

London Borough of Haringey
Partridge Way, Haringey

Summer Overheating Assessment in Dwellings – CIBSE
TM59 Compliance
for
Partridge Way, Haringey



MLM.

Group

Part of Sweco

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Contents

1	Executive Summary	1
2	Introduction	2
3	Methodology	5
3.1	CIBSE TM59 Overheating in Homes (2017)	5
3.2	CIBSE TM49 Design Summer Year for London	5
3.3	Window Design and Ventilation Strategy	6
3.4	Model Summary	8
3.5	Internal Gains.....	8
3.6	Selection of Apartments and Communal corridors	9
4	Results and Analysis.....	11
5	Conclusion	23
Appendix A - Dwellings and Windows Mark-up, Detailed Numerical Results		

1 Executive Summary

MLM Consulting Engineers Ltd have been commissioned by Martin Arnold on behalf of the London Borough of Haringey to undertake an overheating assessment to accompany the Planning Application for the development known as Partridge Way, Haringey, London.

The proposed development comprises of a total of 23 dwellings split into 8 storeys (from 1st to 8th floors). The ground floor levels is occupied by facilities to serve the building such as bike storage and waste/recycling facilities.

The following report assesses the summertime overheating performance (CIBSE TM 59) of the proposed residential development. The simulation has been completed using the recommended internal gains by the TM59 methodology and using the following weather scenarios for London Central (LWC):

- DSY1 2020 High 50%, DSY2 and DSY3 weather files as defined by CIBSE TM49;
- Future compliance with DSY1 with 2050s and 2080s future weather patterns (high emission, 50% percentile);
- Good practice future compliance with DSY 2 and 3 with the 2050s and 2080s future weather patterns (high emissions, 50% percentile) that will help inform the retrofit plan.

After reviewing the initial design and carrying out necessary optimisations, all weather files for London Weather Central have been run to check every space complies. Due to the noise risk, mechanical purge ventilation with tempered air has been used in order to mitigate overheating and optimise all the spaces. The results depict the following observations:

- Under LWC DSY 01 2020 High 50%, all rooms comply with thermal comfort criteria of CIBSE TM59;
- Under LWC DSY 02 2020 High 50% all rooms comply with thermal comfort criteria of CIBSE TM59,
- Under LWC DSY 03 2020 High 50% all rooms comply with thermal comfort criteria of CIBSE TM59;
- Additional optimisations have been carried out for future weather files. With the additional tempered air ventilation under 2050 and 2080 weather conditions, all rooms are seen to provide a good level of thermal comfort for the dwellers complying with the overheating thresholds.
- None of the communal corridors are predicted to exceed temperatures above 28°C, therefore as defined by CIBSE TM 59 methodology there is no risk of overheating;

All the above was based on ventilation strategies, as defined within section 3.3 of this document.

This document demonstrates that best endeavours within the constraints of the project have been undertaken to achieve full compliance with the above design guidance. This is demonstrated via adherence to the steps defined within Policy 5.9 (overheating and cooling) from The London Plan Chapter Five London's Response to Climate change and in particular the steps defined within the Cooling Hierarchy and Haringey's Summary key overheating planning application requirements.

2 Introduction

The proposed development known as Partridge Way is within the London Borough of Haringey. The site is located in an urban location and it is surrounded by high-rise residential buildings to the north and low rise houses towards south. Figure 01 illustrates site location and sun path overlay.

