



**3 VIVEASH CLOSE
HAYES, LONDON**

OVERHEATING REPORT

FOR

GENERAL FOOD TRADING CO. LTD



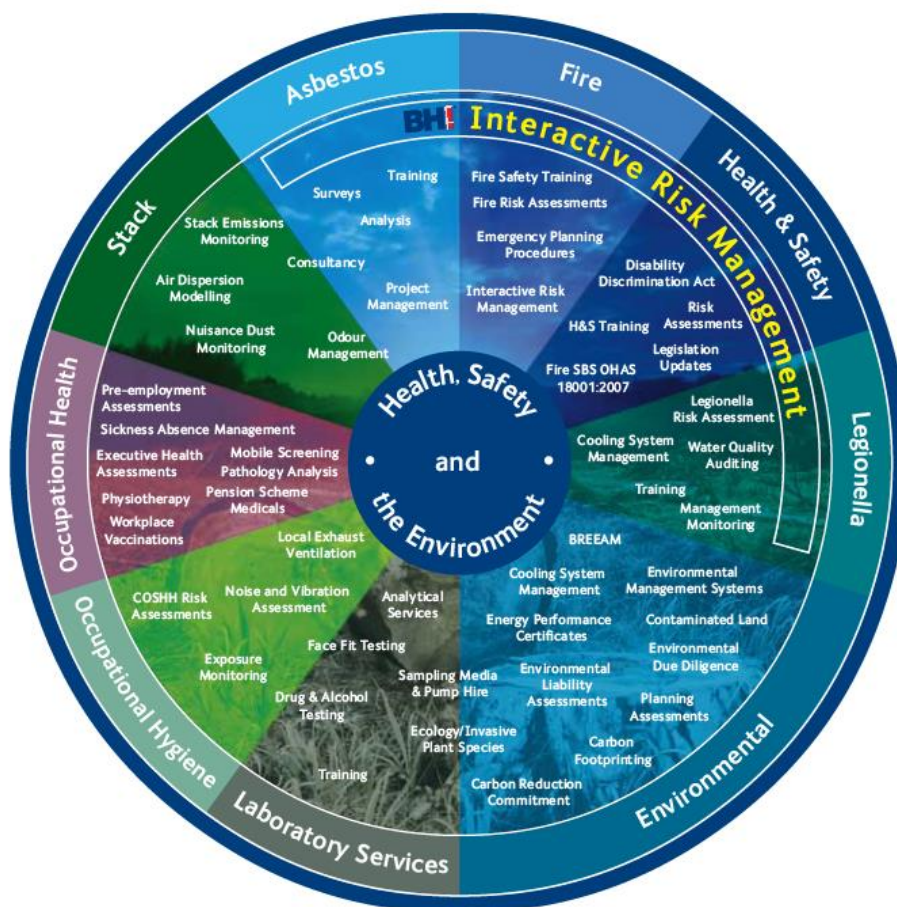
January 2018

Our Ref: HLEU59723/002Rv1

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Report Status:	Final	
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Date:	15 th January 2018	
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EXECUTIVE SUMMARY

RPS Consulting Services (RPS) was commissioned to produce an Overheating Risk Assessment based upon dynamic simulation modelling for the proposed development at 3 Viveash Close, Hayes, London. The proposal consists of the construction of one building with commercial space at ground and first floor and 68 residential units across two separate blocks.

The risk of overheating has been investigated for all occupied areas within each of the dwelling types, against the CIBSE's Technical Memorandum (TM) 49 and 59, which focus on predicting overheating for residential buildings, using location specific data.

The overheating analysis has followed the London Plan Cooling Hierarchy and the requirements detailed in the London Legacy Development Corporation Local Plan Policy S.7: 'Overheating and Greening'. As a result a number of passive and active measures have been implemented into design to reduce the risk of overheating without relying on comfort cooling.

The overheating modelling using LHR_DSY1, 2020s, high emissions, 50% percentile scenario, demonstrates that all living rooms/kitchens and bedrooms within the assessed dwellings pass the CIBSE TM59 criteria.

Further analysis was carried out to communal corridors and to all rooms for warmer and future weather data, even though this is not a mandatory requirement under TM59. It was established that the risk of overheating is increasing, when warmer summers and climate change adjusted weather years are used.

1 INTRODUCTION

RPS Consulting Services (RPS) was commissioned by *General Food Trading Co. Ltd* to produce an Overheating Risk Assessment based upon dynamic simulation modelling for the proposed development at 3 Viveash Close, Hayes, London.

This report reviews the risk of overheating in all occupied dwelling areas (bedrooms and dining/kitchen/living rooms) of each dwelling type and communal corridors. Many factors influence overheating in homes, including the intensity of heat gains, occupancy patterns, orientation, dwelling layout, shading strategy and ventilation method. Therefore dynamic thermal modelling has been used to simulate the internal temperature conditions and establish whether threshold conditions of discomfort will be reached.

A representative sample of dwellings was modelled to assess the risk of overheating. This sample includes typical apartments as well as worst case performing flats (i.e. west facing, single aspect, top floor flats etc.). These areas are likely to suffer from overheating due to the internal heat gains from direct sunlight, people and lighting. The ancillary spaces within the dwellings (circulation, bathrooms, WCs and cupboards) have been excluded from the analysis as they do not fall under the occupied spaces definition.

This report does not review the risk of overheating for the commercial space. This is because the commercial space will be constructed to shell and core standard; hence it is not possible to analyse the final fit out layout and services, which will significantly affect the risk of overheating. At this stage it is expected that air conditioning will be installed in the commercial space therefore no risk of overheating is expected.

