



**DWELLING OVERHEATING
RISK ASSESSMENT**

FOR

St. CLARE BUSINESS PARK

RICHMOND

VERSION 3.1

Issued by:-

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PROJECT REVISION SHEET

St. CLARE BUSINESS PARK, SOUTHWARK

170209

Revision . V3.1

Date of first issue: 09 October 2019

Prepared by: Andrew Sturt

Revision	Date	Details	Changes	Author	Checked
V1	09/10/2019		-	A Sturt	
V2	16/06/2022	Planning	Updated to incorporate AD Part O Requirements	M Smith	A Sturt
V2.1	21/06/2022	Planning	Planning Policy section amended	M Smith	A Sturt
V3.0	03/04/2023	Planning	Amended to suit reduced dwelling numbers	A Sturt	A Sturt
V3.1	13/04/2023	Planning	Minor Amendment	A Sturt	A Sturt

EXECUTIVE SUMMARY

This Overheating Risk Assessment has been prepared by Silcock Dawson and Partners on behalf of Notting Hill Home Ownership Ltd to assess the risk of dwellings overheating at the proposed new development at St Clare Business Park, Richmond.

The redevelopment comprises the demolition of existing buildings and erection of 1 no. mixed use building between three and five storeys plus basement in height, comprising 86 no. residential flats (Class C3) and 1,290 sq.m of commercial floorspace (Class E); 1 no. two storey building comprising 595sq.m of commercial floorspace (Class E); 14no. residential houses (Class C3); and, associated access, external landscaping and car parking.

Dynamic thermal modelling has been undertaken in accordance with the recommendations of Approved document Part O. which refers to CIBSE TM59 Design Methodology with minor amendments for the Assessment of Overheating Risk in Homes, and dwellings are classified as predominantly naturally ventilated.

The assessment is based on all apartments on the first and second floors to address the different apartment types that are at risk of overheating. The cross ventilation available for houses means that these are at a reduced risk of overheating.

The mechanical ventilation allowance and construction details are outlined below.

Item	Dwellings Construction
Window Properties	Window U value: 1.0W/m ² K Glazing G value: 0.4
External wall construction	Brick, cavity, lightweight construction with partial insulation within the cavity and plasterboard on dabs inner surface.
Party wall construction	25mm Plasterboard, cavity, insulation, 25mm plasterboard.
Internal wall construction	Plasterboard stud walls with 15mm plasterboard both sides
Intermediate floor construction	Plasterboard ceiling, air gap, concrete/screed, and carpet finish.
Background Mechanical Ventilation	Background ventilation rate in accordance with Approved Document Part F (approximately 0.4 air changes by MVHR with summer bypass including at least 6l/s extract rate from heat interface unit cupboard).
Infiltration	0.25 air changes per hour
Windows	Openable windows are simulated to start to open when the air temperature reaches 22°C and fully open at 26°C. Windows open inward and have the ability to open fully.
Internal Doors	Internal doors will be held fully open outside of sleeping hours to promote cross flow ventilation.
Balcony Doors	Balcony doors open as the windows, but with an additional night set back applied restricting the window to 200mm.

The CIBSE weather file for the London Heathrow was selected at the most appropriate location for the site. In accordance with the guidance within TM59, Design Summer Year (DSY)1 – 2020, High 50th Percentile has been used for the assessment.

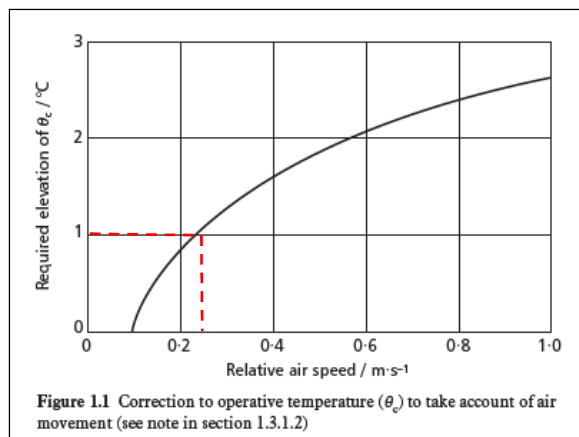
Apartments at 1st and 2nd floor have been used within this sample assessment to indicate the anticipated performance of the apartments.

The overheating risk is largely due to the need to the need to achieve adequate daylight within the apartments, whilst considering the need to address the potential risk of overheating, with the following features incorporated within the design.

- The balconies are located one above the other to provide maximum external shading to the levels below.
- Solar control glazing is applied to all windows which will have a G value of 0.4. The light transmission of the glass will not be below 70% and would not have a negative impact on the daylight amenity.

The noise impact assessment has identified that the ambient noise levels experienced within a number of apartments will exceed the criteria detailed within Approved Document O. Peak louver cooling will be incorporated within the MVHR ventilation systems to temper the supply air within the affected apartments. These units have a low cooling duty and are only able to mitigate overheating risk rather than provide full comfort cooling. As they are integral to the MVHR system, and do not provide full AC they are excluded from the SAP / Part L calculation and have no impact on the Energy Assessment.

In addition the residents will be issued a Home User Guide which will include information relating to thermal comfort during the summer months. This will include information on the use of blinds or curtains when the apartments are unoccupied to reduce the solar gains, and the effect of portable fans. Even a small amount of air movement across an occupant can have a significant impact on the environmental conditions experienced, a velocity of just 0.25m/s can have the effect of raising the threshold comfort temperature by 1°C as illustrated in the extract from CIBSE Guide A below.



CIBSE TM59 suggests that air velocities between 0.2m/s and 0.8m/s are acceptable. The effect of air velocities between 0.2m/s and 0.3m/s, is sufficient to mitigate against the effects of ambient temperature within the lounges, and a slightly higher ventilation range within the bedrooms varying between 0.2m/s and 0.4m/s depending on the severity of the overheating risk indicated above.

The houses have not been included within the assessment, these are less likely to overheat due to the ability of the units to achieve good cross flow ventilation from the front to the rear of the houses and have multiple levels allow the stack effect to increase ventilation rates on relatively still days by moving air from the ground to upper floors.

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-LKD (3)	52	2.3%	Pass	NA	NA	NA	Pass
01-202-LKD (2)	43	1.9%	Pass	NA	NA	NA	Pass
01-203-LKD (2)	52	2.3%	Pass	NA	NA	NA	Pass
01-204-LKD (2)	51	2.2%	Pass	NA	NA	NA	Pass
01-205-LKD (3)	34	1.5%	Pass	NA	NA	NA	Pass
01-206-LKD (1)	53	2.3%	Pass	NA	NA	NA	Pass
01-207-LKD (1)	54	2.4%	Pass	NA	NA	NA	Pass
01-208-LKD (1)	55	2.4%	Pass	NA	NA	NA	Pass
01-209-LKD (2)	60	2.6%	Pass	NA	NA	NA	Pass
01-210-LKD (2)	49	2.1%	Pass	NA	NA	NA	Pass
01-211-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
01-212-LKD (1)	45	2.0%	Pass	NA	NA	NA	Pass
01-213-LKD (2)	52	2.3%	Pass	NA	NA	NA	Pass
01-214-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
01-215-LKD (2)	49	2.1%	Pass	NA	NA	NA	Pass
01-216-LKD (2)	65	2.8%	Pass	NA	NA	NA	Pass
01-217-LKD (1)	45	2.0%	Pass	NA	NA	NA	Pass
01-218-LKD (1)	48	2.1%	Pass	NA	NA	NA	Pass
01-219-LKD (1)	55	2.4%	Pass	NA	NA	NA	Pass
01-220-LKD (1)	49	2.1%	Pass	NA	NA	NA	Pass
01-221-LKD (1)	43	1.9%	Pass	NA	NA	NA	Pass
01-222-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
01-223-LKD (2)	47	2.0%	Pass	NA	NA	NA	Pass
01-224-LKD (2)	46	2.0%	Pass	NA	NA	NA	Pass
01-225-LKD (2)	44	1.9%	Pass	NA	NA	NA	Pass
01-226-LKD (1)	50	2.2%	Pass	NA	NA	NA	Pass
01-227-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
02-201-LKD (3)	57	2.5%	Pass	NA	NA	NA	Pass
02-202-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
02-202-LKD (2)	59	2.6%	Pass	NA	NA	NA	Pass
02-202-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
02-205-LKD (3)	46	2.0%	Pass	NA	NA	NA	Pass
02-206-LKD (1)	62	2.7%	Pass	NA	NA	NA	Pass
02-207-LKD (1)	66	2.9%	Pass	NA	NA	NA	Pass
02-208-LKD (1)	66	2.9%	Pass	NA	NA	NA	Pass
02-209-LKD (2)	67	2.9%	Pass	NA	NA	NA	Pass
02-210-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
02-211-LKD (2)	39	1.7%	Pass	NA	NA	NA	Pass
02-212-LKD (1)	51	2.2%	Pass	NA	NA	NA	Pass
02-213-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
02-214-LKD (2)	37	1.6%	Pass	NA	NA	NA	Pass
02-215-LKD (2)	56	2.4%	Pass	NA	NA	NA	Pass
02-216-LKD (2)	68	3.0%	Pass	NA	NA	NA	Pass
02-217-LKD (1)	57	2.5%	Pass	NA	NA	NA	Pass
02-218-LKD (1)	59	2.6%	Pass	NA	NA	NA	Pass
02-219-LKD (1)	66	2.9%	Pass	NA	NA	NA	Pass
02-220-LKD (1)	58	2.5%	Pass	NA	NA	NA	Pass
02-221-LKD (1)	53	2.3%	Pass	NA	NA	NA	Pass
02-222-LKD (2)	60	2.6%	Pass	NA	NA	NA	Pass
02-223-LKD (2)	55	2.4%	Pass	NA	NA	NA	Pass
02-224-LKD (2)	57	2.5%	Pass	NA	NA	NA	Pass
02-225-LKD (2)	56	2.4%	Pass	NA	NA	NA	Pass
02-226-LKD (1)	55	2.4%	Pass	NA	NA	NA	Pass
02-227-LKD (2)	63	2.7%	Pass	NA	NA	NA	Pass

