic overheating modelling has been carried out for the 'as designed' scheme using IES Virtual Environment software, for a sample of 28 apartments selected to replicate those considered in the consented overheating assessment.

Consented Overheating Assessment

A summary of the results of the consented overheating assessment (addendum) are shown below in Table 1. These results are without internal blinds and use the 2020 weather files only.

Weather file	DSY1		DSY2		DSY3	
Test criteria	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
Rooms pass	66 / 66	40 / 40	64 / 66	18 / 40	61 / 66	0 / 40
Rooms pass (%)	100%	100%	97%	45%	92.4%	0%

Table 1: Summary of overheating results for the consented scheme (2020 weather files, without blinds)

'As Designed' Overheating Assessment

A summary of the results of the 'as designed' overheating assessment for the proposed scheme are shown below in Table 2.

Internal blinds are not proposed in the 'as designed' scheme, so these results are also without internal blinds and use the 2020 weather files only, for direct comparison with the consented overheating assessment results in Table 1 above.

Weather file	DSY1		DSY2		DSY3	
Test criteria	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
Rooms pass	71 / 71	43 / 43	70 / 71	43 / 43	67 / 71	17 / 43
Rooms pass (%)	100%	100%	98.6%	100%	94.4%	39.5%

Table 2: Summary of overheating results for the 'as designed' scheme (2020 weather files, without blinds)

The CIBSE compliance criteria are met in all rooms modelled (for the 2020s DSY1 weather scenario) with natural ventilation via openable windows/doors and increased mechanical ventilation. Active cooling is therefore not proposed.

The CIBSE compliance criteria are not met in all rooms modelled (for the 2020s DSY2 and DSY3 weather scenarios), but the risk of overheating has been further reduced for the 'as designed' scheme over the consented scheme, with more rooms meeting the criteria with the DSY2 and DSY3 weather scenarios.

The assessment demonstrates that the risk of overheating has been reduced as far as practical.

1 Introduction

1.1 This Submission

This Overheating Risk Assessment has been prepared by Meinhardt (UK) Ltd on behalf of Weston Homes and is submitted to comply with the requirements of the S106 Agreement and to discharge Planning Condition 30(a) for the proposed development at the Former Filling Station, 76 Mayes Road, Wood Green, London N22, which was granted planning permission in May 2021 under the reference HGY/2020/0795.

The purpose of this report is to demonstrate that the overheating risk for the final ‘as designed’ scheme has been assessed and reduced in accordance with the consented Overheating Assessment produced by JAW Sustainability Version 02 dated 9th March 2020 and Addendum (referred to as the “consented overheating assessment” throughout this report).

1.2 Extant Planning Permission

Planning permission (ref: HGY/2020/0795) was granted in May 2021 for redevelopment of the site to provide a single building of between 4 and 9 storeys in height, comprising 75 residential units (C3) and 953 sqm of flexible commercial floorspace (Use Classes A1-A5, B1 and B8), with associated cycle parking, plant, refuse and recycling provision, landscaping and all necessary ancillary and enabling works.

This Overheating Risk Assessment is submitted to the London Borough of Haringey in order to comply with the requirements of the S106 Agreement detailed below.

“Energy Plan”	means a review of the Energy Strategy to be submitted to the Council by the Owner in accordance with this Agreement and containing information relation to the Development’s energy requirements and performance and how these will be met and shall comprise the following details: a) An updated overheating study and proposed future mitigation;
---------------	---

4.13	Energy Plan/Sustainability Review
4.13.1	Not to Implement unless and until the Owner has submitted to the Council the Energy Plan to be approved in writing by the Council (“the Approved Energy Plan ”) and in the event of any refusal by the Council to approve the Energy Plan to pay regard to the Council’s reasonable reasons for such refusal and to resubmit the Energy Plan as amended having regard to the Council’s reasonable reasons for refusal.

This Overheating Risk Assessment is also submitted to the London Borough of Haringey in order to discharge Planning Condition 30(a) detailed below.

This is a partial submission to demonstrate the updated modelling only. Further information in relation to sections (a)(i), (a)(ii), (a)(iii) and (b) will be submitted when available, prior to first occupation.

30.	PRIOR TO FIRST OCCUPATION: Overheating (a) Prior to first occupation of the residential element of the development, a revised Overheating Report for future weather files (2050s and 2080s) shall be submitted to and approved by the Local Planning Authority. This will be based on thermal dynamic modelling in line with CIBSE TM59, with TM49 weather files. This should include: i) A retrofit plan setting out how future overheating risk will be mitigated, confirming these measures can be incorporated into the design of the development, prioritising passive design measures. ii) A statement who will manage and own the overheating risk going forward. They should be named report so that if residents have an issue, they can be signposted to the responsible / liable party. iii) A copy of the home guide that sets out measures to mitigate any overheating, providing guidance on how to use the MVHR, how night-time heat purging works in combination with thermal mass, etc. (b) Prior to first occupation of the residential element of the development, overheating measures must be installed to reduce the risk of overheating in habitable rooms in line with the Caxton Road Overheating Assessment V02 prepared by JAW Sustainability (dated 9th March 2020): i) Internal blinds with a shading coefficient of 0.5 or better; ii) Glazing g-value of 0.40; iii) Window openings of 45 degrees or better; iv) MVHR with a summer bypass function.
-----	--

2 Policy and Guidance

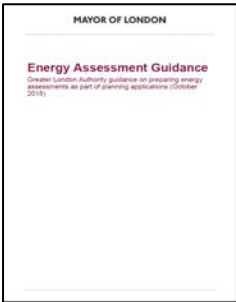
2.1 The London Plan (2021)



The London Plan 2021 is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor’s vision for Good Growth.

The Plan Is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital. Borough’s Local Plans must be in ‘general conformity’ with the London Plan, ensuring that the planning system for London operates in a joined-up way and reflects the overall strategy for how London can develop sustainably.

2.2 Draft Energy Assessment Guidance (2020)



This guidance document explains how to prepare an energy assessment to accompany strategic planning applications referred to the Mayor.

The purpose of an energy assessment is to demonstrate that the proposed climate change mitigation measures comply with London Plan energy policies, including the energy hierarchy. It also ensures energy remains an integral part of the development’s design and evolution.

2.3 TM59 Design Methodology for the Assessment of Overheating Risk in Homes (2017)



This is a standardised approach to predicting overheating risk for residential building designs (new-build or major refurbishment) using dynamic thermal analysis.

This methodology is intended for use by designers in order to influence building design for the better.

2.4 TM52 The Limits of Thermal Comfort: Avoiding Overheating in European Buildings (2013)



This document is intended to inform designers, developers and others responsible for defining the indoor environment in buildings.

It outlines the approach adopted by the CIBSE Overheating Task Force, an approach based on European Standard BS EN 15251 (BSI, 2007).

Criteria are suggested that will enable the recommendations of the standard to be applied to buildings, which are based on the predicted indoor environment.

2.5 Building Regulations



The Building Regulations set out the statutory standards that developments are to meet. These standards cover measures including energy efficiency, water efficiency, sound resistance and ventilation.

Part L of the Building Regulations covers energy efficiency requirements.

The current version of Part L was issued in 2013 (with minor amendments in 2016).

2.6 Building Regulations (Draft for Consultation)



The Future Buildings Standard Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations was issued in January 2021.

It proposes an interim uplift in Part F and Part L standards, a more demanding Fabric Energy Efficiency Standard (FEES) and the introduction of overheating standards for residential in 2021. The implementation of the Future Homes and Buildings Standards are expected in 2025

3 Consented Overheating Assessment

3.1 Units Assessed

A total of 24 No. units were evaluated in the consented overheating assessment, as follows; -

- 1st Floor - A102, A104, A105
- 2nd Floor - A204, A206,
- 3rd Floor - A303, A305, A307,
- 4th Floor - A404, A406, B401, B403
- 5th Floor - A503, A505, A507
- 6th Floor - A603, A604, A605, A607, B601, B604
- 7th Floor - A703
- 8th Floor - A802, A804

The location of the selected units is as shown in Figure 1 to 8 below.