1.1 Scheme Overview

The proposed development consists of the construction of one building with commercial space at ground and first floor and 68 residential units. The building comprises of two separate blocks, of Block A (39 residential units) and Block B (29 residential units).

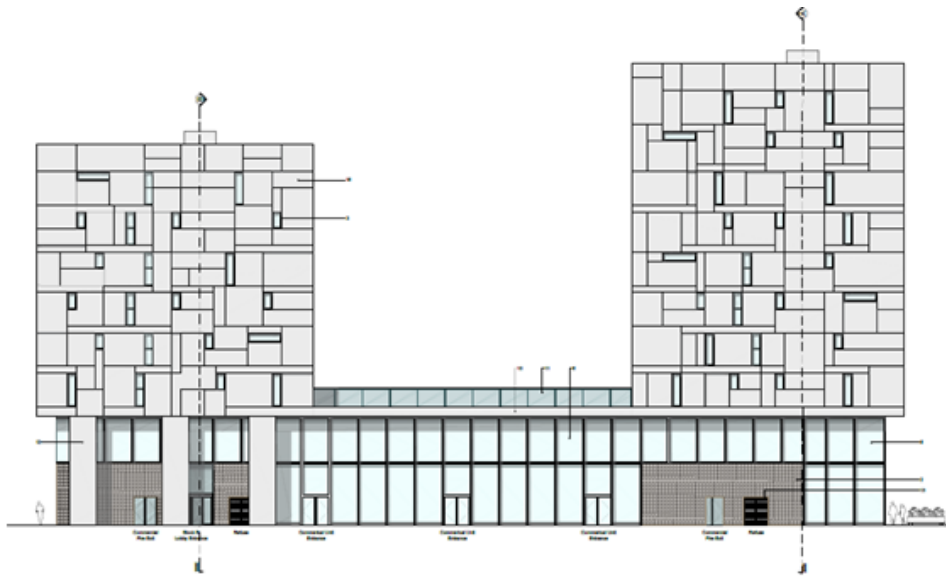


Figure 1: North Elevation of the proposed development

1.2 Report Structure & Methodology

The purpose of this report is to address sections 3.2.2 - 3.2.5 of the Sustainable Design and Construction supplementary planning guidance (SPG) and as well as Chapter 5 of the London Climate Change Adaptation Strategy. These guidelines are referenced by the Greater London Authority (GLA) guidance on preparing energy assessments (March 2016), where dynamic thermal modelling is expected to be carried out to assess the overheating risk in support of the energy assessment. A separate Energy Report, carried out by RPS also forms part of this planning application.

The risk of overheating has been investigated for all occupied areas within each of the dwelling types. The occupied areas were assessed against the CIBSE's Technical Memorandum (TM) 49 and 59, which focus on predicting overheating for buildings using location specific data.

The report provides in Section 2 a summary of the requirements and standards relevant to overheating. Section 3 notes the specification and input data that was enter in to the simulation. Section 4 details the steps taken to establish the risk of overheating and the results of the calculations. Finally, a summary of findings is presented in Section 5.

2 OVERHEATING CONTEXT

Assessing overheating risk in homes is a complex issue and not adequately assessed by Building Regulations. Indeed, Criterion 3 of Part L 2013 of the Building Regulations relates to limiting the effects of heat gains in summer. However, the regulations explicitly recognise that, as Criterion 3 does not cover all factors influencing overheating, there is no guarantee that buildings will not overheat and developers should carry out additional design assessments.

In order to address GLA requirement the risk of operational overheating, dynamic thermal modelling has been carried out in accordance with the guidance provided within CIBSE TM49. However, TM49 doesn't specify any specific performance criteria. CIBSE TM59 is the industry recognised standard for assessing overheating in residential buildings.

2.1. CIBSE TM49 – Design Summer Years for London

CIBSE TM49 was released in 2014 to address the question of whether the current CIBSE Design Summer Year (DSY) for London is the most appropriate year of weather data to assess the summertime cooling needs of buildings in London. TM49 enables the analysis of summer performance of buildings and investigate the impact of urban macroclimatic factors and climate change when carrying out overheating risk assessments for buildings in London.

Specifically, instead of having a single DSY (using observed data from Heathrow), three DSYs are now available capturing the local climate in three different London sites (urban, semi-urban and rural). To address London's urban heat island the following 3 different weather files have been created:

- LHR: Current London weather file based on Heathrow airport. To be used for most developments in London.
- LWC: Weather file based on London Weather Centre. To be used for sites in Central Activities Zone.
- GTW: Weather file based on Gatwick airport. To be used for rural sites.

As it is impossible to prejudge the impact of warm weather conditions on a building in a general sense, the modelling has been conducted using three design weather years from London Heathrow airport data:

- DSY1 - 1989: a moderately warm summer (current weather file used);
- DSY2 - 2003: a year with a very intense single warm spell; and
- DSY3 - 1976: a year with a prolonged period of sustained warmth.

DSY1-1989 is the current DSY and represents a moderately warm summer, as is interpreted in current CIBSE guidance. The years 1976 and 2003 were chosen as more extreme years with different types of summer: the former is a year with a long period of persistent warmth, whereas the latter has a more intense single warm spell.

Future DSYs for London are also available to reflect the UK Climate Projections (DEFRA, 2009) (UKCP09) and allow designers to increase the resilience of their buildings to future changes in climate.

The time periods considered within TM49 are the 2020s, 2050s and 2080s (each a 30-year period centred on the stated decade). In addition for each period, different emission scenarios (low, medium and high) have been taken into account with different probabilities (10th, 50th and 90th percentile). The 50th are viewed to be the 'best guess' level of change.