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-Bedroom 2	58	1.6%	Pass	23	0.7%	Pass	Pass
01-201-Bedroom 3 (S)	57	1.6%	Pass	28	0.9%	Pass	Pass
01-202-Bedroom 1	53	1.4%	Pass	24	0.7%	Pass	Pass
01-202-Bedroom 1	51	1.4%	Pass	24	0.7%	Pass	Pass
01-202-Bedroom 2 (S)	56	1.5%	Pass	28	0.9%	Pass	Pass
01-203-Bedroom 1	23	0.6%	Pass	28	0.9%	Pass	Pass
01-203-Bedroom 2 (S)	58	1.6%	Pass	22	0.7%	Pass	Pass
01-204-Bedroom 1	24	0.7%	Pass	31	0.9%	Pass	Pass
01-204-Bedroom 2	26	0.7%	Pass	28	0.9%	Pass	Pass
01-205-Bedroom 1	42	1.1%	Pass	23	0.7%	Pass	Pass
01-205-Bedroom 2	45	1.2%	Pass	23	0.7%	Pass	Pass
01-205-Bedroom 3 (S)	46	1.3%	Pass	25	0.8%	Pass	Pass
01-206-Bedroom	54	1.5%	Pass	24	0.7%	Pass	Pass
01-207-Bedroom	49	1.3%	Pass	25	0.8%	Pass	Pass
01-208-Bedroom	52	1.4%	Pass	25	0.8%	Pass	Pass
01-209-Bedroom 1	62	1.7%	Pass	23	0.7%	Pass	Pass
01-209-Bedroom 2 (S)	67	1.8%	Pass	22	0.7%	Pass	Pass
01-210-Bedroom 1	62	1.7%	Pass	23	0.7%	Pass	Pass
01-210-Bedroom 2 (S)	69	1.9%	Pass	22	0.7%	Pass	Pass
01-211-Bedroom 1	53	1.4%	Pass	23	0.7%	Pass	Pass
01-211-Bedroom 2 (S)	40	1.1%	Pass	26	0.8%	Pass	Pass
01-212-Bedroom	22	0.6%	Pass	28	0.9%	Pass	Pass
01-213-Bedroom 1	50	1.4%	Pass	24	0.7%	Pass	Pass
01-213-Bedroom 2 (S)	54	1.5%	Pass	27	0.8%	Pass	Pass
01-214-Bedroom 1	54	1.5%	Pass	23	0.7%	Pass	Pass
01-214-Bedroom 2 (S)	40	1.1%	Pass	26	0.8%	Pass	Pass
01-215-Bedroom 1	63	1.7%	Pass	23	0.7%	Pass	Pass
01-215-Bedroom 2 (S)	66	1.8%	Pass	22	0.7%	Pass	Pass
01-216-Bedroom 1	63	1.7%	Pass	23	0.7%	Pass	Pass
01-216-Bedroom 2 (S)	71	1.9%	Pass	23	0.7%	Pass	Pass
01-217-Bedroom	46	1.3%	Pass	23	0.7%	Pass	Pass
01-218-Bedroom	44	1.2%	Pass	24	0.7%	Pass	Pass
01-219-Bedroom	48	1.3%	Pass	23	0.7%	Pass	Pass
01-220-Bedroom	44	1.2%	Pass	23	0.7%	Pass	Pass
01-221-Bedroom	19	0.5%	Pass	28	0.9%	Pass	Pass
01-222-Bedroom 1	45	1.2%	Pass	23	0.7%	Pass	Pass
01-222-Bedroom 2 (S)	53	1.4%	Pass	23	0.7%	Pass	Pass
01-223-Bedroom 1	47	1.3%	Pass	23	0.7%	Pass	Pass
01-223-Bedroom 2 (S)	57	1.6%	Pass	22	0.7%	Pass	Pass
01-224-Bedroom 1	46	1.3%	Pass	23	0.7%	Pass	Pass
01-224-Bedroom 2 (S)	50	1.4%	Pass	26	0.8%	Pass	Pass
01-225-Bedroom 1	36	1.0%	Pass	23	0.7%	Pass	Pass

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-225-Bedroom 2 (S)	44	1.2%	Pass	28	0.9%	Pass	Pass
01-226-Bedroom	48	1.3%	Pass	23	0.7%	Pass	Pass
01-227-Bedroom 1	45	1.2%	Pass	23	0.7%	Pass	Pass
01-227-Bedroom 2 (S)	51	1.4%	Pass	22	0.7%	Pass	Pass
02-201-Bedroom 1	57	1.6%	Pass	27	0.8%	Pass	Pass
02-201-Bedroom 2	67	1.8%	Pass	28	0.9%	Pass	Pass
02-201-Bedroom 3 (S)	67	1.8%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 1	25	0.7%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 1	60	1.6%	Pass	27	0.8%	Pass	Pass
02-202-Bedroom 1	31	0.8%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 2	39	1.1%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 2 (S)	65	1.8%	Pass	23	0.7%	Pass	Pass
02-202-Bedroom 2 (S)	65	1.8%	Pass	32	1.0%	Pass	Pass
02-205-Bedroom 1	50	1.4%	Pass	26	0.8%	Pass	Pass
02-205-Bedroom 2	51	1.4%	Pass	24	0.7%	Pass	Pass
02-205-Bedroom 3 (S)	54	1.5%	Pass	28	0.9%	Pass	Pass
02-206-Bedroom	60	1.6%	Pass	27	0.8%	Pass	Pass
02-207-Bedroom	57	1.6%	Pass	27	0.8%	Pass	Pass
02-208-Bedroom	57	1.6%	Pass	28	0.9%	Pass	Pass
02-209-Bedroom 1	67	1.8%	Pass	26	0.8%	Pass	Pass
02-209-Bedroom 2 (S)	74	2.0%	Pass	23	0.7%	Pass	Pass
02-210-Bedroom 1	68	1.9%	Pass	26	0.8%	Pass	Pass
02-210-Bedroom 2 (S)	76	2.1%	Pass	23	0.7%	Pass	Pass
02-211-Bedroom 1	50	1.4%	Pass	24	0.7%	Pass	Pass
02-211-Bedroom 2 (S)	44	1.2%	Pass	27	0.8%	Pass	Pass
02-212-Bedroom	25	0.7%	Pass	32	1.0%	Pass	Pass
02-213-Bedroom 1	53	1.4%	Pass	26	0.8%	Pass	Pass
02-213-Bedroom 2 (S)	57	1.6%	Pass	31	0.9%	Pass	Pass
02-214-Bedroom 1	50	1.4%	Pass	24	0.7%	Pass	Pass
02-214-Bedroom 2 (S)	41	1.1%	Pass	27	0.8%	Pass	Pass
02-215-Bedroom 1	70	1.9%	Pass	26	0.8%	Pass	Pass
02-215-Bedroom 2 (S)	73	2.0%	Pass	23	0.7%	Pass	Pass
02-216-Bedroom 1	70	1.9%	Pass	26	0.8%	Pass	Pass
02-216-Bedroom 2 (S)	78	2.1%	Pass	25	0.8%	Pass	Pass
02-217-Bedroom	57	1.6%	Pass	26	0.8%	Pass	Pass
02-218-Bedroom	55	1.5%	Pass	25	0.8%	Pass	Pass
02-219-Bedroom	59	1.6%	Pass	26	0.8%	Pass	Pass
02-220-Bedroom	54	1.5%	Pass	25	0.8%	Pass	Pass
02-221-Bedroom	23	0.6%	Pass	32	1.0%	Pass	Pass
02-222-Bedroom 1	52	1.4%	Pass	23	0.7%	Pass	Pass
02-222-Bedroom 2 (S)	60	1.6%	Pass	23	0.7%	Pass	Pass
02-223-Bedroom 1	57	1.6%	Pass	25	0.8%	Pass	Pass
02-223-Bedroom 2 (S)	68	1.9%	Pass	24	0.7%	Pass	Pass
02-224-Bedroom 1	55	1.5%	Pass	25	0.8%	Pass	Pass
02-224-Bedroom 2 (S)	59	1.6%	Pass	31	0.9%	Pass	Pass
02-225-Bedroom 1	46	1.3%	Pass	25	0.8%	Pass	Pass
02-225-Bedroom 2 (S)	55	1.5%	Pass	32	1.0%	Pass	Pass
02-226-Bedroom	60	1.6%	Pass	25	0.8%	Pass	Pass
02-227-Bedroom 1	52	1.4%	Pass	23	0.7%	Pass	Pass
02-227-Bedroom 2 (S)	60	1.6%	Pass	23	0.7%	Pass	Pass

1 INTRODUCTION

1.1 Background

This Overheating Risk Assessment has been prepared by Silcock Dawson and Partners on behalf of Notting Hill Home Ownership to assess the risk of dwellings overheating at the proposed new development at St Clare Business Park, Richmond.