Figure 1: 1st Floor units evaluated in consented overheating assessment



Figure 2: 2nd Floor units evaluated in consented overheating assessment



Figure 3: 3rd Floor units evaluated in consented overheating assessment



Figure 4: 4th Floor units evaluated in consented overheating assessment



Figure 6: 6th Floor units evaluated in consented overheating assessment



Figure 5: 5th Floor units evaluated in consented overheating assessment



Figure 7: 7th Floor units evaluated in consented overheating assessment



Figure 8: 8th Floor units evaluated in consented overheating assessment

3.2 Summary of Results

A summary of the results of the consented overheating assessment (main report) are shown below in Tables 3, 4 and 5. These results incorporate internal blinds.

Weather file	DSY1		DSY2		DSY3	
Test criteria	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
Rooms pass	66 / 66	40 / 40	66 / 66	28 / 40	66 / 66	0 / 40
Rooms pass (%)	100%	100%	100%	70%	100%	0%

Table 3: Summary of overheating results for 2020 weather files with blinds

Weather file	DSY1		DSY2		DSY3	
Test criteria	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
Rooms pass	66 / 66	2 / 40	65 / 66	0 / 40	58 / 66	0 / 40
Rooms pass (%)	100%	5%	98.5%	0%	87.9%	0%

Table 4: Summary of overheating results for 2050 weather files with blinds

Weather file	DSY1		DSY2		DSY3	
Test criteria	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
Rooms pass	66 / 66	2 / 40	63 / 66	0 / 40	58 / 66	0 / 40
Rooms pass (%)	100%	5%	95.5%	0%	87.9%	0%

Table 5: Summary of overheating results for 2080 weather files with blinds

A summary of the results of the consented overheating assessment (addendum) are shown below in Table 6. These results are without internal blinds, and use the 2020 weather file only.

Weather file	DSY1		DSY2		DSY3	
Test criteria	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
Rooms pass	66 / 66	40 / 40	64 / 66	18 / 40	61 / 66	0 / 40
Rooms pass (%)	100%	100%	97%	45%	92.4%	0%

Table 6: Summary of overheating results for 2020 weather files without blinds

The consented overheating assessment did not provide results without blinds for the future 2050 and 2080 weather scenarios.

4 Residential Units Assessed

Dynamic overheating modelling has been carried out for the 'as designed' scheme using IES Virtual Environment software, for a sample of residential apartments throughout the building.

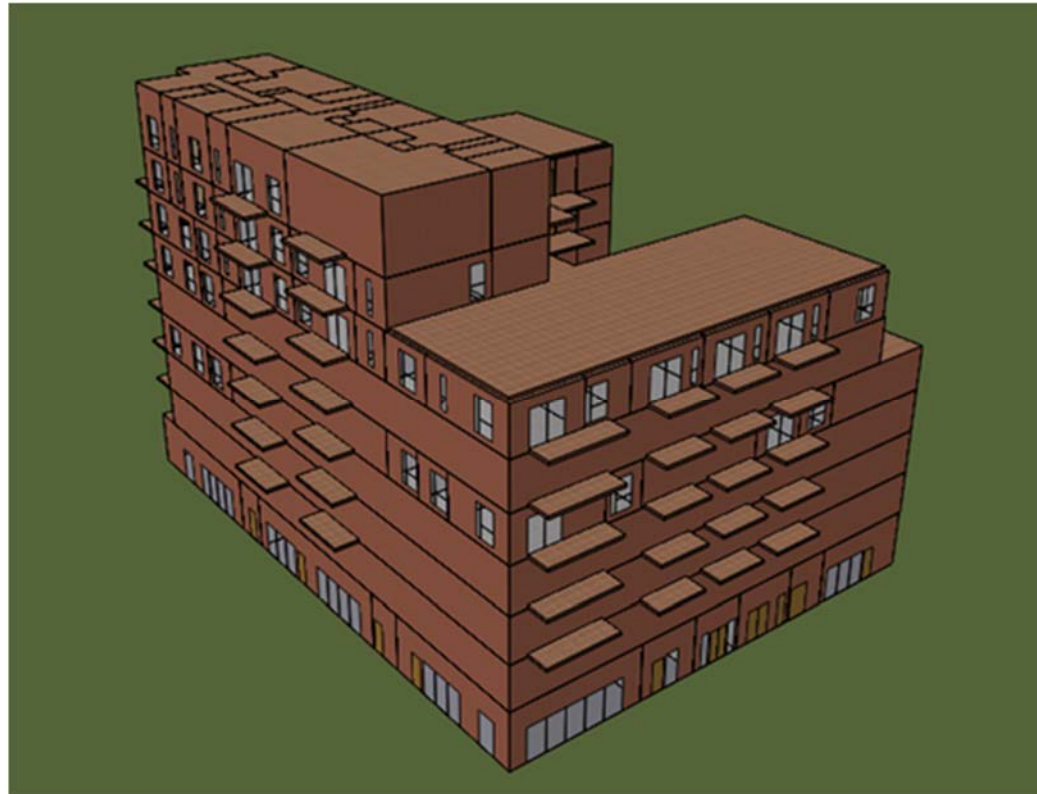


Figure 9: Image of IES thermal model for the 'as designed' scheme

Some internal layout changes have been made in the 'as designed' scheme, so the units have been selected to replicate as closely as possible those considered in the consented overheating assessment to allow direct comparison of the results.

A total of 28 No. units were evaluated in this overheating assessment, as follows; -

- 1st Floor – Plot 2, Plot 4, Plot 5
- 2nd Floor – Plot 9, Plot 11
- 3rd Floor – Plot 16, Plot 18, Plot 20
- 4th Floor – Plot 25, Plot 27, Plot 62, Plot 64
- 5th Floor - Plot 31, Plot 33, Plot 35
- 6th Floor - Plot 38, Plot 39, Plot 40, Plot 42, Plot 71, Plot 74
- 7th Floor - Plot 36, Plot 37, Plot 45, Plot 46
- 8th Floor – Plot 48, Plot 49, Plot 50

The location of the selected units is as shown in Figure 10 to 17 below.