CIBSE TM49 doesn't specify any specific performance criteria but rather a certain methodology by ensuring that for sites within London the most appropriate weather data is used depending upon the location and time period.

2.2. CIBSE TM59 – Design methodology for the assessment of overheating risk in homes

Given the complexity of the factors (i.e. intensity of heat gains, occupancy patterns, orientation, dwelling layout, shading strategy and ventilation method) influencing overheating, it is important that a standardised methodology is used to assess risk and hence the need for this technical memorandum. TM59 proposes the following steps for all overheating assessments for all residential building types:

- A suitable sample of units within a development should be selected.
- Zoning: all sample units should be zoned into the separate rooms including kitchens, living rooms, bedrooms, bathrooms and halls.
- Building constructions should be modelled as proposed, accurately reflecting thermal properties such as thermal mass, insulation and solar transmittance for glazing.
- Standard profiles should be applied for occupancy, lighting and equipment gains.
- Guidance on the treatment of communal corridors should be followed.
- Pipework and equipment (e.g. heat interface unit gains from community heating systems) should be included in the model.
- Operable windows should be included in the model.
- Any internal or external shading provision should be included in the model.
- Additional mechanical ventilation including mechanical ventilation with heat recovery (MVHR) or extract systems should be included in the model.
- Air speed assumptions should be based on the guidance.

- The weather file used for the methodology should be the DSY1 (design summer year) file most appropriate for the site location for the 2020s, high emissions, 50% percentile scenario.
- The assessment should be undertaken using hourly dynamic simulation modelling, which includes all the relevant features of the building.

Homes that are predominantly naturally ventilated, including homes that have MVHR, with good opportunities for natural ventilation in the summer should assess overheating using the adaptive method based on CIBSE TM52 (2013). Compliance is based on passing both of the following two criteria:

- a) For living rooms, kitchens and bedrooms: the number of hours during which DT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
- b) For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26°C for more than 1% of annual hours.

Care homes and accommodation for vulnerable occupants, should use criteria (a) and (b) from above but should assume Type I occupancy (see CIBSE TM52).

For homes predominately mechanically ventilated with restricted window openings, the CIBSE fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26°C for more than 3% of the annual occupied annual hours.

Finally, the overheating test for corridors should be based on the number of annual hours for which an operative temperature of 28°C is exceeded. Whilst there is no mandatory target, if an operative temperature of 28°C is exceeded for more than 3% of total annual hours, this should be flagged as a significant risk within the report.

3 BUILDING INPUT DATA

The thermal model has been generated based upon the architect's floor plans and elevations, issued on 11th December 2017, and the specifications agreed within the design team.

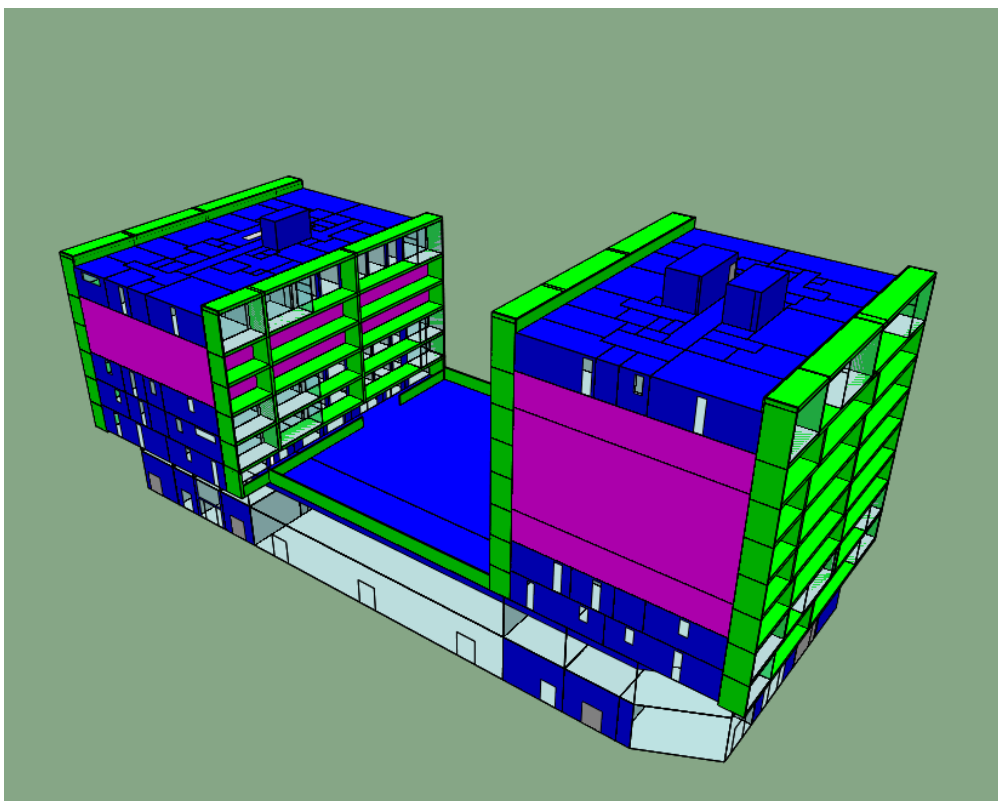


Figure 2: IES model developed based on the architectural drawings provided

The dynamic simulation (ApacheSim) has been carried out with the Government approved IES software, following CIBSE TM49 and TM59 methodologies and the results relative to the CIBSE TM59 criteria were generated using the module Vista Pro adaptive comfort version.