The aim of this report is to document the findings of thermal modelling that has been undertaken to quantify the overheating risk within the dwellings. Modelling has been undertaken in accordance with the criteria set out in CIBSE Technical Memoranda 59 Design Methodology for the Assessment of Overheating Risk in Homes (2017)

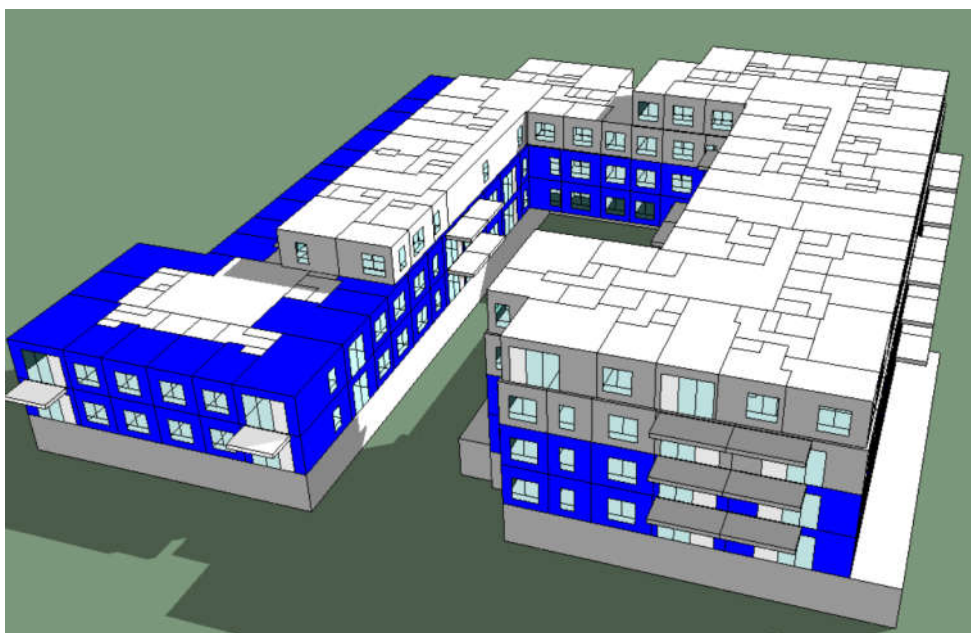
The redevelopment comprises the demolition of existing buildings and erection of 1 no. mixed use building between three and five storeys plus basement in height, comprising 86 no. residential flats (Class C3) and 1,290 sq.m of commercial floorspace (Class E); 1 no. two storey building comprising 595sq.m of commercial floorspace (Class E); 14no. residential houses (Class C3); and, associated access, external landscaping and car parking.

2 PHYSICAL FORM OF THE BUILDING

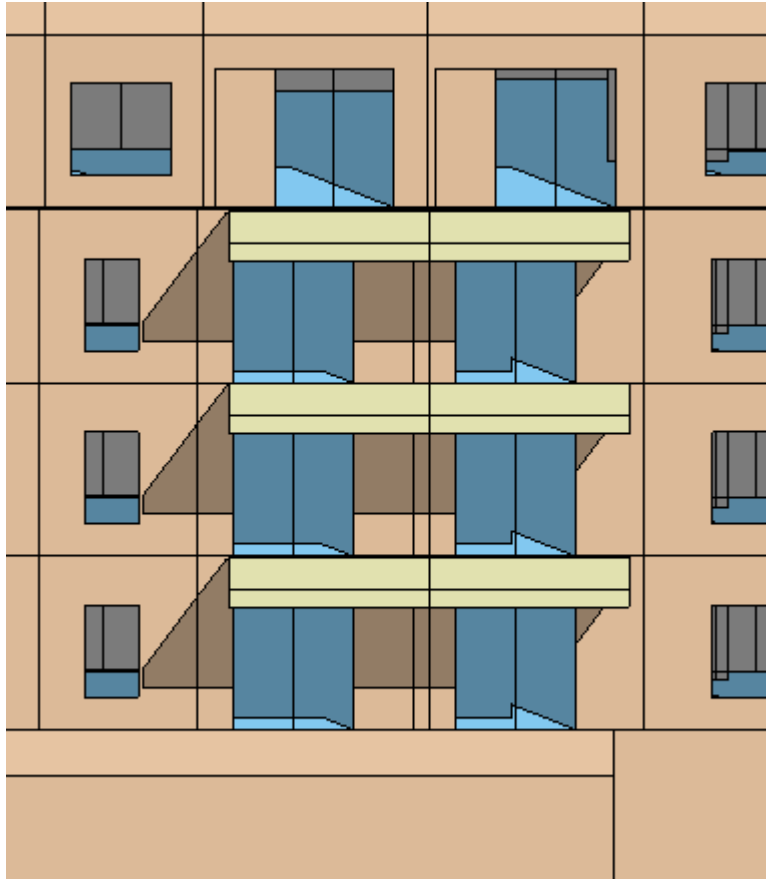
The proposed building is of a medium weight construction, comprising a structural framing system wall construction with a brick external finish. Floors and flat roofs will be constructed of concrete, which will increase the thermal mass of the development, but the effect of this will be reduced by the use of suspended ceilings and floor finishes.

Balconies will be provided to all apartments which will provide additional shading to the units below, particularly on the South and West elevations which have the greatest impact on reducing solar gain in dwellings. The design also incorporates several inset balconies and vertical shades to further reduce the direct solar gains.

Apartments shaded blue in the image below are included within this assessment.



Block 1 North and West elevations in midsummer @ 16.00



The image above of a West elevation balcony illustrates the shading effect over the single largest glazed areas within each apartment.

2.1 Background Ventilation Strategy

A very efficient mechanical ventilation system with heat recovery (MVHR) with automatic summer bypass is proposed for the scheme. The summer bypass will provide continuous ventilation during the summer, which will help to mitigate the risk of overheating particularly at night when the natural ventilation from opening windows will be reduced.

The dwellings most at risk of overheating are the apartments and as these occupy the majority of the development floor area this report focuses on these spaces.

The apartments have a high level of similarity / repetition, therefore the apartments on the 1st and 2nd floors have been assessed.

During construction stage of the development, a full overheating assessment should be undertaken to ensure compliance with Approved Document Part O is still achieved in all apartments.

Floor level – 1



Floor level – 2



Floor plans with apartment reference numbers are included in the results section.

2.2 Lighting and Appliances

High efficiency low energy lighting will be specified within all apartments and will be lower than the standard value specified within the assessment methodology.

In addition lighting and controls within all common circulation spaces, will utilise 100% low energy lighting with presence detection to both conserve energy and reduce the heat gains to the spaces.

3 RELEVANT PLANNING POLICYS

3.1 London Plan (2021) Policy D6 – Housing Quality & Standards

- A Housing development should be of high quality design and provide adequately-sized rooms (see [Table 3.1](#)) with comfortable and functional layouts which are fit for purpose and meet the needs of Londoners without differentiating between tenures.
- B Qualitative aspects of a development are key to ensuring successful sustainable housing. [Table 3.2](#) sets out key qualitative aspects which should be addressed in the design of housing developments.
- C Housing development should maximise the provision of dual aspect dwellings and normally avoid the provision of single aspect dwellings. A single aspect dwelling should only be provided where it is considered a more appropriate design solution to meet the requirements of Part B in [Policy D3 Optimising site capacity through the design-led approach](#) than a dual aspect dwelling, and it can be demonstrated that it will have adequate passive ventilation, daylight and privacy, and avoid overheating.
- D The design of development should provide sufficient daylight and sunlight to new and surrounding housing that is appropriate for its context, whilst avoiding overheating, minimising overshadowing and maximising the usability of outside amenity space.
- E Housing should be designed with adequate and easily accessible storage space that supports the separate collection of dry recyclables (for at least card, paper, mixed plastics, metals, glass) and food waste as well as residual waste.
- F Housing developments are required to meet the minimum standards below which apply to all tenures and all residential accommodation that is self-contained.

Private internal space

- 1) Dwellings must provide at least the gross internal floor area and built-in storage area set out in [Table 3.1](#).
- 2) A dwelling with two or more bedspaces must have at least one double (or twin) bedroom that is at least 2.75m wide. Every other additional double (or twin) bedroom must be at least 2.55m wide.

- 3) A one bedspace single bedroom must have a floor area of at least 7.5 sq.m. and be at least 2.15m wide.
- 4) A two bedspace double (or twin) bedroom must have a floor area of at least 11.5 sq.m..
- 5) Any area with a headroom of less than 1.5m is not counted within the Gross Internal Area unless used solely for storage (If the area under the stairs is to be used for storage, assume a general floor area of 1 sq.m. within the Gross Internal Area).
- 6) Any other area that is used solely for storage and has a headroom of 0.9-1.5m (such as under eaves) can only be counted up to 50 per cent of its floor area, and any area lower than 0.9m is not counted at all.
- 7) A built-in wardrobe counts towards the Gross Internal Area and bedroom floor area requirements, but should not reduce the effective width of the room below the minimum widths set out above. Any built-in area in excess of 0.72 sq.m. in a double bedroom and 0.36 sq.m. in a single bedroom counts towards the built-in storage requirement.
- 8) The minimum floor to ceiling height must be 2.5m for at least 75 per cent of the Gross Internal Area of each dwelling.

Private outside space

- 9) Where there are no higher local standards in the borough Development Plan Documents, a minimum of 5 sq.m. of private outdoor space should be provided for 1-2 person dwellings and an extra 1 sq.m. should be provided for each additional occupant, and it must achieve a minimum depth and width of 1.5m. This does not count towards the minimum Gross Internal Area space standards required in [Table 3.1](#)

G The Mayor will produce guidance on the implementation of this policy for all housing tenures.

3.2 London Plan (2021) Policy S14 – Managing Heat Risk

- A Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.
- B Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:
 - 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.

3.3 Richmond Local Plan (2018) Policy LP 20 - Climate Change Adaption

A. The Council will promote and encourage development to be fully resilient to the future impacts of climate change in order to minimise vulnerability of people and property.

B. New development, in their layout, design, construction, materials, landscaping and operation, should minimise the effects of overheating as well as minimise energy consumption 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, reducing solar reflectance, 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).

C. Opportunities to adapt existing buildings, places and spaces to the likely effects of climate change should be maximised and will be supported.

4 OVERHEATING ASSESSMENT

4.1 Adaptive Thermal Comfort

The overheating assessment is based on the adaptive comfort model following the methodology and recommendations from EN 15251, and modelling has been undertaken following the procedure set out in Approved Document Part O.

The thermal modelling has been carried out using IES VE 2022 software. This modelling software is CIBSE AM11 compliant.

Part O follows the methodology described within CIBSE TM59 and tests two criteria to assess overheating risk. One of which is defined in terms of the difference between the actual operative temperature in the room at any time (T_{op}) and the limiting maximum acceptable temperature (T_{max}). The difference between these temperature values is the 'delta T' (ΔT).

DEFINITIONS

Operative Temperature

$$T_{OP} = 0.5 T_{air} (\text{AirTemp}) + 0.5 T_{mrt} (\text{Mean Radiant Temp})$$

Maximum acceptable temperature

$$T_{MAX} = 0.33T_{rm} + 21.8$$

Where:

Running Mean Temperature, T_{rm} , is the running average of recent external temperatures. The running mean is calculated using a complicated equation that weights the significance of external temperatures according to how recently they occurred. This weighting gives a greater influence for recent days, reducing with time passed as people "forget".