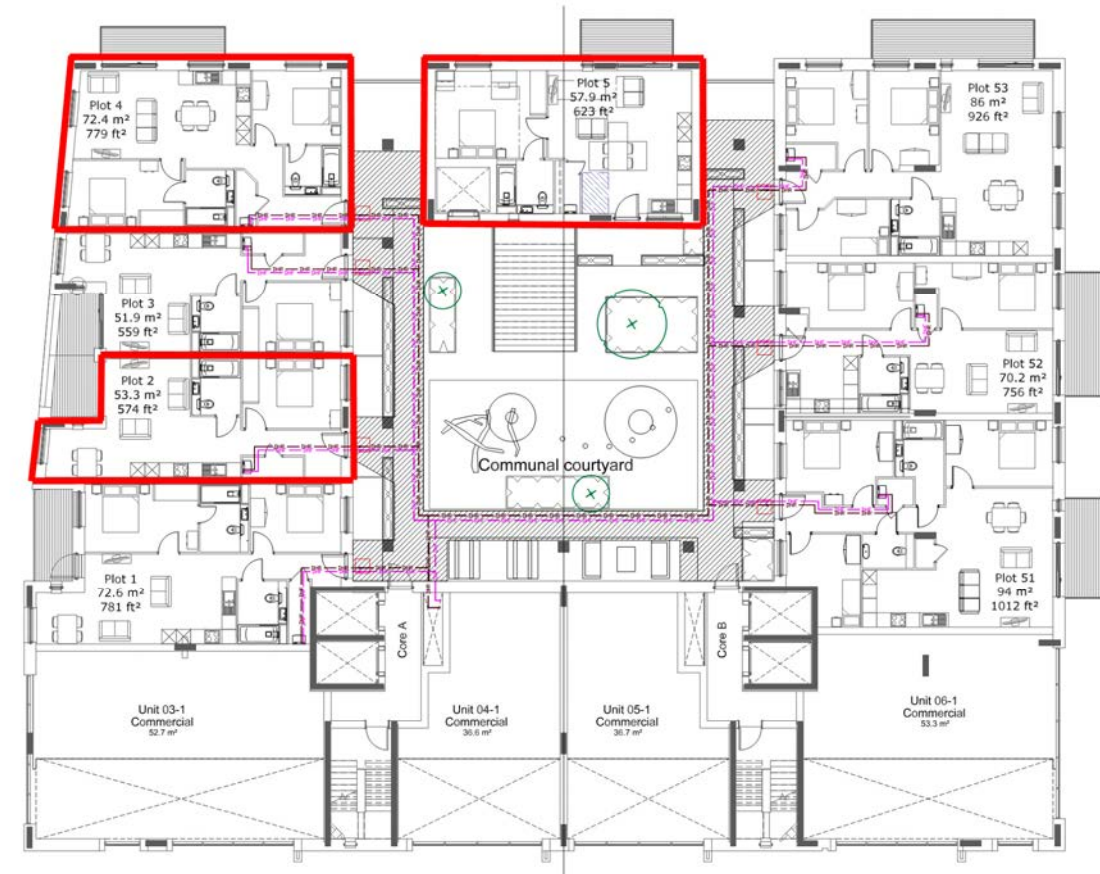


Figure 10: 1st Floor units evaluated in 'as designed' overheating assessment

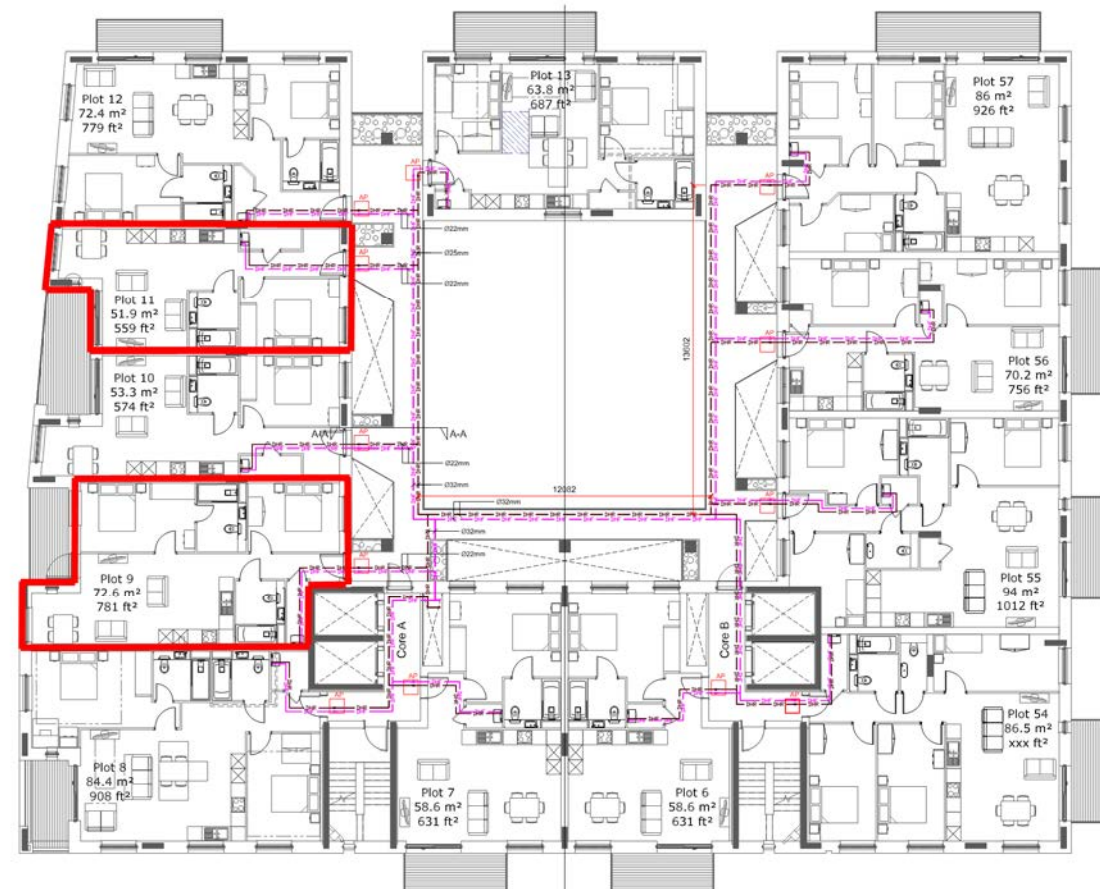


Figure 11: 2nd Floor units evaluated in 'as designed' overheating assessment

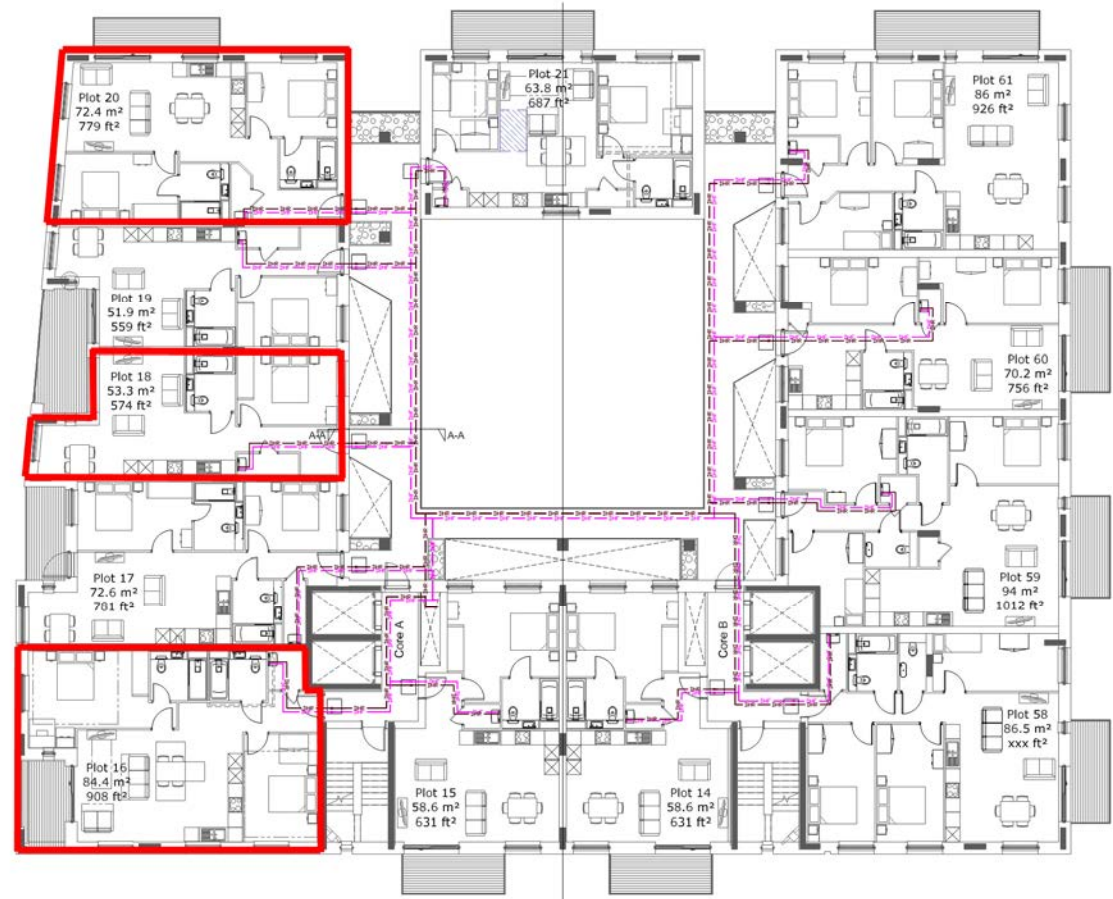


Figure 12: 3rd Floor units evaluated in 'as designed' overheating assessment

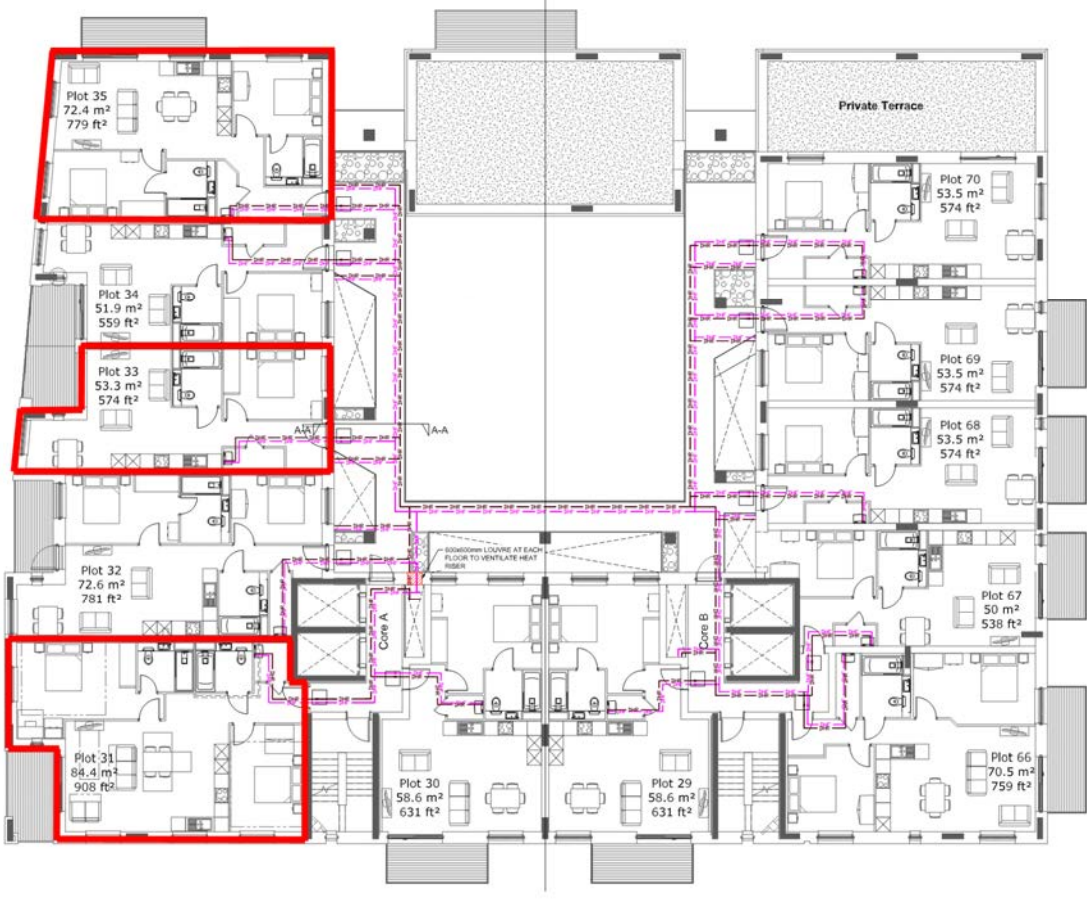


Figure 14: 5th Floor units evaluated in 'as designed' overheating assessment

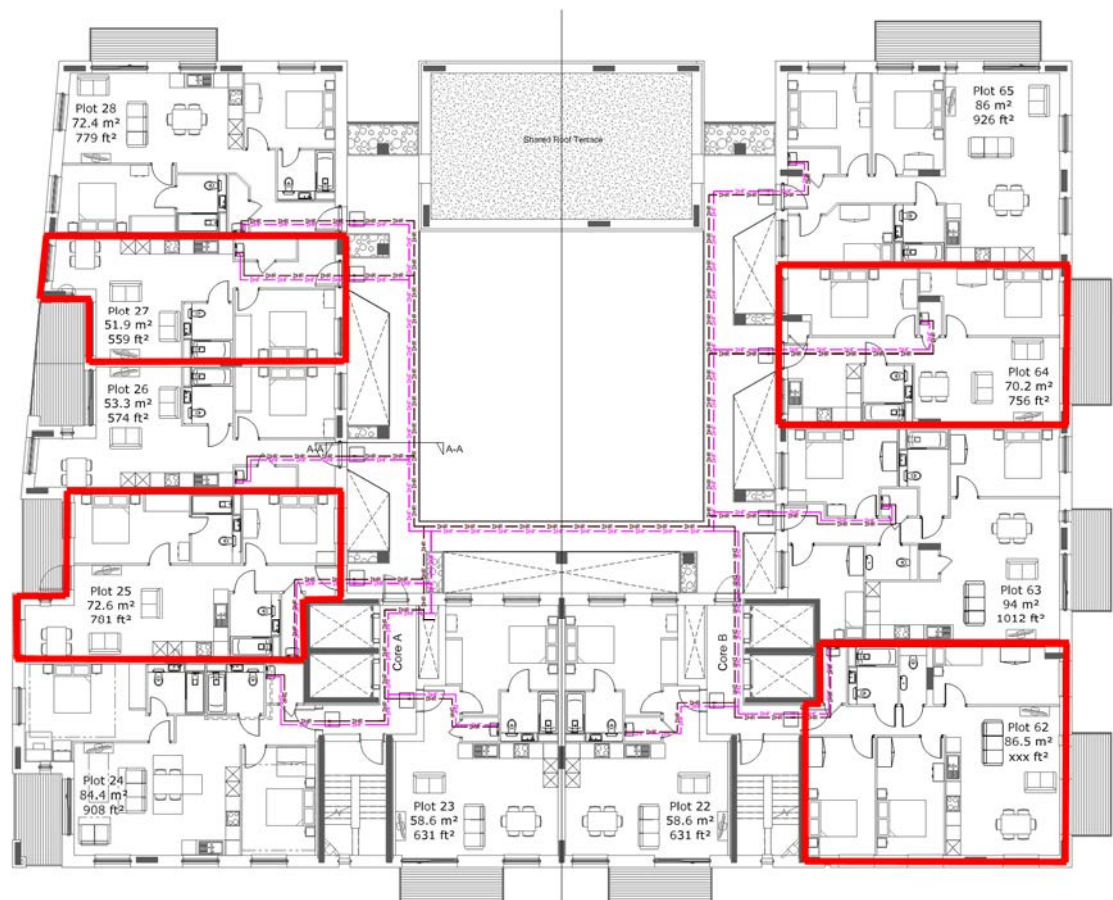


Figure 13: 4th Floor units evaluated in 'as designed' overheating assessment

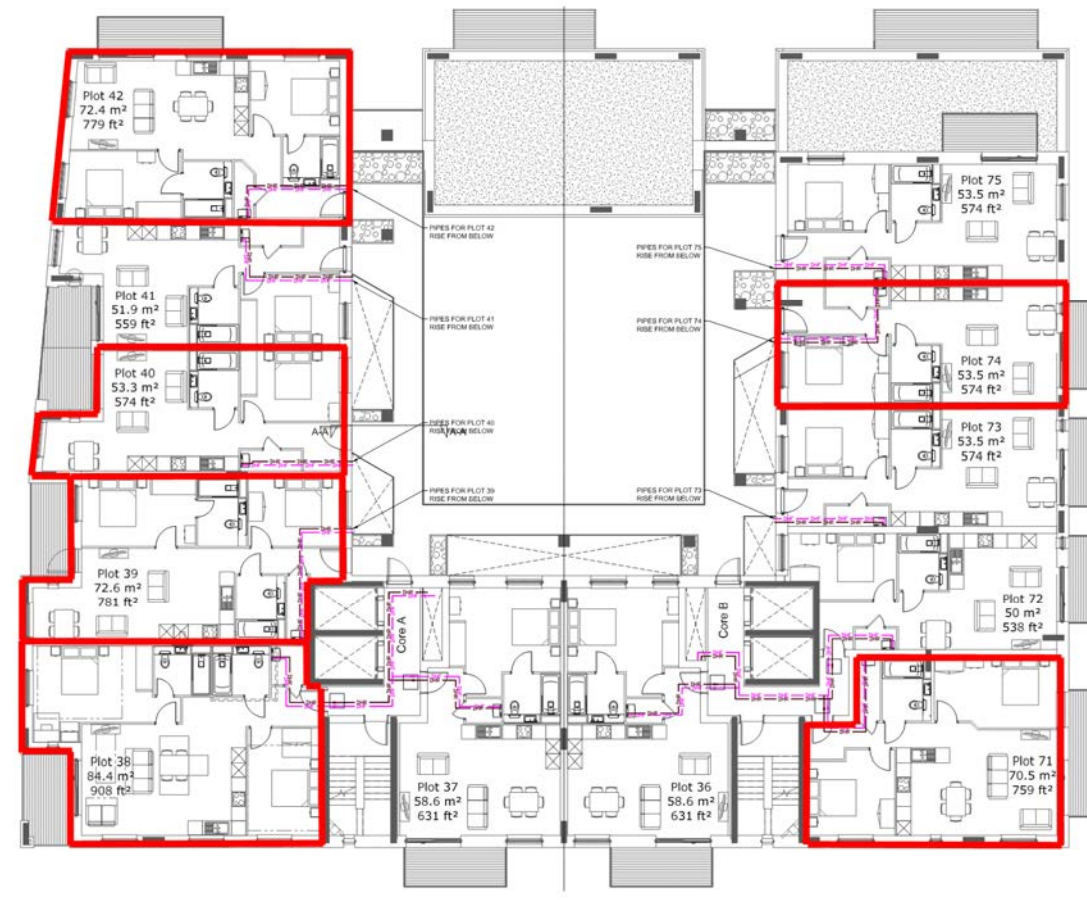


Figure 15: 6th Floor units evaluated in 'as designed' overheating assessment

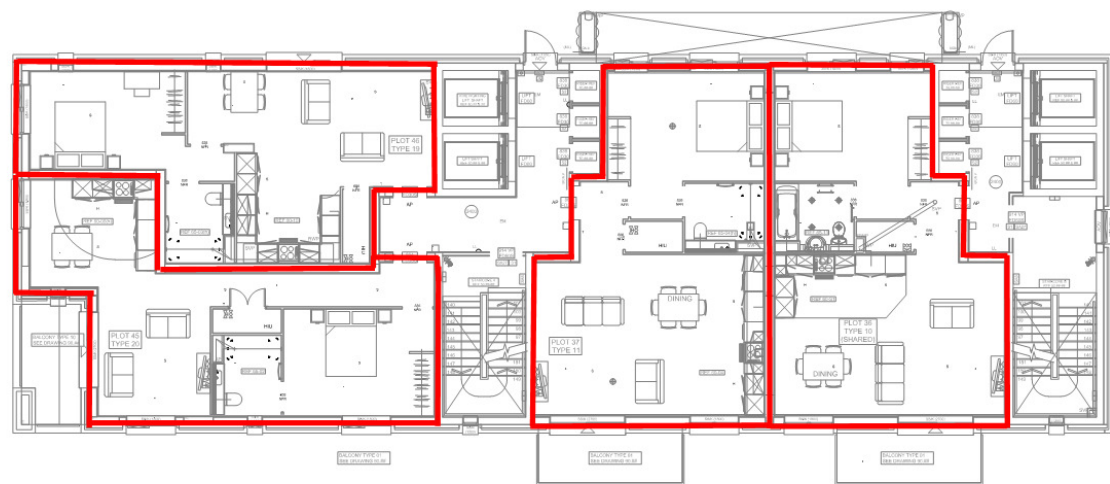


Figure 16: 7th Floor units evaluated in 'as designed' overheating assessment

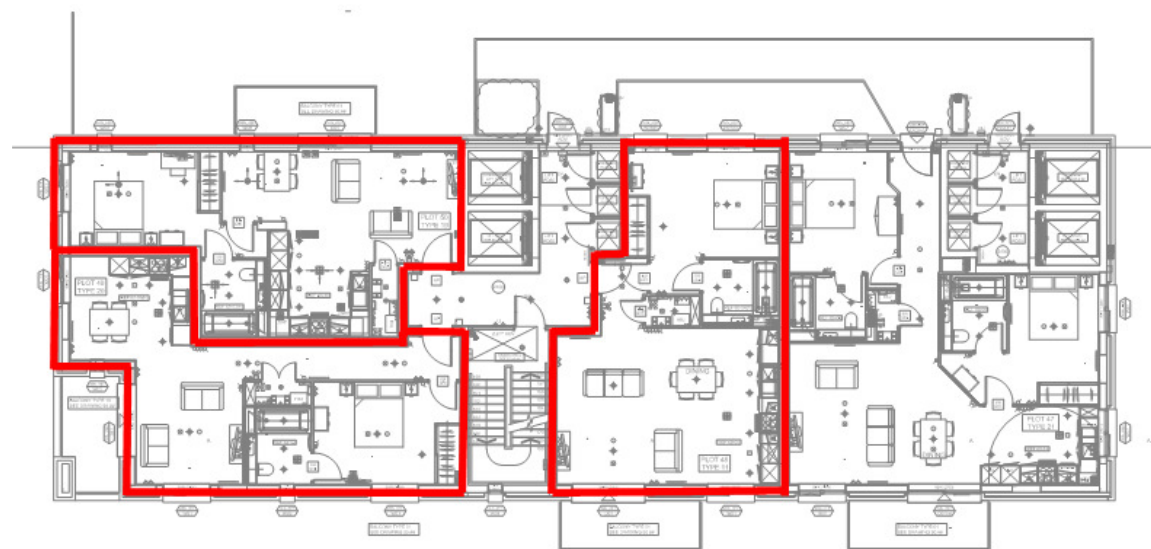


Figure 17: 8th Floor units evaluated in 'as designed' overheating assessment

5 Assessment Methodology

5.1 Reduction of Internal Overheating

The London Plan Policy SI 4 requires that major development proposals reduce the potential for internal overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