The calculations to assess the overheating risk take into account the location, building fabric, windows, door areas and internal gains. The following paragraphs contain the list of assumptions made for the overheating criteria calculations.

3.1. Assessed areas

The overheating analysis has assessed all dwellings but only a sample as per CIBSE TM59 methodology. This assessment has identified all the dwellings that are at risk of overheating. These are likely to be those (a) with large glazing areas, (b) on the topmost floor, (c) having less shading, (d)

having large, sun-facing windows, (e) having a single aspect, (f) having limited opening windows or (g) mid-floor flats. As a result the following units have been selected and analysed:

- Block A Flats:
 - Level 2: A01, A02, A03, A04
 - Level 3-8: A05, A06, A07, A08, A09
 - Level 9: A35, A36, A37, A38, A39
- Block B Flats:
 - Level 2: B01, B02, B03, B04
 - Level 3: B05, B06, B07, B08, B09
 - Level 4: B10, B11, B12, B13, B14
 - Level 7: B25, B26, B27, B28, B29

In addition and in accordance to CIBSE TM59, communal corridors are also at risk of overheating as they contain community heating distribution pipework. A sample of communal corridors has been assessed and these were selected as the most highly to overheat due to (a) presence of community pipework, (b) absence of windows, or (c) long lengths. As a result the following areas have been selected and analysed:

- Block A:
 - Levels 2, 3, 9: Corridor
- Block B:
 - Levels 2, 3, 4, 7: Corridor

This report reviews the risk of overheating in all occupied rooms within the flats. Occupied areas are considered all areas within the assessed building that are likely to be occupied for at least 30 minutes by a building user. For this project, occupied areas are the bedrooms and kitchen/living rooms within the dwellings. The ancillary spaces within the dwellings (corridors, bathrooms, WCs and cupboards) have been excluded from the analysis as they do not fall under the occupied spaces definition. Overall, 33 living rooms/kitchens, 72 bedrooms and 7 communal corridors have been assessed within this report.

Table 1 shows the activity types that were assigned to each zone of the proposed development based upon the room labelling on the drawings provided.

Room Type	Room Activity
Bedroom	Dwelling: Bedroom
WC	Dwelling: Bathroom
Living Room/ kitchen	Dwelling: Lounge
Corridors within flats	Dwelling: Circulation area
Corridor/ Lift / Staircase	Dwelling: Common circulation area
Cupboard	Hotel: Cupboard

Table 1: Allocated activity type

3.2 Weather files

The Design Summer Year (DSY) weather file was introduced in 2002 (CIBSE, 2002) in recognition of the need to have a sequence of warm weather data for use with dynamic thermal simulation programs for the assessment of overheating risk in naturally ventilated and passively cooled ('free running') buildings. The DSY represents a warmer than typical summer. The measure of summer warmth used to select the DSY is the average temperature over the six-month period from April to September. Although in meteorological terms summer is normally defined as the three-month period June, July and August, the longer April–September period was used as overheating problems are also sometimes experienced in spring and early autumn.

According to CIBSE TM49 and the probabilistic design summer years, overheating events with three characteristics can be defined and used to select weather data:

- DSY 1 – moderately warm summer. Represent a moderately warm summer year.
- DSY 2 – short intense warm spell. Represents an intense extreme year, which is chosen as the year with the event which is about the same length as the moderate summer year but has a higher intensity than the moderate summer.
- DSY 3 – long, less intense warm spell. The long extreme year is determined by the year with a less intense extreme than the high intensity year, more intense extreme than the moderate summer year but also has a longer duration than the moderate summer year.

CIBSE TM49 suggests that based on UK Climate Projections (UKCP09 - managed by the Environment Agency working with the Met Office) projections indicated that the more extreme historical summers would become average summers by the middle of the century, which is mainly because of the global warming and carbon dioxide emissions. Therefore, for buildings with long service lives or where overheating impacts are more critical, it is important that the risk of overheating is also analysed against future weather conditions. Hence, the use of climate change adjusted weather years is introduced to evaluate overheating risk on these longer timescales. The greenhouse

gas emissions scenarios considered were the Low, Medium and High scenarios; the time periods were the 2020s, 2050s and 2080s (each a 30-year period centred on the stated decade); and the percentile changes considered were the 10%, 50% and 90% percentiles.

There are significant climate variations across London associated with the urban heat island. To enable the impact of these differences to be investigated, CIBSE TM49 suggests the use of weather files for three locations: London Weather Centre (LWC), Heathrow Airport (LHR) and Gatwick Airport (GTW). The most representative weather station site for the project location should be used. It is recommended that LWC data be used for development within the Greater London Authority Central Activity Zone (CAZ); LHR data be used for development in urban and suburban areas outside the CAZ; and GTW data can be used for development in rural and peri-urban areas around the edge of London.