Criterion 1 – Hours of Exceedance (H_e): The number of hours that the actual operative temperature in the room (T_{op}) exceeds the limiting maximum acceptable temperature (T_{max}) by one degree (K) or more, must be less than 3% of the summer occupied hours, May to September. The maximum number of hours exceeding for Lounges and Kitchens is 59, however as bedrooms are assumed to be continuously occupied this increases to 110 for these spaces.

This criterion provides an understanding of how often a room is likely to exceed its comfort range and can provide a good assessment of acceptability.

Criterion 2 - Frequency Assessment (Bedrooms and Studios only)

In addition to the adaptive comfort a second test is also carried out for bedrooms to provide an assessment of comfort during the sleeping hours. The operative temperature in bedrooms from 22:00 to 07:00 shall not exceed 26°C for more than 1% (33 hours) of the occupied hours annually.

Bedrooms must comply with Criterion 1 and 2 for the room to comply

4.1 Additional Requirements of Approved Document Part O

All window openings to open full inwards, using a modulating profile so Windows to open:

- Start to open when the internal temperature exceeds 22°C.
- ii. Be fully open when the internal temperature exceeds 26°C.
- iii. Start to close when the internal temperature falls below 26°C.
- iv. Be fully closed when the internal temperature falls below 22°C

Blinds should not be included within the assessment, even where their application is likely.

Access to easily accessible apartments should be considered, with measures adopted to prevent unwanted access.

4.2 Building / Room Categories

TM59 suggests four categories of performance under which buildings should be assessed. The CIBSE suggestion is that designers should aim to remain within the Category II limits for building not used by groups that may be adversely affected by warmer environments.

Category	Explanation	Suggested acceptable range (K)
I	High level of expectation only used for spaces occupied by very sensitive and fragile persons	± 2
II	Normal expectation (for new buildings and renovations)	± 3
III	A moderate expectation (used for existing buildings)	± 4
IV	Values outside the criteria for the above categories (only acceptable for a limited periods)	>4

For the purposes of this study all rooms are assessed as Category II.

4.3 Weather Files

The 'London Heathrow' weather file has been selected as the most representative from the data base, due to the outer London location of the development. The exact weather file for the assessment is London_LHR_DSY1_2020 High 50 in accordance with the recommendations within TM59.

TM59 also stipulates that results of the following simulations should be included for information.

- Design Summer Year 2 (Short Intense Warm Spell)
- Design Summer Year 3 (Long, less intense warm spell)

4.4 Noise

The noise impact assessment has identified that a number of dwellings may be subject to high noise levels when the windows are open for extended periods as would be expected to overcome overheating risk. Where identified such dwellings will be provided with 'Peak lop' cooling modules which are integrated within the MVHR system to allow the windows to remain closed. The units do not provide air conditioning, but only provide sufficient cooling to overcome the heating risk as defined within CIBSE TM59 allowing high temperatures to be experienced for a limited number of days per year. Therefore, the energy consumption from the cooling equipment is excluded from the Part L calculation.

Approved Document Part O stipulates that dwellings should comply as naturally ventilated spaces prior to the installation of cooling, to demonstrate that reasonable measures have been incorporated within the design to restrict solar gains to an acceptable level.

4.5 Rooms Assessed

A total of 54 apartments on the 1st and 2nd floors have been assessed, covering all elevations to ensure the apartments most at risk of overheating are assessed.

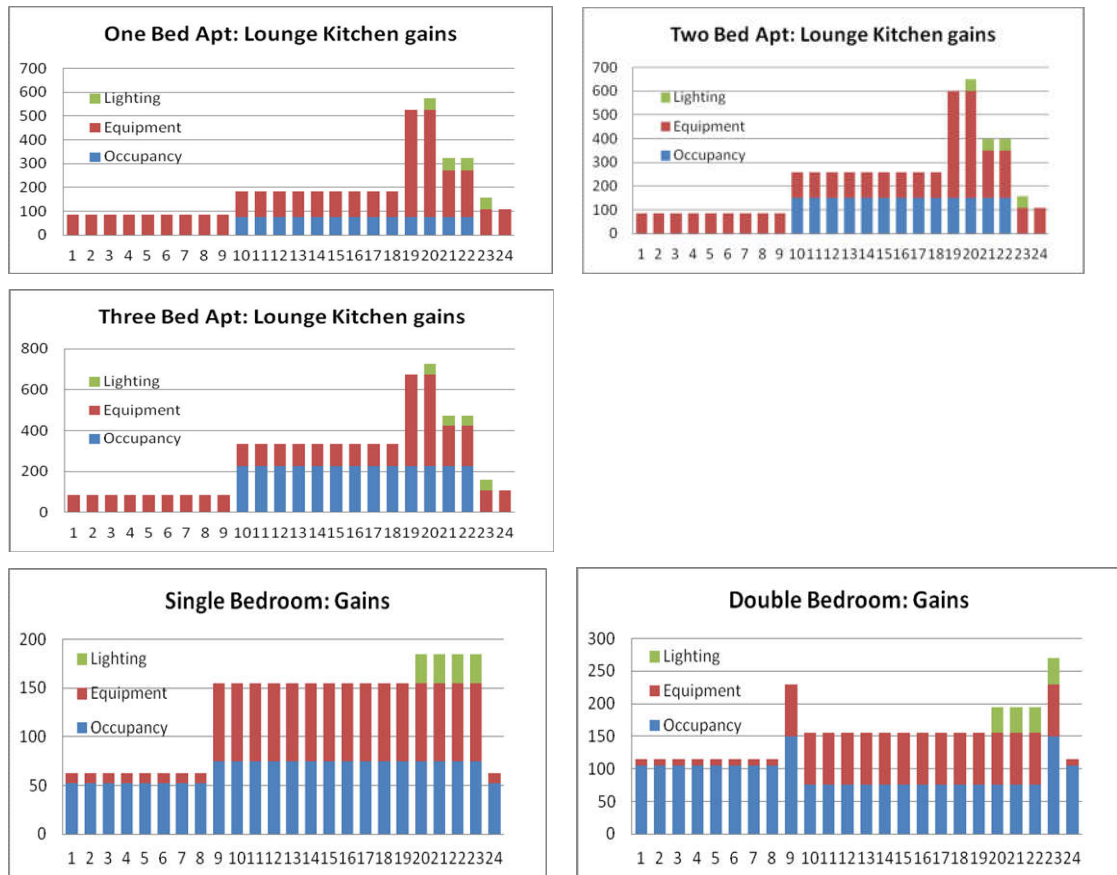
4.6 Building Construction and Ventilation

The following table summarises out the key assumptions used within the simulation.

Item	Dwellings Construction
Window Properties	Window U value: 1.0 W/m ² K Glazing G value: 0.38 Glazing Light Transmittance: 0.7
External wall construction	Brick, cavity, lightweight construction with partial insulation within the cavity and plasterboard on dabs inner surface.
Party wall construction	25mm Plasterboard, cavity, insulation, 25mm plasterboard.
Internal wall construction	Plasterboard stud walls with 15mm plasterboard both sides
Intermediate floor construction	Plasterboard ceiling, air gap, concrete/screed, and carpet finish.
Background Mechanical Ventilation	Background ventilation rate in accordance with Approved Document Part F (approximately 0.4 air changes by MVHR with summer bypass including at least 6l/s extract rate from heat interface unit cupboard).
Infiltration	0.25 air changes per hour
Windows	Openable windows are simulated to start to open when the air temperature reaches 22°C and fully open at 26°C. Windows open inward and have the ability to open fully.
Internal Doors	Internal doors will be held fully open outside of sleeping hours to promote cross flow ventilation.
Balcony Doors	Balcony doors open as the windows, but with an additional night set back applied restricting the window to 200mm.

4.7 Internal Gains

The following graphs show the internal heat gains for the dwellings and the times at which the gains are present as detailed within TM59.



Note: the above graphs are taken from TM59, however the dining room gains have been amended to suit Part O where the occupancy time is between 08:00-23:00.

Lounge heat gains also include heat gains from cooking which are applied from 18:00 to 20:00 the background equipment gains are from the refrigerator and other equipment left on standby.

It should be noted that bedrooms and studio apartments are continuously occupied, this is intended to reflect the possibility that these rooms could be used as home offices, study areas during the day, or by persons that are confined to the bedrooms for extended periods of time.

A full breakdown of internal gains is contained in Appendix 1.