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

The main passive design elements of the development were assessed and set as part of the original application, but a further review of the cooling hierarchy has been carried out as part of this assessment and where possible adjustments made to further reduce the risk of overheating, such as to internal layouts and mechanical ventilation 'boost' air volumes.

5.2 Overheating Criteria

The Chartered Institution of Building Services Engineers (CIBSE) has produced guidance on assessing and mitigating overheating risk in new developments. TM 59 Design Methodology for the Assessment of Overheating Risk in Homes should be used for residential developments.

For compliance with CIBSE TM 59, the modelled apartments must pass both of the following two criteria:

- c) For living rooms, kitchens 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. (CIBSE TM52 Criterion 1: Hours of exceedance).
- d) 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 annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

CIBSE TM 49 guidance and Design Summer Year (DSY) datasets should be used to ensure that all new development is designed for the climate it will experience over its design life.

5.3 Weather Data

The weather file used for the assessment is as per TM59: DSY1 (Design Summer Year) for the site location, for the 2020s, high emissions, 50% percentile scenario.

The London Heathrow weather data set has been used which is the most representative for the site location.

It is expected that the CIBSE compliance criteria are met for the DSY1 weather scenario.

Further testing has been undertaken for the residential apartments using the 2020 versions of the following more extreme design weather years:-

- DSY2 – 2003: a year with a very intense single warm spell.
- DSY3 – 1976: a year with a prolonged period of sustained warmth.

It is acknowledged that meeting the CIBSE compliance criteria is challenging for the DSY 2 & 3 weather files, so full compliance with CIBSE criteria is not expected.

For further information, additional testing has been undertaken for the residential apartments using the 2050 and 2080 versions of the Design Summer Years DSY1, DSY2 and DSY3.

5.4 Model Inputs

This section summarises the input assumptions that have been used in the dynamic thermal modelling.