The following parameters were used for the building simulation in accordance with CIBSE TM49 and TM59:

- Weather Location: London/Heathrow, United Kingdom (Urban and Suburban areas)
- Weather files:
 - DSY1, for 2020, high emissions, 50% percentile scenario
 - DSY1, DSY2 and DSY3, for 2050, medium and high emissions, 50% percentile scenario
 - DSY1, DSY2 and DSY3, for 2080, low, medium and high emissions, 50% percentile scenario

3.3 Building construction data

The thermal transmittance values (U-values) adopted in the model, based on specifications agreed with the design team, are presented in Table 2. All glazing areas assumed to have a g-value of 0.46. Finally, the designed air permeability for the development is $3 \text{ m}^3/\text{hm}^2@50\text{Pa}$

Element	Proposed U-values
External Walls	0.17 W/m ² K
Ground Floor	0.12 W/m ² K
Roof	0.12 W/m ² K
Windows	1.2 W/m ² K
Doors	1.2 W/m ² K

Table 2: Specifications for building elements

3.4 Window and door openings

To enable passive ventilation operable windows and doors have been assessed as part of this analysis. In more detail the following options have been analysed:

- Windows are modelled as open when both the internal dry bulb temperature exceeds 22°C, it is also higher than the external temperature and the room is occupied. The opening area is 50%.
- Windows are also modelled as open during the night as they can be locked securely open. The opening area is 30%.
- Internal doors are left 100% open in the daytime, but are assumed closed when the occupants are sleeping.

The assumed opening areas have taken into account any security, acoustic or air quality issues that limit opening area (e.g. on ground floors) as agreed with the design team.

Openings depending on their exposure to wind pressures, can have different impact on the thermal comfort of the room they serve. To accurately reflect the exposure type for the site location and orientation, the following parameters have been used based on software's (IES) definitions:

- For openings on buildings of more than 12.5m in height, exposure types with names beginning 'High-rise' have been selected.
- Where the Opening Type is to be used for internal openings only, it has been assigned as 'Internal'.

3.5 Building services

Thermal comfort in a room is greatly affected by heat produced from the building services that serve the area.

The building services specification in Table 3 was accounted for within the analysis

Feature	Description	Notes
Ventilation	Mechanical Ventilation with Heat Recovery SFP=0.44; Heat exchanger efficiency η = 90% Mechanical Extract Ventilation in the kitchens and bathrooms/WCs.	Extract ventilation rates are in accordance with Part F due to limited ventilation design at time of assessment.
Heating System	All flats will be connected to the communal VRF system.	
Hot Water System	From main heating system	
Lighting	2 W/m ² (6pm – 11pm)	As specified in Section 5.2 of CIBSE TM59

Table 3: Performance specifications for building services

3.6 Pipework and heat loss

As space and water heating is provided by a community heating system, the Heat Interface Unit (HIU) and the pipework connecting it to the central system is permanently charged with hot water all year around to meet the hot water demand. The distribution pipework for the community heating system runs through the corridors and common spaces. Since this pipework is constantly emitting heat, even if well insulated, it can cause an increase in temperature in these spaces.

This assessment has taken into account all heating pipework distribution losses on the communal corridors and within the dwellings the pipework losses up to the HIU. The heat losses from pipework have been calculated in accordance with the Domestic Building Services Compliance Guide 2013, are presented in Table 4.

Location	Outside diameter of pipe (mm)	Heat loss of pipe (W/m)
Level 2B_Circulation	32	0.26
Level 2A_Corridor	32	0.26
Level 3B_Circulation	32	0.28
Level 4B_Circulation	32	0.28
Level 3A_Corridor	32	0.29
Level 7B_Circulation	32	0.28
Level 9A_Corridor	32	0.29

Table 4: Heat losses from pipework

3.7 Occupancy and equipment

Further to heat gains from lighting, buildings can also have significant internal heat gains from people and equipment. Table 5 presents the heat gains from occupancy within this assessment.

Room	Peak Load (W/person)
Single bedroom	8:00-23:00: 75W/p sensible – 55W/p latent gains For the rest of the day: 52.5W/p sensible – 38.5W/p latent gains
Double bedroom	8:00-9:00 and 22:00-23:00: 75W/p sensible – 55W/p latent gains 9:00-22:00: 37.5W/p sensible – 27.5W/p latent gains For the rest of the day: 52.5W/p sensible – 38.5W/p latent gains
1bed: living room/kitchen	9:00-22:00: 75W/p sensible – 55W/p latent gains
2bed: living room/kitchen	9:00-22:00: 75W/p sensible – 55W/p latent gains
3+bed: living room/kitchen	9:00-22:00: 75W/p sensible – 55W/p latent gains

Table 5: Heat gains from occupancy

Similarly, Table 6 presents the heat gains from equipment included within this assessment.

Room	Peak load (W)
Single and Double bedroom	80 W from 8 am to 11 pm 10 W during the sleeping hours
Living room/kitchen	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 85 W for the rest of the day

Table 6: Heat gains from equipment

3.8 Passive and active measures

The section below details how the different measures implemented have followed the London Plan cooling hierarchy developed in Policy 5.9: 'Overheating and Cooling' and the requirements detailed in the London Legacy Development Corporation Local Plan Policy S.7: 'Overheating and Greening'.