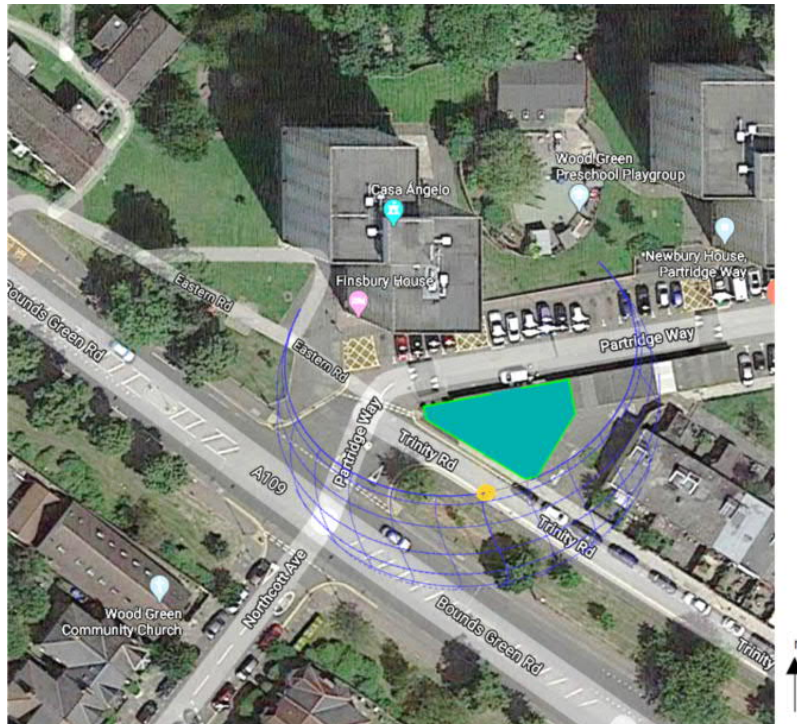


Figure 1 - Google map overlaid with sun path

The purpose of the report is to analyse the overheating risk in homes in accordance with the TM59 methodology against to Policy 5.9 from the London Plan and London Borough of Haringey's Key Overheating Planning Application Requirements.

Policy 5.9 (Overheating and Cooling) from London Plan - Chapter Five London's Response to Climate Change is addressed in order to reduce potential overheating and reliance on air conditioning systems and demonstrate this in accordance with the following cooling hierarchy:

- Minimise internal heat generation through efficient design.
- Reduce the amount of heat entering a building in the summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls.
- Manage heat build-up within the dwelling through exposed internal thermal mass and high ceilings.
- Ample amount of purge ventilation system with tempered/cooled air in extreme summer conditions

The buildings model geometry has been based on the most recent submission scheme drawings provided by Martin Arnold.

Geometric Model

Using the Autocad files provided, a thermal model was carried out. The thermal model has been built in the software EDSL TAS v. 9.5.0. Figure 2 below illustrates the proposed building and surrounding high rise buildings.

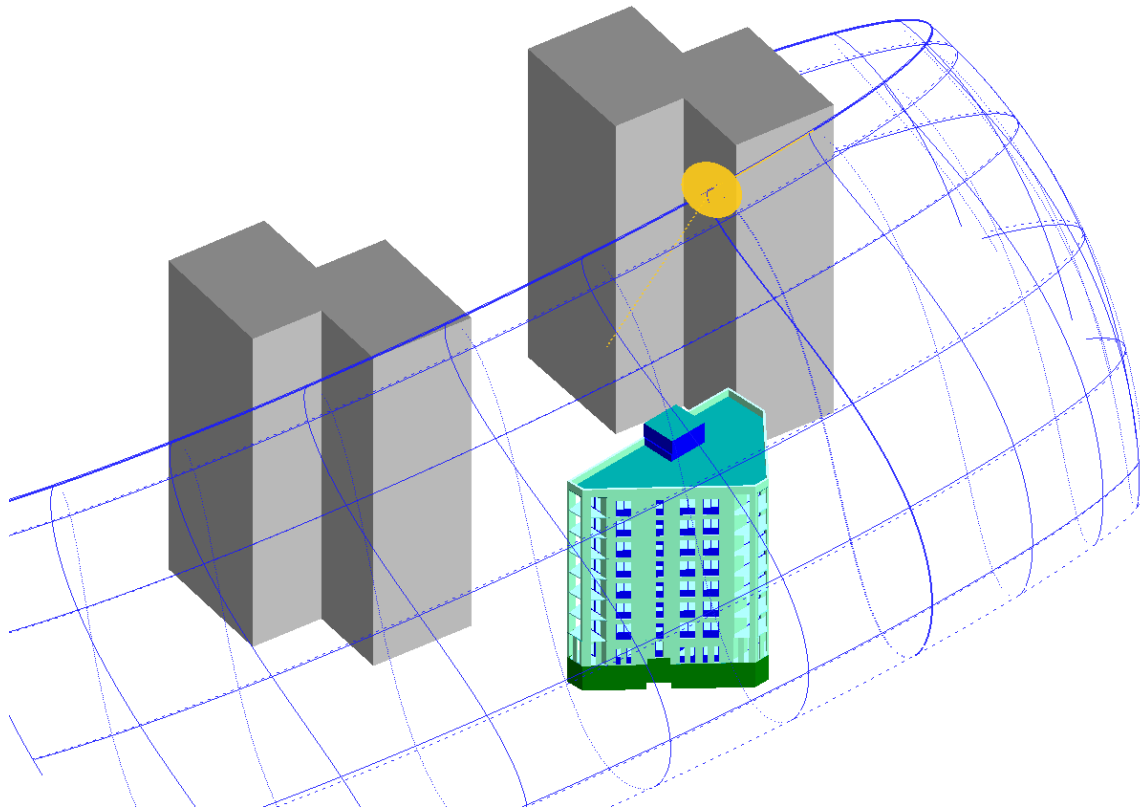


Figure 2 - EDSL TAS Thermal model and sun path

Parametric Model for façade solar radiation studies

Parametric modelling is a process with the ability to change the shape of model geometry for the most compliant/optimised design. It is implemented through Rhino 5, a strong modelling tool in addition to grasshopper which runs on computer programming and backend python scripting.