5.4.1 Fabric Performance

The table below shows the target performance of the building fabric.

Fabric Element	Residential 'U' Values (W/m ² K)
External Walls	0.17
Roof	0.11
Windows	1.20

Table 7: Target Fabric Performance

The consented energy strategy used a U Value of 0.13 W/m² K for the external walls. SES's assessment has confirmed that an average U Value of 0.13 W/m² K is not achievable across the whole building as there are some areas of the external wall where there is not sufficient space to install the full thickness of insulation – for example on the outer face of the perimeter structural columns. Therefore, an average wall U value of 0.17 W/m² K is proposed for the 'as designed' scheme.

The other U values remain as detailed in the consented overheating assessment.

5.4.2 Solar Gain

The g-value of the glazing remains as 0.4 for the residential as detailed in the consented overheating assessment.

5.4.3 Blinds and Shading Devices

The consented overheating assessment (main report) proposed the use of internal blinds with control based on solar flux and outside/inside temperature to prevent them operating at the same time as windows are open.

An automatic control system of this type is not practical for a residential development of this type, and the occupants would not be able to manually control the blinds in this way.

Internal blinds have therefore not been included in the 'as designed' scheme, as they restrict airflow through open windows intended to provide natural ventilation.

The balconies have been modelled to provide external shading for the apartments.

5.4.4 Mechanical Ventilation

MVHR Units are proposed to provide fresh air and extract ventilation for the apartments. These units will be equipped with a summer bypass mode and a boost mode that will enable the unit to provide the following increased ventilation rates in the summer condition.

- Bedroom 25 to 30 l/s
- Living Room 25 to 30 l/s

The consented overheating assessment used an auxiliary ventilation rate of 1 air change per hour.

5.4.5 Natural Ventilation

Sliding doors to balconies have been modelled as fully open.

Other side/top hung opening windows have been modelled with a 45 degree open angle in accordance with the consented overheating assessment.

5.4.6 Infiltration

The target air permeability for the development is 3m³/hr.m²@50Pa. An average infiltration air change of 0.15ACH has been assumed in the dynamic thermal modelling in accordance with Table 4.24 in CIBSE Guide A.

5.4.7 Air Speed Assumptions

Operative air speed in the apartments has been set at 0.1m/s and assumed elevated air speed of 0.8m/s used in the thermal modelling calculation in accordance with CIBSE TM59.

5.4.8 Thermal Comfort Category

The scheme is a new build development, therefore Cat II building was selected as Normal Expectations.

5.4.9 Internal Gains

A thermal template has been created for each of the spaces within the sample apartments taking into account the internal gains. The internal heat gains consist of occupancy gains, equipment gains and lighting gains. CIBSE TM59 has been used in developing the internal gains profile.

Equipment Gains

Equipment heat gains and profiles were assumed in accordance with Table 2 in CISBE TM59.

Room Type	Profile/ Gain
Living Room/ Kitchen	Peak load of 450W from 6pm-8pm 200W from 8pm- 10pm 110W from 9am to 6pm and from 10pm to 12pm
Single Bedroom	Peak load of 80W from 8am to 11pm Base load of 10W during the sleeping hours
Double Bedroom	Peak load of 80W from 8am to 11pm Base load of 10W during the sleeping hours

Table 8: Equipment gains

Lighting Gains

Lighting gains of 2 W/m² have been assumed for each flat for the period of 6pm –11pm in accordance with CIBSE TM59.

Occupancy Gains

Occupancy heat gains and profiles were assumed in accordance with Table 2 in CIBSE TM59.

Occupancy gain has been set at 75 W/person sensible, 55 W/person latent.

Room Type	Profile/ Gain
Single Bedroom	1 person at 70% gains from 11pm -8am 1 person at full gains from 8am to 11pm
Double Bedroom	2 person at 70% gains from 11pm -8am 2 person at full gains from 8am to 9am and from 10pm to 11pm 1 person at full gains in the bedroom from 9am to 10pm
1 Bedroom (Living room/ kitchen)	1 person from 9am -10am, room is unoccupied for the rest the day
2 Bedroom (Living room/ kitchen)	2 person from 9am -10am, room is unoccupied for the rest the day
3 Bedroom (Living room/ kitchen)	3 person from 9am -10am, room is unoccupied for the rest the day

Table 9: Occupancy gains

6 Overheating Modelling Results

6.1 2020 Weather Scenario

The results of the assessment of criteria (a) and (b) for the sample residential apartments for the 2020 weather scenario are shown below.

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 2 Doublebed	0	12	0.4	20	0.6	28
Plot 2 Living/Kitchen	0.7	NA	1	NA	2	NA
Plot 4 Doublebed	0.2	15	0.7	21	0.9	36
Plot 4 Doublebed	0.9	15	1.1	21	2	36
Plot 4 Living/Kitchen	0.7	NA	1.5	NA	2.3	NA
Plot 5 Doublebed	0.1	14	0.6	22	0.8	35
Plot 5 Doublebed	0	12	0.3	21	0.6	34
Plot 5 Living/Kitchen	0	NA	0.6	NA	1	NA
Plot 9 Doublebed	0	11	0.3	20	0.5	29
Plot 9 Doublebed	0	13	0.2	20	0.6	36
Plot 9 Living/Kitchen	0	NA	0.1	NA	0.3	NA
Plot 11 Doublebed	0	10	0.1	19	0.4	28
Plot 11 Living/Kitchen	0.4	NA	0.9	NA	1.8	NA
Plot 16 Doublebed	0	11	0.3	20	0.6	31
Plot 16 Doublebed	0.8	17	1.8	23	2.5	41
Plot 16 Living/Kitchen	0.7	NA	1.9	NA	2.3	NA
Plot 18 Doublebed	0	10	0.1	19	0.3	28
Plot 18 Living/Kitchen	0.1	NA	0.4	NA	1.1	NA
Plot 20 Doublebed	0	13	0.4	21	0.7	34
Plot 20 Doublebed	0.4	15	0.7	21	1.3	35
Plot 20 Living/Kitchen	0.1	NA	0.8	NA	1.2	NA
Plot 25 Doublebed	0	14	0.3	21	0.6	29
Plot 25 Doublebed	0	13	0.3	20	0.6	35
Plot 25 Living/Kitchen	0	NA	0.1	NA	0.3	NA
Plot 27 Doublebed	0	12	0.3	21	0.6	30
Plot 27 Living/Kitchen	0.5	NA	1	NA	1.8	NA
Plot 62 Doublebed	0.8	14	1.8	22	2.5	32
Plot 62 Doublebed	0.6	14	1.7	22	2.1	32
Plot 62 Singlebed	0.2	13	0.8	21	1	30
Plot 62 Living/Kitchen	0	NA	1.2	NA	1.3	NA
Plot 64 Doublebed	0	13	0.3	20	0.6	32
Plot 64 Doublebed	0.1	14	0.8	21	0.9	33
Plot 64 Living/Kitchen	0	NA	0.5	NA	0.7	NA
Plot 31 Doublebed	0	10	0.3	20	0.5	30
Plot 31 Doublebed	0.8	16	1.7	22	2.3	37
Plot 31 Living/Kitchen	0.6	NA	1.8	NA	2.2	NA
Plot 33 Doublebed	0	10	0.2	21	0.5	30
Plot 33 Living/Kitchen	0.2	NA	0.8	NA	1.4	NA
Plot 35 Doublebed	0	13	0.4	21	0.7	34
Plot 35 Doublebed	0.3	14	0.7	20	1.2	33