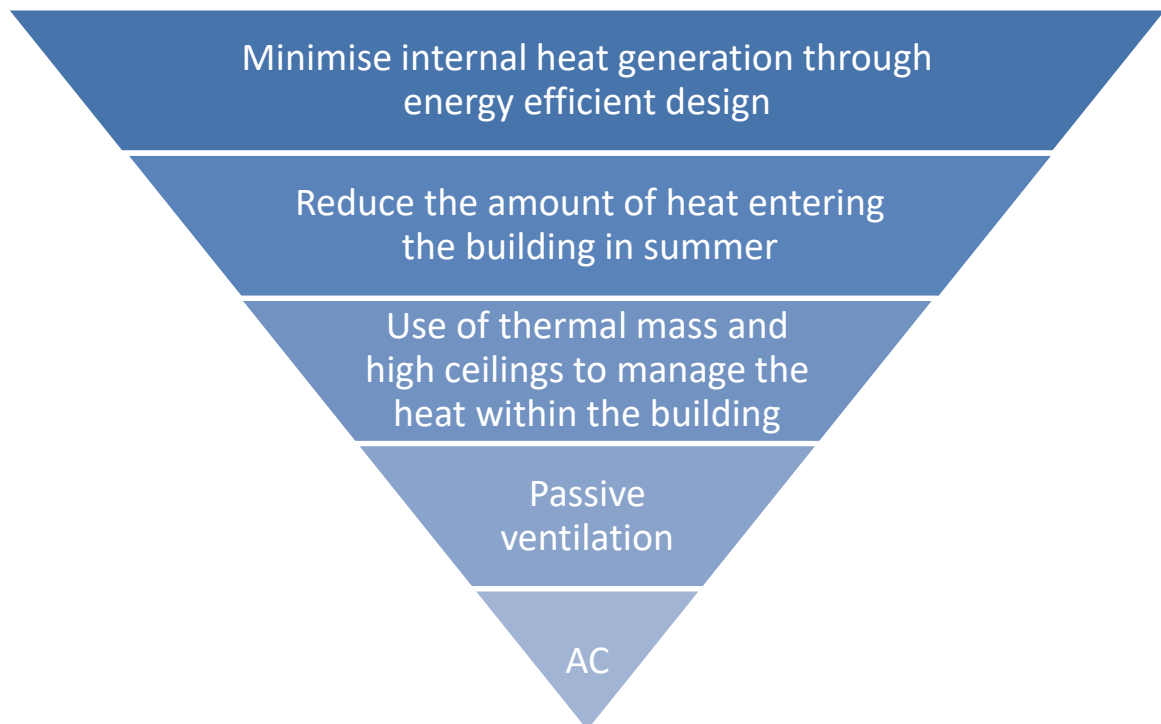


Figure 3: Cooling hierarchy

New development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. Therefore, all new developments should also be designed to avoid the need for energy intensive air conditioning systems as much as possible. Taking this into account the following measures have been implemented into design:

- **Passive Design**
 - High levels of insulation have been specified to the external walls, roof and floor slab, improving on Part L 2013 standards;
 - High levels of insulation for space and hot water pipeworks;
 - Incorporation of thermal mass in the building fabric to naturally attenuate heat gain during hot weather;
 - High specification glazing, improving on Part L 2013 standards;
 - Low solar transmittance factor (g-value) in all glazing areas, to reduce the maximum amount of solar energy passing through;
 - The incorporation of balconies and panels providing local shade to limit solar gain;
 - Promotion of natural ventilation to reduce internal temperature in the rooms by opening all openable windows by 50% within the flats (of their openable area), when the internal temperature within the areas reaches 22°C and it is higher than the external during the day. In addition, windows will be openable by 30% during sleeping hours when the internal temperature within the rooms reaches 22°C and it is higher than the external temperature; and

- All windows in winter gardens openable by 50% during the summer months and patio doors openable by 100% during the day, when the internal temperature within the areas reaches 22°C. In addition, patio doors will be openable by 30% during sleeping hours when the internal temperature within the areas reaches 22°C.
- Active Measures
 - Energy efficient light fittings to all areas to reduce latent heat gains.
 - Efficient mechanical ventilation with heat recovery in all dwellings with extract ventilation in the kitchens and bathrooms.

4 ANALYSIS & RESULTS

According to CIBSE TM59, all developments are required to pass the overheating criteria using the DSY1 file most appropriate to the site location, for the 2020s, high emissions, 50% percentile scenario. Other files including the more extreme DSY2 and DSY3 files, as well as future files (i.e. 2050s or 2080s), should be used to further test designs of particular concern, but a pass is not mandatory for the purposes of the simpler test presented in this document.

Using the specification and proposed measures to combat any potential overheating, a dynamic simulation using the Government approved software was carried out.

4.1 Primary Results – DSY1, 2020s, high emissions, 50% percentile scenario

The overheating modelling using LHR_DSY1, 2020s, high emissions, 50% percentile scenario, demonstrates that all occupied areas within the dwellings pass the CIBSE TM59 criteria. In more detail:

- In all living rooms, kitchens and bedrooms the number of hours during which DT is greater than or equal to one degree (K) during the period May to September inclusive is not more than 3% of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).
- In all bedrooms, the operative temperature, from 10 pm to 7 am, does not exceed 26°C for more than 1% of annual hours.
- In all homes that are predominately mechanically ventilated with restricted window openings, all occupied rooms do not exceed an operative temperature of 26°C for more than 3% of the annual occupied annual hours.

Moreover, an overheating test for corridors was carried out in order to calculate the number of annual hours for which an operative temperature of 28°C is exceeded. The overheating modelling using LHR_DSY1, 2020s, high emissions, 50% percentile scenario, demonstrates that all assessed communal corridors comply the CIBSE TM59 criteria.

A full breakdown of the results can be found in Appendix A. This shows that for a moderately warm summer the significant majority of occupied areas have no risk of overheating.