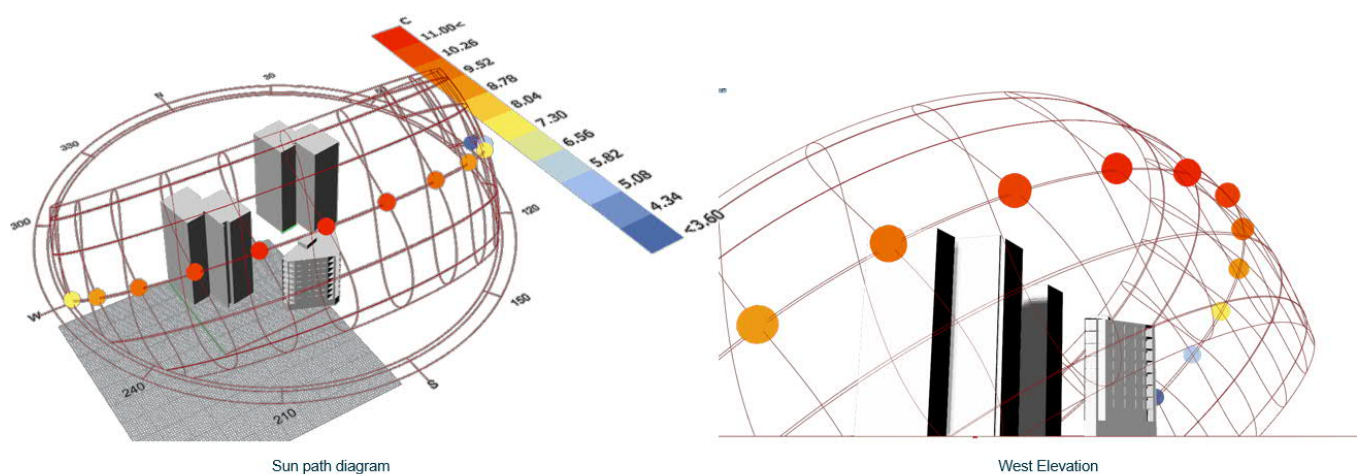


Figure 3 Rhino modelled geometry with sun path for parametric studies on the model

Façade solar radiation study for building fabric optimisation

Workflow using Rhino model geometry was used to observe the solar radiation on the façade at the Equinox 22nd March using Ladybug in Grasshopper. The component calculates the incident solar radiation on input geometry using a sky matrix.