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 35 Living/Kitchen	0.1	NA	0.7	NA	1.2	NA
Plot 38 Doublebed	0.3	11	0.7	20	1.1	30
Plot 38 Doublebed	1.6	16	2.3	22	3.5	34
Plot 38 Living/Kitchen	1.4	NA	2.7	NA	3.7	NA
Plot 39 Doublebed	0	14	0.6	21	0.8	33
Plot 39 Doublebed	0.2	13	0.6	21	1.1	41
Plot 39 Living/Kitchen	0	NA	0.3	NA	0.7	NA
Plot 40 Doublebed	0.3	16	1	21	1.3	36
Plot 40 Living/Kitchen	1.3	NA	1.6	NA	2.8	NA
Plot 42 Doublebed	0.3	16	0.8	25	1.2	44
Plot 42 Doublebed	1.1	21	1.6	25	2.5	44
Plot 42 Living/Kitchen	1.3	NA	2.1	NA	3.2	NA
Plot 71 Doublebed	0.9	14	2	22	2.4	35
Plot 71 Doublebed	0.3	15	1	21	1.3	33
Plot 71 Living/Kitchen	0.2	NA	1.7	NA	1.7	NA
Plot 74 Doublebed	0.9	15	1.2	21	2.3	36
Plot 74 Living/Kitchen	0.1	NA	0.9	NA	1.5	NA
Plot 36 Doublebed	0.1	12	0.7	19	0.7	31
Plot 36 Living/Kitchen	0.7	NA	2.8	NA	2.3	NA
Plot 37 Doublebed	0	11	0.6	19	0.7	31
Plot 37 Living/Kitchen	0.6	NA	2.2	NA	1.8	NA
Plot 45 Doublebed	0.9	14	1.9	21	2.6	33
Plot 45 Living/Kitchen	2.3	NA	3.4	NA	4.8	NA
Plot 46 Doublebed	0.1	11	0.6	20	1	31
Plot 46 Living/Kitchen	0.2	NA	1	NA	1.3	NA
Plot 48 Doublebed	0	13	0.6	22	0.8	37
Plot 48 Living/Kitchen	0.8	NA	2.6	NA	2.4	NA
Plot 49 Doublebed	0.4	16	1.1	22	1.1	36
Plot 49 Living/Kitchen	1.3	NA	2.1	NA	2.9	NA
Plot 50 Doublebed	0	11	0.3	20	0.7	34
Plot 50 Living/Kitchen	0	NA	0.7	NA	1.1	NA
Rooms pass	71 / 71	43 / 43	70 / 71	43 / 43	67 / 71	17 / 43
Rooms pass (%)	100%	100%	98.6%	100%	94.4%	39.5%

Table 10: Overheating results for the ‘as designed’ scheme (2020 weather files, without blinds)

6.2 2050 Weather Scenario

The results of the assessment of criteria (a) and (b) for the sample residential apartments for the 2050 weather scenario are shown below.

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 2 Doublebed	0.3	28	0.8	42	1.1	60
Plot 2 Living/Kitchen	1.6	NA	1.9	NA	3.4	NA
Plot 4 Doublebed	0.5	32	1.1	47	2	76
Plot 4 Doublebed	1.9	37	2.1	46	3.5	74

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 4 Living/Kitchen	2.2	NA	2.8	NA	4.8	NA
Plot 5 Doublebed	0.5	34	1	47	1.8	72
Plot 5 Doublebed	0.3	33	0.7	47	1.1	71
Plot 5 Living/Kitchen	0.4	NA	1.2	NA	2.1	NA
Plot 9 Doublebed	0.2	29	0.7	42	0.9	61
Plot 9 Doublebed	0.3	34	0.7	47	1.3	75
Plot 9 Living/Kitchen	0.1	NA	0.6	NA	0.8	NA
Plot 11 Doublebed	0.2	29	0.6	41	0.8	59
Plot 11 Living/Kitchen	1.3	NA	1.7	NA	3.3	NA
Plot 16 Doublebed	0.3	30	0.8	45	1.1	67
Plot 16 Doublebed	2.1	39	2.9	53	4.2	81
Plot 16 Living/Kitchen	2.3	NA	3.6	NA	5.5	NA
Plot 18 Doublebed	0	28	0.4	40	0.7	58
Plot 18 Living/Kitchen	0.6	NA	1.1	NA	2.2	NA
Plot 20 Doublebed	0.4	33	0.8	46	1.3	77
Plot 20 Doublebed	1.1	35	1.3	47	2.6	74
Plot 20 Living/Kitchen	0.8	NA	1.5	NA	3.2	NA
Plot 25 Doublebed	0.3	29	0.7	42	1	65
Plot 25 Doublebed	0.3	34	0.7	47	1.3	78
Plot 25 Living/Kitchen	0.1	NA	0.6	NA	1	NA
Plot 27 Doublebed	0.2	31	0.7	46	0.9	65
Plot 27 Living/Kitchen	1.3	NA	1.9	NA	3.2	NA
Plot 62 Doublebed	2.2	34	3	51	4.2	71
Plot 62 Doublebed	1.8	34	2.8	51	4	71
Plot 62 Singlebed	0.7	31	1.6	46	2.3	67
Plot 62 Living/Kitchen	0.8	NA	2.1	NA	2.5	NA
Plot 64 Doublebed	0.3	32	0.8	49	1.2	72
Plot 64 Doublebed	0.6	36	1.2	50	1.9	70
Plot 64 Living/Kitchen	0.2	NA	1.2	NA	1.5	NA
Plot 31 Doublebed	0.2	30	0.8	42	1.1	65
Plot 31 Doublebed	2	36	2.9	52	4.2	77
Plot 31 Living/Kitchen	2.3	NA	3.5	NA	5.2	NA
Plot 33 Doublebed	0.2	30	0.7	45	0.9	64
Plot 33 Living/Kitchen	1	NA	1.5	NA	3	NA
Plot 35 Doublebed	0.4	32	0.8	46	1.3	76
Plot 35 Doublebed	1	34	1.3	45	2.4	73
Plot 35 Living/Kitchen	0.6	NA	1.5	NA	3	NA
Plot 38 Doublebed	0.8	32	1.2	44	2.2	67
Plot 38 Doublebed	2.9	35	3.5	47	5	73
Plot 38 Living/Kitchen	3.5	NA	4.8	NA	7	NA
Plot 39 Doublebed	0.5	32	0.9	48	1.6	68
Plot 39 Doublebed	0.8	38	1	51	2.1	80
Plot 39 Living/Kitchen	0.4	NA	1.1	NA	1.4	NA
Plot 40 Doublebed	1.1	38	1.7	54	2.8	73
Plot 40 Living/Kitchen	2.7	NA	3.3	NA	5.2	NA
Plot 42 Doublebed	0.9	48	1.4	60	2.5	92

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 42 Doublebed	2.5	47	2.7	57	4	85
Plot 42 Living/Kitchen	2.9	NA	3.6	NA	5.5	NA
Plot 71 Doublebed	2.2	36	3	52	4.3	75
Plot 71 Doublebed	0.8	38	2	51	2.8	71
Plot 71 Living/Kitchen	1.3	NA	3.2	NA	3.6	NA
Plot 74 Doublebed	1.9	39	2.1	55	3.6	82
Plot 74 Living/Kitchen	0.8	NA	1.7	NA	2.6	NA
Plot 36 Doublebed	2.4	NA	4.8	NA	5.9	NA
Plot 36 Living/Kitchen	0.4	31	1	41	1.4	65
Plot 37 Doublebed	0.4	31	1	41	1.3	64
Plot 37 Living/Kitchen	1.7	NA	4	NA	5.3	NA
Plot 45 Doublebed	2.3	33	2.9	48	4.2	71
Plot 45 Living/Kitchen	4.7	NA	5.4	NA	7.6	NA
Plot 46 Doublebed	0.7	33	1	44	2.1	70
Plot 46 Living/Kitchen	0.8	NA	1.7	NA	2.9	NA
Plot 48 Doublebed	0.5	35	1	49	1.4	72
Plot 48 Living/Kitchen	2.4	NA	4.4	NA	5.8	NA
Plot 49 Doublebed	1.1	35	2.1	53	2.7	77
Plot 49 Living/Kitchen	3	NA	4	NA	5.6	NA
Plot 50 Doublebed	0.3	33	0.7	45	1.1	68
Plot 50 Living/Kitchen	0.4	NA	1.3	NA	1.8	NA
Rooms pass	69 / 71	17 / 43	59 / 71	0 / 43	45 / 71	0 / 43
Rooms pass (%)	97.2%	39.5%	83.1%	0%	63.4%	0%

Table 11: Overheating results for the 'as designed' scheme (2050 weather files, without blinds)

6.3 2080 Weather Scenario

The results of the assessment of criteria (a) and (b) for the sample residential apartments for the 2080 weather scenario are shown below.