4.2 Varied profiles of current weather data

Further to assessing the overheating risk for a moderately warm summer for 2020 weather data, CIBSE TM49 and 59 require the overheating modelling to be also conducted using future weather data, with different heat intensity and carbon emissions. Therefore an overheating analysis was carried out for the following scenarios, for 33 living rooms/kitchens, 72 bedrooms and 7 communal corridors:

- DSY2 and DSY3 for the 2020s, high emissions, 50% percentile scenario
- DSY1, DSY2 and DSY3 for the 2050s, medium and high emissions, 50% percentile scenario
- DSY1, DSY2 and DSY3 for the 2050s, low, medium and high emissions, 50% percentile scenario

Weather data	Rooms passing Criterion 1: Hours of exceedance of CIBSE TM52	Bedrooms passing comfort during the sleeping hours criterion	Corridors passing operative temperature criterion	Percentage of rooms passing CIBSE TM59 criteria
DSY2 - 2020, high emissions	103	65	7	92%
DSY3 - 2020, high emissions	88	2	7	22%
DSY1: - 2050, medium emissions	99	39	7	65%
DSY2 - 2050, medium emissions	81	0	7	14%
DSY3 - 2050, medium emissions	44	0	7	6%
DSY1: - 2050, high emissions	91	2	7	26%
DSY2 - 2050, high emissions	70	0	7	6%
DSY3 - 2050, high emissions	16	0	7	6%

DSY1: - 2080, low emissions	96	10	7	37%
DSY2 - 2080, low emissions	77	0	7	11%
DSY3 - 2080, low emissions	37	0	7	6%
DSY1: - 2080, medium emissions	68	0	7	12%
DSY2 - 2080, medium emissions	45	0	7	6%
DSY3 - 2080, medium emissions	4	0	4	4%
DSY1: - 2080, high emissions	13	0	7	6%
DSY2 - 2080, high emissions	7	0	6	5%
DSY3 - 2080, high emissions	0	0	0	0%

Table 7: Results of overheating simulation using varied future weather profiles for 50% percentile scenario

As can be seen from the results in Table 7, when the overheating analysis has been run against different warmer, annual weather profiles for 2020, the risk of overheating is still limited. On the other hand, the number of rooms failing the criteria increases as more intensive weather data are used in the future; however, this is to be expected with the future weather files having a significantly higher average and peak temperatures and CO₂ emissions.

According to CIBSE TM59, a pass is not mandatory for the warmer or future weather files. The results presented in Table 7 show that despite these harsher weather scenarios, the majority of the proposed development is still at risk of overheating; therefore, comfort cooling may be required for some units in future.

Detailed results showing the performance of all assessed rooms against TM59 criteria for weather data shown in Table 7 are not included within this report, but can be available upon request.

5 CONCLUSIONS

The dynamic overheating modelling analysis using the Government's approved computer software has been carried out for all types of occupied residential areas to address the requirement under the London Plan. This modelling has been carried out in accordance with CIBSE TM49, TM52 and TM59, in accordance with the GLA guidance on preparing energy assessments. To minimise the risk of overheating in these areas, passive and active measures have been introduced in the building design. In more detail, the following passive and active measures have been proposed to reduce the risk of overheating:

- High levels of insulation have been specified to all building elements, improving on Part L 2013 standards;
- Incorporation of thermal mass in the building fabric to naturally attenuate heat gain during hot weather;
- The incorporation of balconies and vertical panels provide local shade to limit solar gain;
- High specification glazing, improving on Part L 2013 standards;
- Low solar transmittance factor (g-value) in all glazing areas, to reduce the maximum amount of solar energy passing through;
- Efficient mechanical ventilation with heat recovery in all dwellings with extract ventilation in the kitchens and bathrooms;
- Energy efficient light fittings to all areas to reduce latent heat gains;
- Internal solar shading devices (blinds); and
- Promotion of natural ventilation to reduce internal temperature in the rooms by opening all openable windows by 50% within the flats (of their openable area), when the internal temperature within the areas reaches 22°C and it is higher than the external. In addition, windows will be openable by 30% during sleeping hours when the internal temperature within the areas reaches 22°C.
- All windows in winter gardens openable by 50% during the summer months and patio doors openable by 100% during the day, when the internal temperature within the areas reaches 22°C. In addition, patio doors will be openable by 30% during sleeping hours when the internal temperature within the areas reaches 22°C.

Based upon the specification as detailed in Section 3, the results of the primary weather data simulation confirmed that all occupied rooms pass Criterion 1 of CIBSE TM52 and all bedrooms pass passing comfort during the sleeping hours criterion, when they are assessed against LHR DSY1, 2020, high emissions, 50% percentile weather file. Hence all living rooms/kitchens and bedrooms meet CIBSE TM59 mandatory criteria.

An addition analysis was carried out to all communal corridors to establish if the operative temperature of 28°C is exceeded for more than 3% of total annual hours. It was concluded that all corridors meet CIBSE TM59 Criterion, when they are assessed against LHR DSY1, 2020, high emissions, 50% percentile weather file.

The overheating modelling also reviewed the impact of potential warmer and future weather scenarios; even though compliance with these weather data is not mandatory in CIBSE TM59. It was established that the risk of overheating is increasing, when warmer summers and climate change adjusted weather years are used.

Appendix A: Primary Overheating Results

Results from the other simulation scenarios can be made available upon request.

DSY1, 2020s, high emissions, 50% percentile scenario		
Room Name	Living rooms/kitchens and bedrooms TM52 Criterion 1	Bedrooms Comfort during the sleeping hours criterion
Level 2A_Flat A01 bed1	1.1	22
Level 2A_Flat A01 bed2	0.8	22
Level 2A_Flat A02 bed1	0.6	22
Level 2A_Flat A02 bed2	0.6	20
Level 2A_Flat A02 bed3	0.4	20
Level 2A_Flat A03 bed1	0.4	19
Level 2A_Flat A04 bed1	1.1	22
Level 2A_Flat A04 bed2	1.4	23
Level 2A_Flat A04 bed3	1.4	21
Level 2B_Flat B01 bed1	0.1	18
Level 2B_Flat B01 bed2	0.4	18
Level 2B_Flat B01 bed3	0.3	20
Level 2B_Flat B02 bed1	0.5	17
Level 2B_Flat B02 bed2	0.4	19
Level 2B_Flat B02 bed3	0.4	21
Level 2B_Flat B03 bed1	0.5	20
Level 2B_Flat B03 bed2	0.6	22
Level 2B_Flat B03 bed3	0.5	19
Level 2B_Flat B04 bed1	0.6	21
Level 3A_Flat A05 bed 1	0.9	17
Level 3A_Flat A06 bed 2	0.5	15