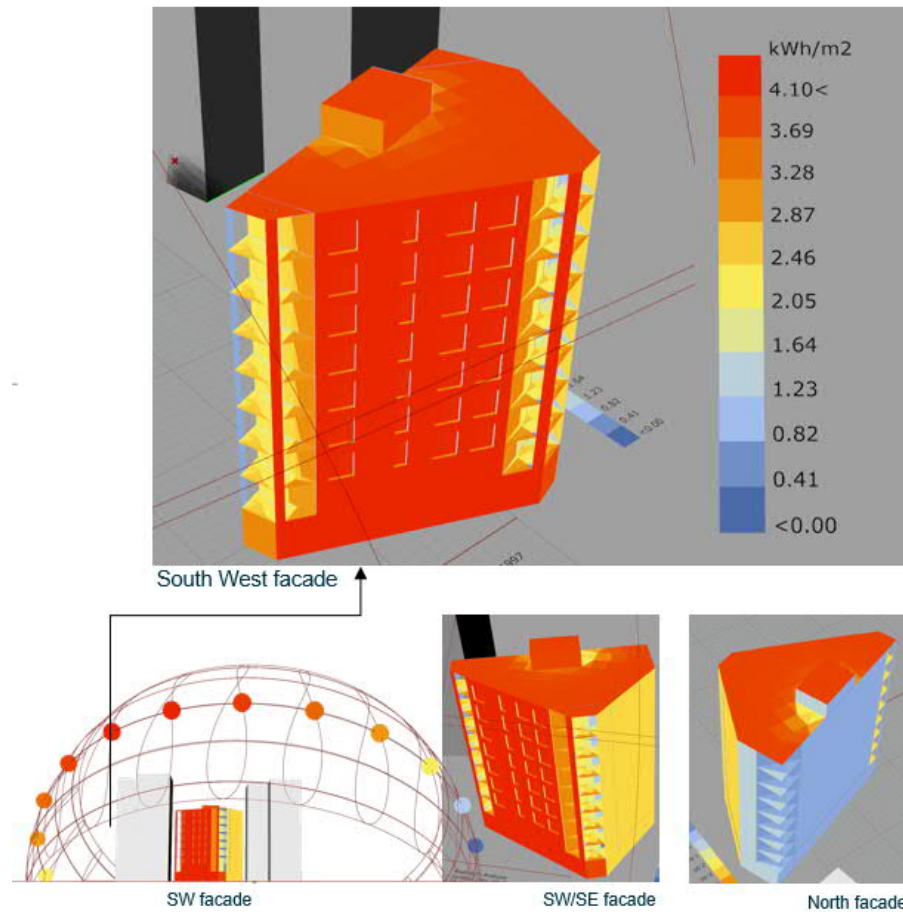


Figure 4 Façade solar studies for enhanced window and fabric optimisation

The initial analysis depicted higher radiation towards the South-West façade at 4.10 kWh/m2. Whereas the South East façade and North façade depicted lesser radiation with 2.05 kWh/m2 and 0.82 kWh/m2 respectively.

3 Methodology

Environmental Design Solutions Limited EDSL – TAS v 9.5 was used to carry out the computer simulation for the overheating risk analysis. This software is approved by the Government for dynamic modelling simulation according to CIBSE AM 11.

Initial discussion with design team has been carried out in order to make changes to optimise the design with regards to air quality and noise assessment under the weather file for London Weather Central 2020 LWC DSY1/2/3. Subsequent simulations under LWC DSY 2, 3 2020 high 50% as well as for future weather scenarios (2050 and 2080) have been carried out. Each set of simulation contains the total of 9 results for each 2020 (DSY 1, 2 and 3), 2050 (DSY 1, 2 and 3) and 2080 (DSY 1, 2 and 3) weather scenarios.

The above should be read in conjunction with Appendix A.

In addition to thermal comfort under CIBSE TM59, daylighting levels and distributions have been taken into account during the analysis to make sure that internal spaces enjoy good daylighting levels and distribution. The daylighting levels have been reviewed against BRE Guide (Site Layout Planning for Daylight and Sunlight – A guide to good practice, second edition) for internally occupied areas.

3.1 CIBSE TM59 Overheating in Homes (2017)

The overheating assessment has been based on the CIBSE TM59:2017 Design Methodology for the assessment of overheating risk in homes, which criteria is based on passing both of the following two criteria:

- Criteria 01: CIBSE TM52 Criteria 1 (Hours of Exceedance) - For living rooms, kitchens and bedrooms: The number of hours during which ΔT is greater than or equal to K during the period May to September includes shall not be more than 3 of occupied hours.
- Criteria 02: CIBSE Guide A Criteria for Bedrooms only: To guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10pm to 7am shall not exceed 26°C for more than 1% of annual hours.
- In relation to corridors, CIBSE TM59 does not set a target, but advises if an operative temperature of 28°C is exceeded for more than 3% of the total annual hours, then this should be identified as a significant risk.

3.2 CIBSE TM49 Design Summer Year for London

CIBSE TM49 suggests that the current weather file is not considered sufficient extreme to provide a basis for overheating assessment for most of the buildings in London and warmer weather date should be used. Over the next three decades (the 2020's period) three years to form the set of probabilistic design summer years. The following three years were selected to form the set of probabilistic design summer years:

- DSY-1: 1989 – refers to the current DSY and represents a moderately warm summer;
- DSY-2: 2003 – refers to a single intense warm spell;
- DSY-3: 1976 – refers to relatively intense persistent warm spell.
- Additional simulations for Future compliance with DSY 1 2050's and 2080s future weather patterns (high emissions, 50% percentile) through of retrofit plan with measure that can be implemented; and
- Good practice future compliance with DSY 2 and 3 with 2050's and 2080s future weather pattern (high emissions, 50% percentile) that will help inform the retrofit plan.

3.3 Window Design and Ventilation Strategy

(To be read in conjunction with Appendix A)