5 APARTMENT RESULTS

5.1 Design Summer Year 1

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-LKD (3)	52	2.3%	Pass	NA	NA	NA	Pass
01-202-LKD (2)	43	1.9%	Pass	NA	NA	NA	Pass
01-203-LKD (2)	52	2.3%	Pass	NA	NA	NA	Pass
01-204-LKD (2)	51	2.2%	Pass	NA	NA	NA	Pass
01-205-LKD (3)	34	1.5%	Pass	NA	NA	NA	Pass
01-206-LKD (1)	53	2.3%	Pass	NA	NA	NA	Pass
01-207-LKD (1)	54	2.4%	Pass	NA	NA	NA	Pass
01-208-LKD (1)	55	2.4%	Pass	NA	NA	NA	Pass
01-209-LKD (2)	60	2.6%	Pass	NA	NA	NA	Pass
01-210-LKD (2)	49	2.1%	Pass	NA	NA	NA	Pass
01-211-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
01-212-LKD (1)	45	2.0%	Pass	NA	NA	NA	Pass
01-213-LKD (2)	52	2.3%	Pass	NA	NA	NA	Pass
01-214-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
01-215-LKD (2)	49	2.1%	Pass	NA	NA	NA	Pass
01-216-LKD (2)	65	2.8%	Pass	NA	NA	NA	Pass
01-217-LKD (1)	45	2.0%	Pass	NA	NA	NA	Pass
01-218-LKD (1)	48	2.1%	Pass	NA	NA	NA	Pass
01-219-LKD (1)	55	2.4%	Pass	NA	NA	NA	Pass
01-220-LKD (1)	49	2.1%	Pass	NA	NA	NA	Pass
01-221-LKD (1)	43	1.9%	Pass	NA	NA	NA	Pass
01-222-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
01-223-LKD (2)	47	2.0%	Pass	NA	NA	NA	Pass
01-224-LKD (2)	46	2.0%	Pass	NA	NA	NA	Pass
01-225-LKD (2)	44	1.9%	Pass	NA	NA	NA	Pass
01-226-LKD (1)	50	2.2%	Pass	NA	NA	NA	Pass
01-227-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
02-201-LKD (3)	57	2.5%	Pass	NA	NA	NA	Pass
02-202-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
02-202-LKD (2)	59	2.6%	Pass	NA	NA	NA	Pass
02-202-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
02-205-LKD (3)	46	2.0%	Pass	NA	NA	NA	Pass
02-206-LKD (1)	62	2.7%	Pass	NA	NA	NA	Pass
02-207-LKD (1)	66	2.9%	Pass	NA	NA	NA	Pass
02-208-LKD (1)	66	2.9%	Pass	NA	NA	NA	Pass
02-209-LKD (2)	67	2.9%	Pass	NA	NA	NA	Pass
02-210-LKD (2)	54	2.4%	Pass	NA	NA	NA	Pass
02-211-LKD (2)	39	1.7%	Pass	NA	NA	NA	Pass
02-212-LKD (1)	51	2.2%	Pass	NA	NA	NA	Pass
02-213-LKD (2)	58	2.5%	Pass	NA	NA	NA	Pass
02-214-LKD (2)	37	1.6%	Pass	NA	NA	NA	Pass
02-215-LKD (2)	56	2.4%	Pass	NA	NA	NA	Pass
02-216-LKD (2)	68	3.0%	Pass	NA	NA	NA	Pass
02-217-LKD (1)	57	2.5%	Pass	NA	NA	NA	Pass
02-218-LKD (1)	59	2.6%	Pass	NA	NA	NA	Pass
02-219-LKD (1)	66	2.9%	Pass	NA	NA	NA	Pass
02-220-LKD (1)	58	2.5%	Pass	NA	NA	NA	Pass
02-221-LKD (1)	53	2.3%	Pass	NA	NA	NA	Pass
02-222-LKD (2)	60	2.6%	Pass	NA	NA	NA	Pass
02-223-LKD (2)	55	2.4%	Pass	NA	NA	NA	Pass
02-224-LKD (2)	57	2.5%	Pass	NA	NA	NA	Pass
02-225-LKD (2)	56	2.4%	Pass	NA	NA	NA	Pass
02-226-LKD (1)	55	2.4%	Pass	NA	NA	NA	Pass
02-227-LKD (2)	63	2.7%	Pass	NA	NA	NA	Pass

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-Bedroom 2	58	1.6%	Pass	23	0.7%	Pass	Pass
01-201-Bedroom 3 (S)	57	1.6%	Pass	28	0.9%	Pass	Pass
01-202-Bedroom 1	53	1.4%	Pass	24	0.7%	Pass	Pass
01-202-Bedroom 1	51	1.4%	Pass	24	0.7%	Pass	Pass
01-202-Bedroom 2 (S)	56	1.5%	Pass	28	0.9%	Pass	Pass
01-203-Bedroom 1	23	0.6%	Pass	28	0.9%	Pass	Pass
01-203-Bedroom 2 (S)	58	1.6%	Pass	22	0.7%	Pass	Pass
01-204-Bedroom 1	24	0.7%	Pass	31	0.9%	Pass	Pass
01-204-Bedroom 2	26	0.7%	Pass	28	0.9%	Pass	Pass
01-205-Bedroom 1	42	1.1%	Pass	23	0.7%	Pass	Pass
01-205-Bedroom 2	45	1.2%	Pass	23	0.7%	Pass	Pass
01-205-Bedroom 3 (S)	46	1.3%	Pass	25	0.8%	Pass	Pass
01-206-Bedroom	54	1.5%	Pass	24	0.7%	Pass	Pass
01-207-Bedroom	49	1.3%	Pass	25	0.8%	Pass	Pass
01-208-Bedroom	52	1.4%	Pass	25	0.8%	Pass	Pass
01-209-Bedroom 1	62	1.7%	Pass	23	0.7%	Pass	Pass
01-209-Bedroom 2 (S)	67	1.8%	Pass	22	0.7%	Pass	Pass
01-210-Bedroom 1	62	1.7%	Pass	23	0.7%	Pass	Pass
01-210-Bedroom 2 (S)	69	1.9%	Pass	22	0.7%	Pass	Pass
01-211-Bedroom 1	53	1.4%	Pass	23	0.7%	Pass	Pass
01-211-Bedroom 2 (S)	40	1.1%	Pass	26	0.8%	Pass	Pass
01-212-Bedroom	22	0.6%	Pass	28	0.9%	Pass	Pass
01-213-Bedroom 1	50	1.4%	Pass	24	0.7%	Pass	Pass
01-213-Bedroom 2 (S)	54	1.5%	Pass	27	0.8%	Pass	Pass
01-214-Bedroom 1	54	1.5%	Pass	23	0.7%	Pass	Pass
01-214-Bedroom 2 (S)	40	1.1%	Pass	26	0.8%	Pass	Pass
01-215-Bedroom 1	63	1.7%	Pass	23	0.7%	Pass	Pass
01-215-Bedroom 2 (S)	66	1.8%	Pass	22	0.7%	Pass	Pass
01-216-Bedroom 1	63	1.7%	Pass	23	0.7%	Pass	Pass
01-216-Bedroom 2 (S)	71	1.9%	Pass	23	0.7%	Pass	Pass
01-217-Bedroom	46	1.3%	Pass	23	0.7%	Pass	Pass
01-218-Bedroom	44	1.2%	Pass	24	0.7%	Pass	Pass
01-219-Bedroom	48	1.3%	Pass	23	0.7%	Pass	Pass
01-220-Bedroom	44	1.2%	Pass	23	0.7%	Pass	Pass
01-221-Bedroom	19	0.5%	Pass	28	0.9%	Pass	Pass
01-222-Bedroom 1	45	1.2%	Pass	23	0.7%	Pass	Pass
01-222-Bedroom 2 (S)	53	1.4%	Pass	23	0.7%	Pass	Pass
01-223-Bedroom 1	47	1.3%	Pass	23	0.7%	Pass	Pass
01-223-Bedroom 2 (S)	57	1.6%	Pass	22	0.7%	Pass	Pass
01-224-Bedroom 1	46	1.3%	Pass	23	0.7%	Pass	Pass
01-224-Bedroom 2 (S)	50	1.4%	Pass	26	0.8%	Pass	Pass
01-225-Bedroom 1	36	1.0%	Pass	23	0.7%	Pass	Pass

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-225-Bedroom 2 (S)	44	1.2%	Pass	28	0.9%	Pass	Pass
01-226-Bedroom	48	1.3%	Pass	23	0.7%	Pass	Pass
01-227-Bedroom 1	45	1.2%	Pass	23	0.7%	Pass	Pass
01-227-Bedroom 2 (S)	51	1.4%	Pass	22	0.7%	Pass	Pass
02-201-Bedroom 1	57	1.6%	Pass	27	0.8%	Pass	Pass
02-201-Bedroom 2	67	1.8%	Pass	28	0.9%	Pass	Pass
02-201-Bedroom 3 (S)	67	1.8%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 1	25	0.7%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 1	60	1.6%	Pass	27	0.8%	Pass	Pass
02-202-Bedroom 1	31	0.8%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 2	39	1.1%	Pass	32	1.0%	Pass	Pass
02-202-Bedroom 2 (S)	65	1.8%	Pass	23	0.7%	Pass	Pass
02-202-Bedroom 2 (S)	65	1.8%	Pass	32	1.0%	Pass	Pass
02-205-Bedroom 1	50	1.4%	Pass	26	0.8%	Pass	Pass
02-205-Bedroom 2	51	1.4%	Pass	24	0.7%	Pass	Pass
02-205-Bedroom 3 (S)	54	1.5%	Pass	28	0.9%	Pass	Pass
02-206-Bedroom	60	1.6%	Pass	27	0.8%	Pass	Pass
02-207-Bedroom	57	1.6%	Pass	27	0.8%	Pass	Pass
02-208-Bedroom	57	1.6%	Pass	28	0.9%	Pass	Pass
02-209-Bedroom 1	67	1.8%	Pass	26	0.8%	Pass	Pass
02-209-Bedroom 2 (S)	74	2.0%	Pass	23	0.7%	Pass	Pass
02-210-Bedroom 1	68	1.9%	Pass	26	0.8%	Pass	Pass
02-210-Bedroom 2 (S)	76	2.1%	Pass	23	0.7%	Pass	Pass
02-211-Bedroom 1	50	1.4%	Pass	24	0.7%	Pass	Pass
02-211-Bedroom 2 (S)	44	1.2%	Pass	27	0.8%	Pass	Pass
02-212-Bedroom	25	0.7%	Pass	32	1.0%	Pass	Pass
02-213-Bedroom 1	53	1.4%	Pass	26	0.8%	Pass	Pass
02-213-Bedroom 2 (S)	57	1.6%	Pass	31	0.9%	Pass	Pass
02-214-Bedroom 1	50	1.4%	Pass	24	0.7%	Pass	Pass
02-214-Bedroom 2 (S)	41	1.1%	Pass	27	0.8%	Pass	Pass
02-215-Bedroom 1	70	1.9%	Pass	26	0.8%	Pass	Pass
02-215-Bedroom 2 (S)	73	2.0%	Pass	23	0.7%	Pass	Pass
02-216-Bedroom 1	70	1.9%	Pass	26	0.8%	Pass	Pass
02-216-Bedroom 2 (S)	78	2.1%	Pass	25	0.8%	Pass	Pass
02-217-Bedroom	57	1.6%	Pass	26	0.8%	Pass	Pass
02-218-Bedroom	55	1.5%	Pass	25	0.8%	Pass	Pass
02-219-Bedroom	59	1.6%	Pass	26	0.8%	Pass	Pass
02-220-Bedroom	54	1.5%	Pass	25	0.8%	Pass	Pass
02-221-Bedroom	23	0.6%	Pass	32	1.0%	Pass	Pass
02-222-Bedroom 1	52	1.4%	Pass	23	0.7%	Pass	Pass
02-222-Bedroom 2 (S)	60	1.6%	Pass	23	0.7%	Pass	Pass
02-223-Bedroom 1	57	1.6%	Pass	25	0.8%	Pass	Pass
02-223-Bedroom 2 (S)	68	1.9%	Pass	24	0.7%	Pass	Pass
02-224-Bedroom 1	55	1.5%	Pass	25	0.8%	Pass	Pass
02-224-Bedroom 2 (S)	59	1.6%	Pass	31	0.9%	Pass	Pass
02-225-Bedroom 1	46	1.3%	Pass	25	0.8%	Pass	Pass
02-225-Bedroom 2 (S)	55	1.5%	Pass	32	1.0%	Pass	Pass
02-226-Bedroom	60	1.6%	Pass	25	0.8%	Pass	Pass
02-227-Bedroom 1	52	1.4%	Pass	23	0.7%	Pass	Pass
02-227-Bedroom 2 (S)	60	1.6%	Pass	23	0.7%	Pass	Pass

All rooms comply with the assessment methodology, with no rooms exceeding the criteria.