Level 3A_Flat A06 bed 3	0.3	16
Level 3A_Flat A06 bed1	0.4	23
Level 3A_Flat A07 bed1	0.4	15
Level 3A_Flat A08 bed1	0.3	15
Level 3A_Flat A08 bed2	0.4	15
Level 3A_Flat A09 bed1	0.7	16
Level 3A_Flat A09 bed2	0.8	17
Level 3B_Flat B05 bed1	0.2	13
Level 3B_Flat B05 bed1	0	14
Level 3B_Flat B06 bed1	0.5	15
Level 3B_Flat B06 bed2	0.5	15
Level 3B_Flat B06 bed3	0.4	27
Level 3B_Flat B07 bed1	0.4	16
Level 3B_Flat B08 bed1	0.5	16
Level 3B_Flat B08 bed2	0.5	22
Level 3B_Flat B08 bed3	0.5	16
Level 3B_Flat B09 bed1	0.4	16
Level 3B_Flat B09 bed2	0.6	16
Level 3B_Flat B09 bed3	0.4	18
Level 4B_Flat B10 bed1	0.1	13
Level 4B_Flat B10 bed2	0	13
Level 4B_Flat B11 bed1	0.5	15
Level 4B_Flat B11 bed2	0.5	15
Level 4B_Flat B11 bed3	0.4	28
Level 4B_Flat B12 bed1	0.3	15
Level 4B_Flat B13 bed1	0.5	16

Level 4B_Flat B13 bed2	0.5	22
Level 4B_Flat B13 bed3	0.5	16
Level 4B_Flat B14 bed1	0.4	16
Level 4B_Flat B14 bed2	0.4	16
Level 4B_Flat B14 bed3	0.4	17
Level 4B_Flat B25 bed1	1	14
Level 4B_Flat B25 bed2	0.4	16
Level 7B_Flat B26 bed1	0.5	17
Level 7B_Flat B26 bed2	0.6	16
Level 7B_Flat B26 bed3	0.5	29
Level 7B_Flat B27 bed1	0.5	16
Level 7B_Flat B28 bed1	0.5	16
Level 7B_Flat B28 bed2	0.5	22
Level 7B_Flat B28 bed3	0.6	16
Level 7B_Flat B29 bed1	1.1	16
Level 7B_Flat B29 bed2	1.1	16
Level 7B_Flat B29 bed3	0.6	18
Level 9A_Flat A35 bed 1	0.9	17
Level 9A_Flat A36 bed1	0.5	15
Level 9A_Flat A36 bed2	0.5	16
Level 9A_Flat A37 bed1	0.5	16
Level 9A_Flat A38 bed1	0.5	16
Level 9A_Flat A38 bed2	0.5	16
Level 9A_Flat A39 bed 1	1.2	18
Level 9A_Flat A39 bed 2	1	18
Level 2A_Flat A01 living room	1.4	-

Level 2A_Flat A02 living room	1	-
Level 2A_Flat A03 living room	0.6	-
Level 2A_Flat A04 living room	2	-
Level 2B_Flat B01 living room	0.6	-
Level 2B_Flat B02 living room	0.7	-
Level 2B_Flat B03 living room	0.9	-
Level 2B_Flat B04 living room	0.8	-
Level 3A_Flat A05 living room	1.5	-
Level 3A_Flat A06 living room	2.1	-
Level 3A_Flat A07 living room	0.8	-
Level 3A_Flat A08 living room	0.6	-
Level 3A_Flat A09 living room	1	-
Level 3B_Flat B05 living room	0.7	-
Level 3B_Flat B06 living room	0.9	-
Level 3B_Flat B07 living room	0.8	-
Level 3B_Flat B08 living room	0.7	-
Level 3B_Flat B09 living room	0.7	-
Level 4B_Flat B10 living room	0.7	-
Level 4B_Flat B11 living room	0.8	-
Level 4B_Flat B12 living room	0.8	-
Level 4B_Flat B13 living room	0.7	-
Level 4B_Flat B14 living room	0.8	-
Level 4B_Flat B25 living room	1.4	-
Level 7B_Flat B26 living room	1.8	-
Level 7B_Flat B27 living room	1	-
Level 7B_Flat B28 living room	0.9	-

Level 7B_Flat B29 living room	0.9	-
Level 9A_Flat A35 living room	1.5	-
Level 9A_Flat A36 living room	1.7	-
Level 9A_Flat A37 living room	1	-
Level 9A_Flat A38 living room	0.7	-
Level 9A_Flat A39 living room	1.1	-

Appendix B: General Notes

RPS CONSULTING SERVICES

Sustainability and Energy Assessments

General Notes

General

1. The report is based on information available at the time of the writing and discussions with the client during project meetings. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by RPS for inaccuracies in the data supplied by any other party.
2. The review of local and regional policy does not constitute a detailed review. It is simply used as a guide to provide the context for the development and to determine the likely requirements of the Local Authority.
3. No site visits have been carried out as any part thereof, unless otherwise specified.
4. This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in guidance may necessitate a re-interpretation of the report in whole or in part after its original submission.
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