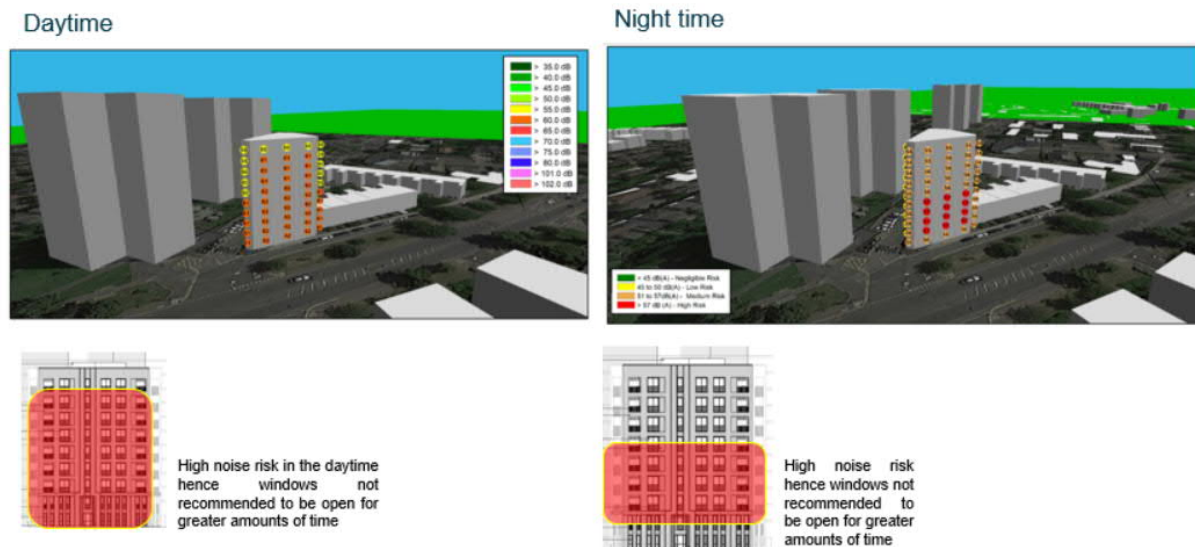


Figure 5 Acoustic Noise Risk Analysis

Based on the Acoustic Noise Risk Analysis it was noted that the development lies in a high risk area of noise. Therefore, it is not recommended to open windows for longer periods of time.

For the purpose of the analysis the windows are assumed to be closed in order to avoid negative acoustic influence from the outside.

Overheating is mitigated by using purge ventilation with tempered air within the apartment spaces. The following assumptions have been made to for the assessment as follows:

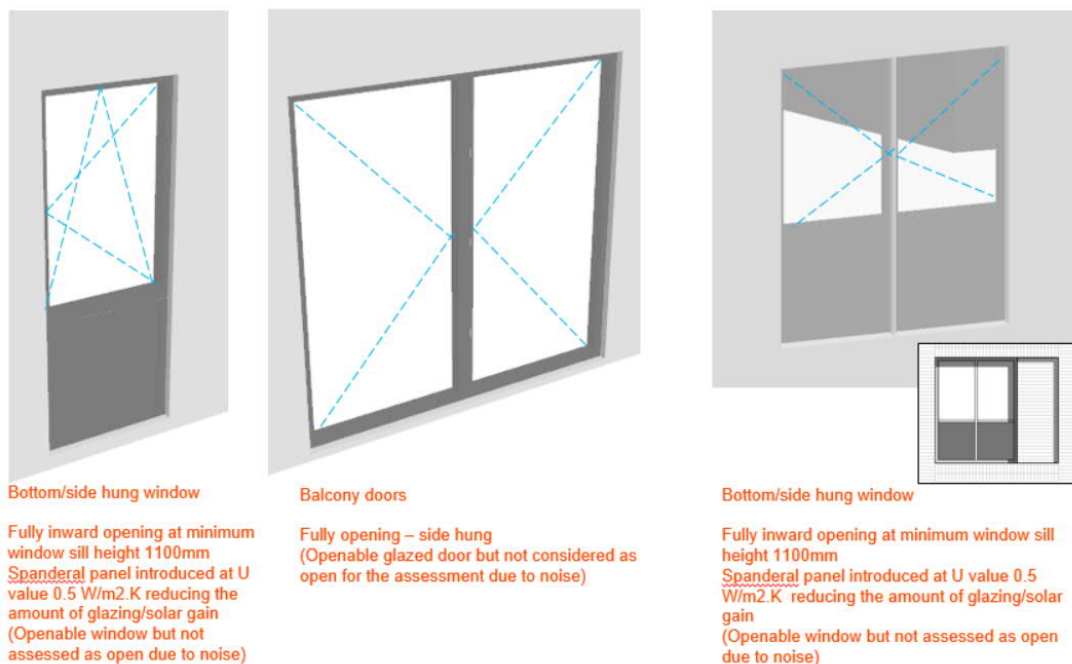


Figure 5 - Window types and opening free areas for all simulations



In addition to windows, internal doors play an important role to allow air flow. The following opening configurations have been implemented for all simulations:

- The ventilation is based on purge ventilation with tempered air with an air change rate of 1.5 via any packaged unit system or reversible ASHP and individual water source heat pump in the flats or similar.

3.3.1 Blinds

As per as CIBSE TM59, blinds can be specified as long as they do not clash with windows openings.

For the analysis blinds have not been specified currently for the design. However, they can be added for improved thermal comfort and reduction in solar gains especially from the south/south west façade.