The design of the apartments has been sympathetic to the requirements to minimise overheating, whilst considering the need to provide adequate daylight, and adopt the principles of Policy LP20 by:

- Utilising the balcony design to provide additional shading to the apartments below
- Solar control glazing is applied to all windows which will have a will have a G value of 0.38. The light transmission of the glass at these levels will not be below 70% and would not have a negative impact on the daylight amenity.
- The dwellings are energy efficient, due to the choice of heating system proposed there will be no unwanted heat emissions from heat network pipework.

In addition the residents will be issued a Home User Guide which will include information relating to thermal comfort during the summer months. This will include information on the use of blinds when the apartments are unoccupied to reduce the solar gains, and the effect of portable fans. Even a small amount of air movement across an occupant can have a significant impact on the environmental conditions experienced; a velocity of just 0.25m/s can have the effect of raising the threshold comfort temperature by 1°C.





Unit/Room type	Occupancy	Equipment load
Studio	2 people at all times	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 8 am to 11 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 8 am to 11 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 8 am to 11 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	2 People at 75% gains 8am to 11pm; room is unoccupied for the rest of the day	Peak load of 150W from 6pm to 10pm 60W from 9am to 6pm and from 10pm to 12pm Base load of 35W for the rest of the day.
3-bedroom apartment: kitchen	3 people at 25% gains from 8am to 11pm; room is unoccupied for the rest of the day	Peak load of 300W from 6pm to 8pm Base load of 50W for the rest of the day.
Double Bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gain in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single Bedroom	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours

Notes:

All times in GMT

TM59 requires assessments to assess the conditions when the more extreme weather files DSY 2 and DSY 3 are applied. The additional assessments are provided for information and compliance is not required.

DSY 2 – Contained a short intense warm spell

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-LKD (3)	76	3.3%	Fail	NA	NA	NA	Fail
01-202-LKD (2)	70	3.1%	Fail	NA	NA	NA	Fail
01-203-LKD (2)	78	3.4%	Fail	NA	NA	NA	Fail
01-204-LKD (2)	77	3.4%	Fail	NA	NA	NA	Fail
01-205-LKD (3)	64	2.8%	Pass	NA	NA	NA	Pass
01-206-LKD (1)	74	3.2%	Fail	NA	NA	NA	Fail
01-207-LKD (1)	76	3.3%	Fail	NA	NA	NA	Fail
01-208-LKD (1)	76	3.3%	Fail	NA	NA	NA	Fail
01-209-LKD (2)	83	3.6%	Fail	NA	NA	NA	Fail
01-210-LKD (2)	74	3.2%	Fail	NA	NA	NA	Fail
01-211-LKD (2)	81	3.5%	Fail	NA	NA	NA	Fail
01-212-LKD (1)	73	3.2%	Fail	NA	NA	NA	Fail
01-213-LKD (2)	78	3.4%	Fail	NA	NA	NA	Fail
01-214-LKD (2)	82	3.6%	Fail	NA	NA	NA	Fail
01-215-LKD (2)	76	3.3%	Fail	NA	NA	NA	Fail
01-216-LKD (2)	85	3.7%	Fail	NA	NA	NA	Fail
01-217-LKD (1)	75	3.3%	Fail	NA	NA	NA	Fail
01-218-LKD (1)	75	3.3%	Fail	NA	NA	NA	Fail
01-219-LKD (1)	78	3.4%	Fail	NA	NA	NA	Fail
01-220-LKD (1)	73	3.2%	Fail	NA	NA	NA	Fail
01-221-LKD (1)	69	3.0%	Pass	NA	NA	NA	Pass
01-222-LKD (2)	77	3.4%	Fail	NA	NA	NA	Fail
01-223-LKD (2)	73	3.2%	Fail	NA	NA	NA	Fail
01-224-LKD (2)	73	3.2%	Fail	NA	NA	NA	Fail
01-225-LKD (2)	72	3.1%	Fail	NA	NA	NA	Fail
01-226-LKD (1)	75	3.3%	Fail	NA	NA	NA	Fail
01-227-LKD (2)	79	3.4%	Fail	NA	NA	NA	Fail
02-201-LKD (3)	81	3.5%	Fail	NA	NA	NA	Fail
02-202-LKD (2)	78	3.4%	Fail	NA	NA	NA	Fail
02-202-LKD (2)	85	3.7%	Fail	NA	NA	NA	Fail
02-202-LKD (2)	83	3.6%	Fail	NA	NA	NA	Fail
02-205-LKD (3)	72	3.1%	Fail	NA	NA	NA	Fail
02-206-LKD (1)	84	3.7%	Fail	NA	NA	NA	Fail
02-207-LKD (1)	85	3.7%	Fail	NA	NA	NA	Fail
02-208-LKD (1)	85	3.7%	Fail	NA	NA	NA	Fail
02-209-LKD (2)	87	3.8%	Fail	NA	NA	NA	Fail
02-210-LKD (2)	82	3.6%	Fail	NA	NA	NA	Fail
02-211-LKD (2)	67	2.9%	Pass	NA	NA	NA	Pass
02-212-LKD (1)	78	3.4%	Fail	NA	NA	NA	Fail
02-213-LKD (2)	84	3.7%	Fail	NA	NA	NA	Fail
02-214-LKD (2)	66	2.9%	Pass	NA	NA	NA	Pass
02-215-LKD (2)	83	3.6%	Fail	NA	NA	NA	Fail
02-216-LKD (2)	89	3.9%	Fail	NA	NA	NA	Fail
02-217-LKD (1)	83	3.6%	Fail	NA	NA	NA	Fail
02-218-LKD (1)	83	3.6%	Fail	NA	NA	NA	Fail
02-219-LKD (1)	87	3.8%	Fail	NA	NA	NA	Fail
02-220-LKD (1)	83	3.6%	Fail	NA	NA	NA	Fail
02-221-LKD (1)	75	3.3%	Fail	NA	NA	NA	Fail
02-222-LKD (2)	82	3.6%	Fail	NA	NA	NA	Fail
02-223-LKD (2)	81	3.5%	Fail	NA	NA	NA	Fail
02-224-LKD (2)	82	3.6%	Fail	NA	NA	NA	Fail
02-225-LKD (2)	83	3.6%	Fail	NA	NA	NA	Fail
02-226-LKD (1)	83	3.6%	Fail	NA	NA	NA	Fail
02-227-LKD (2)	83	3.6%	Fail	NA	NA	NA	Fail

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-Bedroom 2	77	2.1%	Pass	38	1.2%	Fail	Fail
01-201-Bedroom 3 (S)	77	2.1%	Pass	43	1.3%	Fail	Fail
01-202-Bedroom 1	70	1.9%	Pass	38	1.2%	Fail	Fail
01-202-Bedroom 1	70	1.9%	Pass	38	1.2%	Fail	Fail
01-202-Bedroom 2 (S)	75	2.0%	Pass	44	1.3%	Fail	Fail
01-203-Bedroom 1	56	1.5%	Pass	51	1.6%	Fail	Fail
01-203-Bedroom 2 (S)	84	2.3%	Pass	35	1.1%	Fail	Fail
01-204-Bedroom 1	54	1.5%	Pass	52	1.6%	Fail	Fail
01-204-Bedroom 2	59	1.6%	Pass	51	1.6%	Fail	Fail
01-205-Bedroom 1	64	1.7%	Pass	38	1.2%	Fail	Fail
01-205-Bedroom 2	64	1.7%	Pass	37	1.1%	Fail	Fail
01-205-Bedroom 3 (S)	69	1.9%	Pass	40	1.2%	Fail	Fail
01-206-Bedroom	73	2.0%	Pass	40	1.2%	Fail	Fail
01-207-Bedroom	68	1.9%	Pass	41	1.2%	Fail	Fail
01-208-Bedroom	72	2.0%	Pass	42	1.3%	Fail	Fail
01-209-Bedroom 1	84	2.3%	Pass	37	1.1%	Fail	Fail
01-209-Bedroom 2 (S)	94	2.6%	Pass	36	1.1%	Fail	Fail
01-210-Bedroom 1	85	2.3%	Pass	37	1.1%	Fail	Fail
01-210-Bedroom 2 (S)	94	2.6%	Pass	36	1.1%	Fail	Fail
01-211-Bedroom 1	74	2.0%	Pass	36	1.1%	Fail	Fail
01-211-Bedroom 2 (S)	67	1.8%	Pass	42	1.3%	Fail	Fail
01-212-Bedroom	54	1.5%	Pass	51	1.6%	Fail	Fail
01-213-Bedroom 1	73	2.0%	Pass	38	1.2%	Fail	Fail
01-213-Bedroom 2 (S)	79	2.2%	Pass	46	1.4%	Fail	Fail
01-214-Bedroom 1	74	2.0%	Pass	36	1.1%	Fail	Fail
01-214-Bedroom 2 (S)	67	1.8%	Pass	42	1.3%	Fail	Fail
01-215-Bedroom 1	86	2.3%	Pass	37	1.1%	Fail	Fail
01-215-Bedroom 2 (S)	94	2.6%	Pass	36	1.1%	Fail	Fail
01-216-Bedroom 1	86	2.3%	Pass	37	1.1%	Fail	Fail
01-216-Bedroom 2 (S)	95	2.6%	Pass	36	1.1%	Fail	Fail
01-217-Bedroom	70	1.9%	Pass	38	1.2%	Fail	Fail
01-218-Bedroom	70	1.9%	Pass	38	1.2%	Fail	Fail
01-219-Bedroom	73	2.0%	Pass	38	1.2%	Fail	Fail
01-220-Bedroom	61	1.7%	Pass	38	1.2%	Fail	Fail
01-221-Bedroom	48	1.3%	Pass	50	1.5%	Fail	Fail
01-222-Bedroom 1	65	1.8%	Pass	36	1.1%	Fail	Fail
01-222-Bedroom 2 (S)	73	2.0%	Pass	36	1.1%	Fail	Fail
01-223-Bedroom 1	66	1.8%	Pass	37	1.1%	Fail	Fail
01-223-Bedroom 2 (S)	77	2.1%	Pass	36	1.1%	Fail	Fail
01-224-Bedroom 1	66	1.8%	Pass	37	1.1%	Fail	Fail
01-224-Bedroom 2 (S)	71	1.9%	Pass	43	1.3%	Fail	Fail
01-225-Bedroom 1	64	1.7%	Pass	37	1.1%	Fail	Fail
01-225-Bedroom 2 (S)	73	2.0%	Pass	49	1.5%	Fail	Fail