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 2 Doublebed	1.1	89	1.8	99	2.9	127
Plot 2 Living/Kitchen	4.3	NA	4.5	NA	6.3	NA
Plot 4 Doublebed	1.9	107	2.6	111	4.1	151
Plot 4 Doublebed	4.1	109	3.8	109	5.2	145
Plot 4 Living/Kitchen	5.4	NA	5.7	NA	7.2	NA
Plot 5 Doublebed	1.5	104	2.5	110	4	150
Plot 5 Doublebed	1	102	1.7	111	2.8	148
Plot 5 Living/Kitchen	1.8	NA	3	NA	5.2	NA
Plot 9 Doublebed	1	95	1.7	103	2.5	132
Plot 9 Doublebed	1.4	107	1.9	113	2.9	151
Plot 9 Living/Kitchen	1	NA	1.7	NA	3	NA
Plot 11 Doublebed	0.8	92	1.4	101	2.4	132
Plot 11 Living/Kitchen	3.8	NA	4.1	NA	6.1	NA
Plot 16 Doublebed	1.2	93	1.9	102	3	139

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 16 Doublebed	4.8	117	4.9	116	6.3	163
Plot 16 Living/Kitchen	5.4	NA	6.4	NA	8.8	NA
Plot 18 Doublebed	0.7	88	1.2	100	2	129
Plot 18 Living/Kitchen	2.4	NA	3	NA	4.7	NA
Plot 20 Doublebed	1.1	104	1.9	115	3.2	152
Plot 20 Doublebed	2.8	107	2.9	112	4.2	147
Plot 20 Living/Kitchen	2.7	NA	3.8	NA	5.8	NA
Plot 25 Doublebed	1.1	99	1.7	107	2.8	134
Plot 25 Doublebed	1.4	106	1.9	113	2.9	151
Plot 25 Living/Kitchen	1	NA	1.8	NA	3	NA
Plot 27 Doublebed	1	103	1.7	107	2.6	142
Plot 27 Living/Kitchen	3.8	NA	4.2	NA	6	NA
Plot 62 Doublebed	5.1	108	5	111	6.4	152
Plot 62 Doublebed	4.5	107	4.7	112	6	152
Plot 62 Singlebed	2.2	103	3.3	112	4.7	141
Plot 62 Living/Kitchen	2.6	NA	4.8	NA	6.3	NA
Plot 64 Doublebed	1.2	97	1.9	109	3.1	145
Plot 64 Doublebed	1.6	114	2.8	116	4.2	149
Plot 64 Living/Kitchen	1.6	NA	3	NA	4.3	NA
Plot 31 Doublebed	1.2	93	1.9	103	2.9	135
Plot 31 Doublebed	4.7	112	4.8	114	6.2	155
Plot 31 Living/Kitchen	5.3	NA	6.3	NA	8.6	NA
Plot 33 Doublebed	0.9	101	1.5	108	2.5	141
Plot 33 Living/Kitchen	3.1	NA	3.6	NA	5.3	NA
Plot 35 Doublebed	1.1	104	1.9	114	3.2	148
Plot 35 Doublebed	2.7	103	2.9	108	4.1	144
Plot 35 Living/Kitchen	2.7	NA	3.8	NA	5.8	NA
Plot 38 Doublebed	2.3	92	2.9	103	4.1	137
Plot 38 Doublebed	7	109	5.8	112	8	149
Plot 38 Living/Kitchen	7.9	NA	8	NA	10.5	NA
Plot 39 Doublebed	1.5	104	2.3	112	3.6	143
Plot 39 Doublebed	2.3	115	2.6	118	4	156
Plot 39 Living/Kitchen	1.5	NA	2.4	NA	3.9	NA
Plot 40 Doublebed	3.1	112	3.6	113	4.8	149
Plot 40 Living/Kitchen	6.4	NA	6	NA	8.2	NA
Plot 42 Doublebed	2.7	129	3.1	132	4.3	176
Plot 42 Doublebed	5.2	130	4.5	128	6.6	166
Plot 42 Living/Kitchen	6.6	NA	6.6	NA	8.3	NA
Plot 71 Doublebed	5.4	114	5	116	6.3	158
Plot 71 Doublebed	2.9	112	3.9	118	5.3	152
Plot 71 Living/Kitchen	3.7	NA	6.2	NA	8.3	NA
Plot 74 Doublebed	4.2	113	3.9	119	5.3	160
Plot 74 Living/Kitchen	2.6	NA	4.3	NA	5.9	NA
Plot 36 Doublebed	1.3	93	2.4	103	3.6	136
Plot 36 Living/Kitchen	6.5	NA	7.8	NA	9.5	NA
Plot 37 Doublebed	1.2	92	2.3	103	3.5	135

Room Name	DSY1		DSY2		DSY3	
	Criteria 1	Criteria 2	Criteria 1	Criteria 2	Criteria 1	Criteria 2
	= < 3.0	< 33	= < 3.0	< 33	= < 3.0	< 33
Plot 37 Living/Kitchen	5.3	NA	6.9	NA	8.8	NA
Plot 45 Doublebed	5.3	103	5.1	110	6.4	145
Plot 45 Living/Kitchen	10	NA	8.5	NA	12	NA
Plot 46 Doublebed	1.9	94	2.7	102	3.6	141
Plot 46 Living/Kitchen	2.6	NA	4	NA	5.9	NA
Plot 48 Doublebed	1.3	102	2.4	109	3.4	147
Plot 48 Living/Kitchen	6.1	NA	7.2	NA	9	NA
Plot 49 Doublebed	2.9	111	3.7	114	4.9	151
Plot 49 Living/Kitchen	6.7	NA	6.7	NA	8.6	NA
Plot 50 Doublebed	1.3	96	1.8	107	2.9	141
Plot 50 Living/Kitchen	1.7	NA	3.2	NA	4.4	NA
Rooms pass	44 / 71	0 / 43	34 / 71	0 / 43	14 / 71	0 / 43
Rooms pass (%)	62%	0%	47.9%	0%	19.7%	0%

Table 12: Overheating results for the 'as designed' scheme (2080 weather files, without blinds)

6.4 Results Summary

The CIBSE compliance criteria are met in all rooms modelled (for the 2020s DSY1 weather scenario) with natural ventilation via openable windows/doors and increased mechanical ventilation. Active cooling is therefore not proposed.

The CIBSE compliance criteria are not met in all rooms modelled (for the 2020s DSY2 and DSY3 weather scenarios), but the risk of overheating has been further reduced for the 'as designed' scheme over the consented scheme, with more rooms meeting the criteria with the DSY2 and DSY3 weather scenarios.

The assessment demonstrates that the risk of overheating has been reduced as far as practical.

6.5 Mitigation

The proposed overheating mitigation measures are summarised below;-

- In residential dwellings the use of natural ventilation via openable windows/doors and increased mechanical ventilation will generally sufficiently reduce the risk of overheating.
- During extreme summer weather, residents will be encouraged to use additional measures to reduce the risk of overheating, including the following;-
 - Using portable fans to increase airflow
 - Minimising internal heat gains
 - Keeping windows open as long as possible
- Guidance will be provided to residents on reducing the overheating risk in their home in line with the cooling hierarchy, including guidance on how to use the MVHR, how night-time heat purging works in combination with thermal mass, etc.
- A retrofit plan will be developed setting out how future overheating risk will be mitigated, confirming how these measures can be incorporated into the design of the development.



Meinhardt (UK) Ltd
10 Aldersgate Street
London
EC1A 4HJ
T: +44 (0) 20 7831 7969

www.meinhardt.co.uk