Figure 5 - Windows fitted blind

3.4 Model Summary

The following section lists all the information input into the geometric model to produce the thermal model which is the basis of this assessment.

- CIBSE TM49 London Design Summer Year (2020 s DSY1, 2 and 3 High 50%, 2050s DSY1, 2 and 3 High 50% and 2080s DSY1, 2 and 3 High 50%,) weather files used;
- Air exchange by infiltration has been included at 0.25 air changes an hour;
- MVHR boost ventilation with cooling coil for summer using 1.5 ACH for the whole apartment
- Internal Gains – Summarised in section 3.5 the entire rooms as per as CIBSE TM59.

Table 1 – Building Fabric Details

The building model incorporates the following set U-values for the fabric:

Element	U-Value (W/m ² K)	G-Value
External Walls	0.18	N/A
Party Walls	0.90	
Ground Floor	0.13	
Internal Floor (between Ground and First Floor)	0.16	
Internal Floor (between apartments)	1.20	
Flat Roof	0.12	
Windows (Double Glazing argon filled and aluminium frame with thermal breaks)	0.9 (for glazing only)	0.46
Glazing Light Transmittance: 70%		

3.5 Internal Gains

Internal gains are assumed to be based on the CIBSE TM59, listed in table 3 below.

Table 2 – Summary of Occupancy and Equipment Gains (as per as CIBSE TM59)

Unit/Room Type	Occupancy	Equipment Load
1 – Bedroom Apartment: Living Room/Kitchen	1 person from 9am to 10pm; room is unoccupied for the rest of the day.	Peak load of 450 W from 6pm to 8pm; 200 W from 8pm to 10pm; 110 W from 9am to 6pm and from 10pm to 12pm; Base load of 85 W for the rest of the day.

Unit/Room Type	Occupancy	Equipment Load
2 – Bedroom Apartment: Living Room/Kitchen	2 person from 9am to 10pm; room is unoccupied for the rest of the day.	Peak load of 450 W from 6pm to 8pm; 200 W from 8pm to 10pm; 110 W from 9am to 6pm and from 10pm to 12pm; Base load of 85 W for the rest of the day.
3 – Bedroom Apartment: Living Room/Kitchen	3 person from 9am to 10pm; room is unoccupied for the rest of the day.	Peak load of 450 W from 6pm to 8pm; 200 W from 8pm to 10pm; 110 W from 9am to 6pm and from 10pm to 12pm; Base load of 85 W for the rest of the day.
3 – Bedroom Apartment: Living Room	3 people at 5% gains from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6pm to 10pm; 60 W from 9am to 6pm and from 10pm to 12pm; Base load of 35 W for the rest of the day.
3 – Bedroom Apartment: Kitchen	3 people at 25% gains from 9am to 10pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6pm to 8am; Base load of 50 W for the rest of the day.
Double Bedroom	2 people at 70% gains from 11pm to 8am, 2 people at full gains from 8am to 9am and from 10pm to 11pm, 1 person at full gain in the bedroom from 9am to 10pm.	Peak load of 80 W from 8am to 11pm; Base load of 10 W during the sleeping hours.
Single Bedroom	1 person at 70% gains from 11pm to 8am, 1 person at full gains from 8am to 11pm.	Peak load of 80 W from 8am to 11pm; Base load of 10 W during the sleeping hours.
Communal Corridors	Assumed to be zero	110 W form LTHW pipe (Constant) Pipe losses estimated at 10W/m (as per as Table 1 (Default heat losses from pipework – HMG, 2013; Table 5)
All Rooms and communal corridors - Lighting	N/A	Lighting assumed 2 W/m ² from 6pm to 11pm.

3.6 Selection of Apartments and Communal corridors

(To be read in conjunction with Appendix A)

The proposed development includes a total of 23 dwellings. Different apartment types with different orientations and height levels were selected in order to analyse each category of apartment. Figure 6 illustrates the floor levels included in the simulations.

A total of 26 occupied rooms including living rooms, kitchens and bedrooms have been analysed. From the 26 rooms, 16 serve bedrooms.

Due to different orientations and exposures, the selection of apartments consisted on taking all middle floor and top floors apartments. The development does not contain ground floor levels apartments.

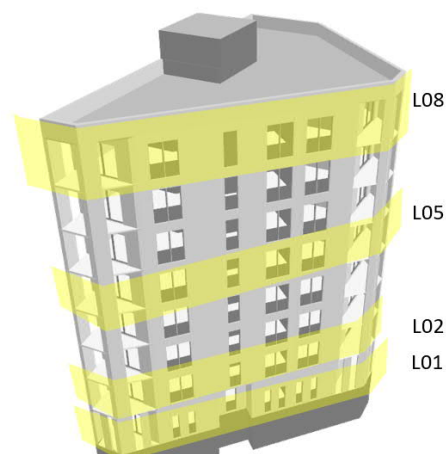


Figure 6 - Illustrates floor level assessed.