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-226-Bedroom	74	2.0%	Pass	38	1.2%	Fail	Fail
01-227-Bedroom 1	65	1.8%	Pass	36	1.1%	Fail	Fail
01-227-Bedroom 2 (S)	73	2.0%	Pass	36	1.1%	Fail	Fail
02-201-Bedroom 1	77	2.1%	Pass	42	1.3%	Fail	Fail
02-201-Bedroom 2	81	2.2%	Pass	43	1.3%	Fail	Fail
02-201-Bedroom 3 (S)	83	2.3%	Pass	48	1.5%	Fail	Fail
02-202-Bedroom 1	60	1.6%	Pass	56	1.7%	Fail	Fail
02-202-Bedroom 1	78	2.1%	Pass	43	1.3%	Fail	Fail
02-202-Bedroom 1	62	1.7%	Pass	59	1.8%	Fail	Fail
02-202-Bedroom 2	69	1.9%	Pass	58	1.8%	Fail	Fail
02-202-Bedroom 2 (S)	85	2.3%	Pass	38	1.2%	Fail	Fail
02-202-Bedroom 2 (S)	81	2.2%	Pass	51	1.6%	Fail	Fail
02-205-Bedroom 1	71	1.9%	Pass	42	1.3%	Fail	Fail
02-205-Bedroom 2	73	2.0%	Pass	40	1.2%	Fail	Fail
02-205-Bedroom 3 (S)	75	2.0%	Pass	44	1.3%	Fail	Fail
02-206-Bedroom	79	2.2%	Pass	43	1.3%	Fail	Fail
02-207-Bedroom	76	2.1%	Pass	43	1.3%	Fail	Fail
02-208-Bedroom	79	2.2%	Pass	46	1.4%	Fail	Fail
02-209-Bedroom 1	94	2.6%	Pass	42	1.3%	Fail	Fail
02-209-Bedroom 2 (S)	99	2.7%	Pass	38	1.2%	Fail	Fail
02-210-Bedroom 1	95	2.6%	Pass	42	1.3%	Fail	Fail
02-210-Bedroom 2 (S)	97	2.6%	Pass	38	1.2%	Fail	Fail
02-211-Bedroom 1	71	1.9%	Pass	39	1.2%	Fail	Fail
02-211-Bedroom 2 (S)	64	1.7%	Pass	48	1.5%	Fail	Fail
02-212-Bedroom	57	1.6%	Pass	56	1.7%	Fail	Fail
02-213-Bedroom 1	80	2.2%	Pass	42	1.3%	Fail	Fail
02-213-Bedroom 2 (S)	83	2.3%	Pass	52	1.6%	Fail	Fail
02-214-Bedroom 1	71	1.9%	Pass	39	1.2%	Fail	Fail
02-214-Bedroom 2 (S)	65	1.8%	Pass	48	1.5%	Fail	Fail
02-215-Bedroom 1	97	2.6%	Pass	41	1.2%	Fail	Fail
02-215-Bedroom 2 (S)	98	2.7%	Pass	38	1.2%	Fail	Fail
02-216-Bedroom 1	97	2.6%	Pass	41	1.2%	Fail	Fail
02-216-Bedroom 2 (S)	99	2.7%	Pass	41	1.2%	Fail	Fail
02-217-Bedroom	81	2.2%	Pass	43	1.3%	Fail	Fail
02-218-Bedroom	81	2.2%	Pass	42	1.3%	Fail	Fail
02-219-Bedroom	83	2.3%	Pass	42	1.3%	Fail	Fail
02-220-Bedroom	73	2.0%	Pass	41	1.2%	Fail	Fail
02-221-Bedroom	54	1.5%	Pass	56	1.7%	Fail	Fail
02-222-Bedroom 1	74	2.0%	Pass	39	1.2%	Fail	Fail
02-222-Bedroom 2 (S)	80	2.2%	Pass	39	1.2%	Fail	Fail
02-223-Bedroom 1	76	2.1%	Pass	40	1.2%	Fail	Fail
02-223-Bedroom 2 (S)	87	2.4%	Pass	38	1.2%	Fail	Fail
02-224-Bedroom 1	75	2.0%	Pass	40	1.2%	Fail	Fail
02-224-Bedroom 2 (S)	78	2.1%	Pass	49	1.5%	Fail	Fail
02-225-Bedroom 1	71	1.9%	Pass	42	1.3%	Fail	Fail
02-225-Bedroom 2 (S)	79	2.2%	Pass	58	1.8%	Fail	Fail
02-226-Bedroom	84	2.3%	Pass	42	1.3%	Fail	Fail
02-227-Bedroom 1	74	2.0%	Pass	39	1.2%	Fail	Fail
02-227-Bedroom 2 (S)	80	2.2%	Pass	39	1.2%	Fail	Fail

DSY 3 – Long, but less intense warm spell

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-LKD (3)	118	5.1%	Fail	NA	NA	NA	Fail
01-202-LKD (2)	110	4.8%	Fail	NA	NA	NA	Fail
01-203-LKD (2)	120	5.2%	Fail	NA	NA	NA	Fail
01-204-LKD (2)	120	5.2%	Fail	NA	NA	NA	Fail
01-205-LKD (3)	100	4.4%	Fail	NA	NA	NA	Fail
01-206-LKD (1)	120	5.2%	Fail	NA	NA	NA	Fail
01-207-LKD (1)	123	5.4%	Fail	NA	NA	NA	Fail
01-208-LKD (1)	125	5.4%	Fail	NA	NA	NA	Fail
01-209-LKD (2)	129	5.6%	Fail	NA	NA	NA	Fail
01-210-LKD (2)	115	5.0%	Fail	NA	NA	NA	Fail
01-211-LKD (2)	123	5.4%	Fail	NA	NA	NA	Fail
01-212-LKD (1)	114	5.0%	Fail	NA	NA	NA	Fail
01-213-LKD (2)	120	5.2%	Fail	NA	NA	NA	Fail
01-214-LKD (2)	124	5.4%	Fail	NA	NA	NA	Fail
01-215-LKD (2)	118	5.1%	Fail	NA	NA	NA	Fail
01-216-LKD (2)	132	5.8%	Fail	NA	NA	NA	Fail
01-217-LKD (1)	114	5.0%	Fail	NA	NA	NA	Fail
01-218-LKD (1)	117	5.1%	Fail	NA	NA	NA	Fail
01-219-LKD (1)	123	5.4%	Fail	NA	NA	NA	Fail
01-220-LKD (1)	113	4.9%	Fail	NA	NA	NA	Fail
01-221-LKD (1)	110	4.8%	Fail	NA	NA	NA	Fail
01-222-LKD (2)	121	5.3%	Fail	NA	NA	NA	Fail
01-223-LKD (2)	119	5.2%	Fail	NA	NA	NA	Fail
01-224-LKD (2)	113	4.9%	Fail	NA	NA	NA	Fail
01-225-LKD (2)	113	4.9%	Fail	NA	NA	NA	Fail
01-226-LKD (1)	118	5.1%	Fail	NA	NA	NA	Fail
01-227-LKD (2)	125	5.4%	Fail	NA	NA	NA	Fail
02-201-LKD (3)	125	5.4%	Fail	NA	NA	NA	Fail
02-202-LKD (2)	119	5.2%	Fail	NA	NA	NA	Fail
02-202-LKD (2)	125	5.4%	Fail	NA	NA	NA	Fail
02-202-LKD (2)	125	5.4%	Fail	NA	NA	NA	Fail
02-205-LKD (3)	109	4.7%	Fail	NA	NA	NA	Fail
02-206-LKD (1)	128	5.6%	Fail	NA	NA	NA	Fail
02-207-LKD (1)	130	5.7%	Fail	NA	NA	NA	Fail
02-208-LKD (1)	131	5.7%	Fail	NA	NA	NA	Fail
02-209-LKD (2)	136	5.9%	Fail	NA	NA	NA	Fail
02-210-LKD (2)	121	5.3%	Fail	NA	NA	NA	Fail
02-211-LKD (2)	98	4.3%	Fail	NA	NA	NA	Fail
02-212-LKD (1)	122	5.3%	Fail	NA	NA	NA	Fail
02-213-LKD (2)	128	5.6%	Fail	NA	NA	NA	Fail
02-214-LKD (2)	97	4.2%	Fail	NA	NA	NA	Fail
02-215-LKD (2)	125	5.4%	Fail	NA	NA	NA	Fail
02-216-LKD (2)	134	5.8%	Fail	NA	NA	NA	Fail
02-217-LKD (1)	126	5.5%	Fail	NA	NA	NA	Fail
02-218-LKD (1)	130	5.7%	Fail	NA	NA	NA	Fail
02-219-LKD (1)	133	5.8%	Fail	NA	NA	NA	Fail
02-220-LKD (1)	127	5.5%	Fail	NA	NA	NA	Fail
02-221-LKD (1)	118	5.1%	Fail	NA	NA	NA	Fail
02-222-LKD (2)	128	5.6%	Fail	NA	NA	NA	Fail
02-223-LKD (2)	126	5.5%	Fail	NA	NA	NA	Fail
02-224-LKD (2)	125	5.4%	Fail	NA	NA	NA	Fail
02-225-LKD (2)	124	5.4%	Fail	NA	NA	NA	Fail
02-226-LKD (1)	125	5.4%	Fail	NA	NA	NA	Fail
02-227-LKD (2)	131	5.7%	Fail	NA	NA	NA	Fail