The room names have been marked up as follows:

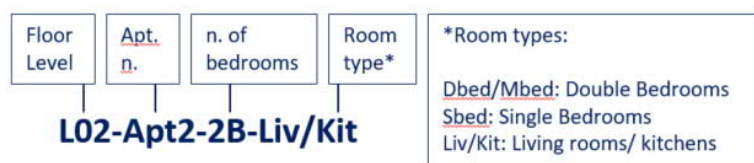
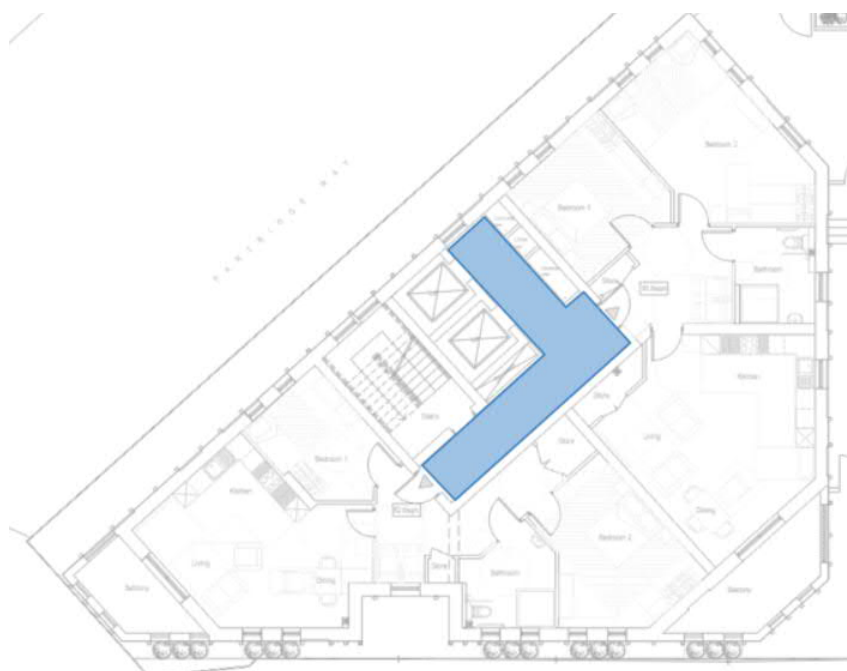


Figure 7 - Room mark up on plans

All the communal corridors have exact length and shape. Therefore, one corridor at the floor level 05 has been selected to represent the results.

Figure 8 - Corridor mark up



4 Results and Analysis

(This section needs to be read in conjunction with Appendix A)

The table below is a summary of the results fragmented into Criteria 1 (all spaces), Criteria 2 (Bedrooms) and criteria 01 and 02 together as per CIBSE TM59. The results include weather scenario DSY 1 and additional iterations for weather scenarios DSY 2 and DSY 3 for 2020, 2050 and 2080.

Table 3 – Detailed Results

DSY1-2020

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	1	3285	32	1	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	1	3285	32	2	Pass

L05-Apt7-2B-DBed2	Bedroom	3672	110	0	3285	32	1	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	0	3285	32	3	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	0	3285	32	2	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY2-2020

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	2	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	0	3285	32	10	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	0	3285	32	4	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	1	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	0	3285	32	10	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	0	3285	32	7	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	3	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	0	3285	32	15	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	0	3285	32	14	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	1	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY3-2020

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	2	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	0	3285	32	9	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	0	3285	32	2	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	0	3285	32	9	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	0	3285	32	8	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	2	Pass

L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	0	3285	32	11	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	0	3285	32	10	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY1-2050

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	2	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	4	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	11	3285	32	0	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	6	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	7	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	14	3285	32	0	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	9	3285	32	0	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	4	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	9	3285	32	0	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	6	3285	32	0	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY2-2050

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	6	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	1	3285	32	0	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	1	3285	32	0	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	1	3285	32	1	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	0	3285	32	1	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY3-2050

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	11	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	1	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	15	3285	32	0	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	4	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	10	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	18	3285	32	0	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	11	3285	32	0	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	4	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	11	3285	32	3	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	7	3285	32	2	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY1-2080

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	13	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	2	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	7	3285	32	1	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	3	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	5	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	7	3285	32	0	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	4	3285	32	0	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	2	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	5	3285	32	3	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	3	3285	32	2	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY2-2080

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	14	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	0	3285	32	1	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	0	3285	32	1	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	0	3285	32	1	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	0	3285	32	11	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	0	3285	32	9	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

DSY3-2080

Natural Ventilation Overheating Results

Zone Name	Room Use	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Annual Night Occupied Hours for Bedroom	Max Exceedable Night Hours	Criterion 2: Number of Night Hours Exceeding 26 °C for Bedrooms.	Result
L01-Apt1-2B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt1-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L01-Apt1-2B-SBed	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L01-Apt2-2B-DBed2	Bedroom	3672	110	0	3285	32	22	Pass
L01-Apt2-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt3-1B-DBed1	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt3-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt4-2B-DBed1	Bedroom	3672	110	6	3285	32	1	Pass
L02-Apt4-2B-DBed2	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt4-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L02-Apt5-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L02-Apt5-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05 -Corridor	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt6-1B-Liv/Kit	Living Room / Kitchen	1989	59	4	N/A	N/A	N/A	Pass
L05-Apt7-2B-DBed1	Bedroom	3672	110	9	3285	32	0	Pass
L05-Apt7-2B-DBed2	Bedroom	3672	110	3	3285	32	0	Pass
L05-Apt7-2B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L05-Apt8-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L05-Apt8-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt9-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt9-1B-Liv/Kit	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass
L08-Apt10-2B-DBed1	Bedroom	3672	110	4	3285	32	5	Pass
L08-Apt10-2B-DBed2	Bedroom	3672	110	1	3285	32	4	Pass
L08-Apt11-1B-DBed	Bedroom	3672	110	0	3285	32	0	Pass
L08-Apt11-1B-Kit/Liv	Living Room / Kitchen	1989	59	0	N/A	N/A	N/A	Pass

A total of 26 occupied spaces (including Bedrooms and Living room areas) have been analysed using nine weather scenarios. From 26 occupied spaces, 16 serve bedrooms.

Based on the submission scheme and ventilation with tempered air, the strategy has seen to provide an optimum level of thermal comfort to the spaces in all weather scenarios DSY1/2/3. The scheme was also seen to comply in the future weather scenarios of 2050 and 2080. All of the rooms assessed comply with Design Weather DSY1, DSY2 and DSY3 scenario.

The building design addresses the Policy 5.9 (Overheating and Cooling) from London Plan - Chapter Five London's Response to Climate Change as follows:

- Window area has been reduced to ensure large amount of heat gain from glazing is minimised.
- Robust U values have been used and G value of 0.46 in order to optimise heat gain throughout the year. A lower G value would be suitable for overheating risk; however, it would have detrimental effect on the building energy performance throughout the year.
- Passive ventilation through windows opening have been specified in conjunction with MVHR tempered air ventilation with cooling coils or similar system.

It is important to note that the above measures have been implemented by taking into consideration the architectural elements of the building to ensure that the architectural language is retained.

It is important to note that large opening proportions are not appropriate for the development due to health and safety, aesthetic considerations and most importantly noise risk. Therefore, a careful consideration of windows type should be taken into account. Generally, side hung windows offer larger opening proportions when compared to top or bottom hung ones. Additionally, taking into consideration the building height, inward openings would be more appropriate.

Both corridors assessed comply with design criteria in all the weather scenarios. There has not been reported temperature above 28°C.

5 Conclusion

It is identified that all apartments comply with weather file DSY1, DSY2 and DSY3 in 2020, 2050 and 2080 weather scenarios. This has been based on the chosen overheating mitigation strategy in lieu of the restriction on window openings. In order to avoid the noise risk the windows are recommended to be closed majority time of the day. The current mitigation strategy deals with tempered air ventilation with cooling coil or a similar system. It is seen to be effective in keeping a good thermal comfort level throughout the summer periods.

Thermal comfort adaptability depends on a range of factors, such as temperature, air speed, air temperature, radiant temperature, clothing and the metabolic rate of the occupants; however, in the case of the project Noise Risk has been seen to be the most important driving factor for choosing the overheating strategy of the project. Hence, MVHR with tempered air/cooling coil or similar system has been considered at a set point of 25 degree Celsius.

It is important to note that most of the apartments of the proposed development have been designed with dual aspect glazing, which provides the potential for cross ventilation, however windows are recommended to be open at very limited times. In addition, the dual aspect where possible, shows very good daylighting levels and distribution.

The development does not present ground floor units, therefore, windows restrictors for security purpose have not been applied on windows openings.

The development makes the best use of the floor plate in line with site layout and therefore it minimises internal corridors, consequently, reducing the likelihood of overheating.

The strategy proposes measures in line with the London Plan cooling hierarchy and Haringey's summary Key Overheating Planning Application requirements by utilising the building fabric, passive measures and mechanical ventilation with tempered air to avoid overheating risk.

Appendix A - Dwellings and Windows Mark-up, Detailed Numerical Results



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