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-201-Bedroom 2	128	3.5%	Fail	60	1.8%	Fail	Fail
01-201-Bedroom 3 (S)	124	3.4%	Fail	68	2.1%	Fail	Fail
01-202-Bedroom 1	117	3.2%	Fail	61	1.9%	Fail	Fail
01-202-Bedroom 1	112	3.1%	Fail	61	1.9%	Fail	Fail
01-202-Bedroom 2 (S)	121	3.3%	Fail	68	2.1%	Fail	Fail
01-203-Bedroom 1	84	2.3%	Pass	75	2.3%	Fail	Fail
01-203-Bedroom 2 (S)	131	3.6%	Fail	52	1.6%	Fail	Fail
01-204-Bedroom 1	87	2.4%	Pass	80	2.4%	Fail	Fail
01-204-Bedroom 2	90	2.5%	Pass	75	2.3%	Fail	Fail
01-205-Bedroom 1	102	2.8%	Pass	59	1.8%	Fail	Fail
01-205-Bedroom 2	106	2.9%	Pass	55	1.7%	Fail	Fail
01-205-Bedroom 3 (S)	111	3.0%	Pass	65	2.0%	Fail	Fail
01-206-Bedroom	122	3.3%	Fail	62	1.9%	Fail	Fail
01-207-Bedroom	109	3.0%	Pass	62	1.9%	Fail	Fail
01-208-Bedroom	117	3.2%	Fail	64	1.9%	Fail	Fail
01-209-Bedroom 1	131	3.6%	Fail	56	1.7%	Fail	Fail
01-209-Bedroom 2 (S)	135	3.7%	Fail	52	1.6%	Fail	Fail
01-210-Bedroom 1	131	3.6%	Fail	56	1.7%	Fail	Fail
01-210-Bedroom 2 (S)	138	3.8%	Fail	52	1.6%	Fail	Fail
01-211-Bedroom 1	111	3.0%	Pass	53	1.6%	Fail	Fail
01-211-Bedroom 2 (S)	100	2.7%	Pass	68	2.1%	Fail	Fail
01-212-Bedroom	80	2.2%	Pass	76	2.3%	Fail	Fail
01-213-Bedroom 1	112	3.1%	Fail	60	1.8%	Fail	Fail
01-213-Bedroom 2 (S)	124	3.4%	Fail	70	2.1%	Fail	Fail
01-214-Bedroom 1	111	3.0%	Pass	53	1.6%	Fail	Fail
01-214-Bedroom 2 (S)	99	2.7%	Pass	68	2.1%	Fail	Fail
01-215-Bedroom 1	133	3.6%	Fail	56	1.7%	Fail	Fail
01-215-Bedroom 2 (S)	133	3.6%	Fail	52	1.6%	Fail	Fail
01-216-Bedroom 1	133	3.6%	Fail	56	1.7%	Fail	Fail
01-216-Bedroom 2 (S)	140	3.8%	Fail	54	1.6%	Fail	Fail
01-217-Bedroom	111	3.0%	Pass	58	1.8%	Fail	Fail
01-218-Bedroom	110	3.0%	Pass	58	1.8%	Fail	Fail
01-219-Bedroom	114	3.1%	Fail	59	1.8%	Fail	Fail
01-220-Bedroom	102	2.8%	Pass	58	1.8%	Fail	Fail
01-221-Bedroom	76	2.1%	Pass	75	2.3%	Fail	Fail
01-222-Bedroom 1	106	2.9%	Pass	55	1.7%	Fail	Fail
01-222-Bedroom 2 (S)	111	3.0%	Pass	54	1.6%	Fail	Fail
01-223-Bedroom 1	111	3.0%	Pass	54	1.6%	Fail	Fail
01-223-Bedroom 2 (S)	127	3.5%	Fail	53	1.6%	Fail	Fail
01-224-Bedroom 1	108	2.9%	Pass	54	1.6%	Fail	Fail
01-224-Bedroom 2 (S)	111	3.0%	Pass	68	2.1%	Fail	Fail
01-225-Bedroom 1	97	2.6%	Pass	57	1.7%	Fail	Fail
01-225-Bedroom 2 (S)	108	2.9%	Pass	74	2.3%	Fail	Fail

Room Ref	Criterion 1: Max = 3%			Criterion 2: Max 1%			Overall Result
	No. and % hours >1K above tmax			No. and % hours > 26°C			
01-226-Bedroom	114	3.1%	Fail	58	1.8%	Fail	Fail
01-227-Bedroom 1	106	2.9%	Pass	53	1.6%	Fail	Fail
01-227-Bedroom 2 (S)	111	3.0%	Pass	54	1.6%	Fail	Fail
02-201-Bedroom 1	124	3.4%	Fail	67	2.0%	Fail	Fail
02-201-Bedroom 2	134	3.6%	Fail	65	2.0%	Fail	Fail
02-201-Bedroom 3 (S)	137	3.7%	Fail	76	2.3%	Fail	Fail
02-202-Bedroom 1	91	2.5%	Pass	82	2.5%	Fail	Fail
02-202-Bedroom 1	130	3.5%	Fail	68	2.1%	Fail	Fail
02-202-Bedroom 1	96	2.6%	Pass	87	2.6%	Fail	Fail
02-202-Bedroom 2	106	2.9%	Pass	87	2.6%	Fail	Fail
02-202-Bedroom 2 (S)	131	3.6%	Fail	56	1.7%	Fail	Fail
02-202-Bedroom 2 (S)	133	3.6%	Fail	78	2.4%	Fail	Fail
02-205-Bedroom 1	107	2.9%	Pass	62	1.9%	Fail	Fail
02-205-Bedroom 2	111	3.0%	Pass	62	1.9%	Fail	Fail
02-205-Bedroom 3 (S)	117	3.2%	Fail	71	2.2%	Fail	Fail
02-206-Bedroom	132	3.6%	Fail	67	2.0%	Fail	Fail
02-207-Bedroom	122	3.3%	Fail	69	2.1%	Fail	Fail
02-208-Bedroom	130	3.5%	Fail	73	2.2%	Fail	Fail
02-209-Bedroom 1	138	3.8%	Fail	65	2.0%	Fail	Fail
02-209-Bedroom 2 (S)	143	3.9%	Fail	57	1.7%	Fail	Fail
02-210-Bedroom 1	139	3.8%	Fail	65	2.0%	Fail	Fail
02-210-Bedroom 2 (S)	144	3.9%	Fail	57	1.7%	Fail	Fail
02-211-Bedroom 1	107	2.9%	Pass	61	1.9%	Fail	Fail
02-211-Bedroom 2 (S)	99	2.7%	Pass	72	2.2%	Fail	Fail
02-212-Bedroom	90	2.5%	Pass	87	2.6%	Fail	Fail
02-213-Bedroom 1	121	3.3%	Fail	63	1.9%	Fail	Fail
02-213-Bedroom 2 (S)	127	3.5%	Fail	77	2.3%	Fail	Fail
02-214-Bedroom 1	107	2.9%	Pass	61	1.9%	Fail	Fail
02-214-Bedroom 2 (S)	97	2.6%	Pass	72	2.2%	Fail	Fail
02-215-Bedroom 1	140	3.8%	Fail	65	2.0%	Fail	Fail
02-215-Bedroom 2 (S)	142	3.9%	Fail	57	1.7%	Fail	Fail
02-216-Bedroom 1	142	3.9%	Fail	65	2.0%	Fail	Fail
02-216-Bedroom 2 (S)	151	4.1%	Fail	62	1.9%	Fail	Fail
02-217-Bedroom	124	3.4%	Fail	66	2.0%	Fail	Fail
02-218-Bedroom	120	3.3%	Fail	65	2.0%	Fail	Fail
02-219-Bedroom	126	3.4%	Fail	64	1.9%	Fail	Fail
02-220-Bedroom	117	3.2%	Fail	64	1.9%	Fail	Fail
02-221-Bedroom	85	2.3%	Pass	85	2.6%	Fail	Fail
02-222-Bedroom 1	112	3.1%	Fail	60	1.8%	Fail	Fail
02-222-Bedroom 2 (S)	120	3.3%	Fail	60	1.8%	Fail	Fail
02-223-Bedroom 1	123	3.3%	Fail	62	1.9%	Fail	Fail
02-223-Bedroom 2 (S)	135	3.7%	Fail	60	1.8%	Fail	Fail
02-224-Bedroom 1	122	3.3%	Fail	62	1.9%	Fail	Fail
02-224-Bedroom 2 (S)	124	3.4%	Fail	75	2.3%	Fail	Fail
02-225-Bedroom 1	111	3.0%	Pass	63	1.9%	Fail	Fail
02-225-Bedroom 2 (S)	124	3.4%	Fail	84	2.6%	Fail	Fail
02-226-Bedroom	126	3.4%	Fail	63	1.9%	Fail	Fail
02-227-Bedroom 1	111	3.0%	Pass	60	1.8%	Fail	Fail
02-227-Bedroom 2 (S)	119	3.2%	Fail	60	1.8%	Fail	Fail

The apartments perform better when assessed against DSY 2 a persistently long period of warmth, but performing less well during DSY 3 which includes a short intense heat wave, with a maximum day time temperature of 35°C