JS LEWIS LTD

Overheating Risk Assessment

Enderby Place

Revision B

Maritime View Ltd

November 2023

JS LEWIS LTD

Client:	Maritime View Ltd
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1 INTRODUCTION

1.1 Purpose and Scope of this Document

This document addresses the planning-stage requirement for an overheating risk assessment in line with the GLA's Energy Guidance note and the adopted London Plan policies. It is for planning purposes only. The client has appointed a design team to develop the proposals that address local, regional and national policy, and to submit the planning application.

1.2 Description of Development

The proposed development is for the erection of part-3, part-23, part-35 storey buildings, providing up to 564 residential apartments (Class C3), light industrial (Class E(g)(iii)) and community / café use (Sui Generis), and associated highways, landscaping and public realm works.

1.3 Location and Scheme Description

The Site, accessed by Telcon Way, is currently cleared. It has a draft allocation and has previously received planning permission for residential-led mixed use. It is a riverside site with the Thames to the West. The relatively recent development of Enderby Wharf is located to the South of the Site, and the proposed development at Morden Wharf is located to the North of the Site.

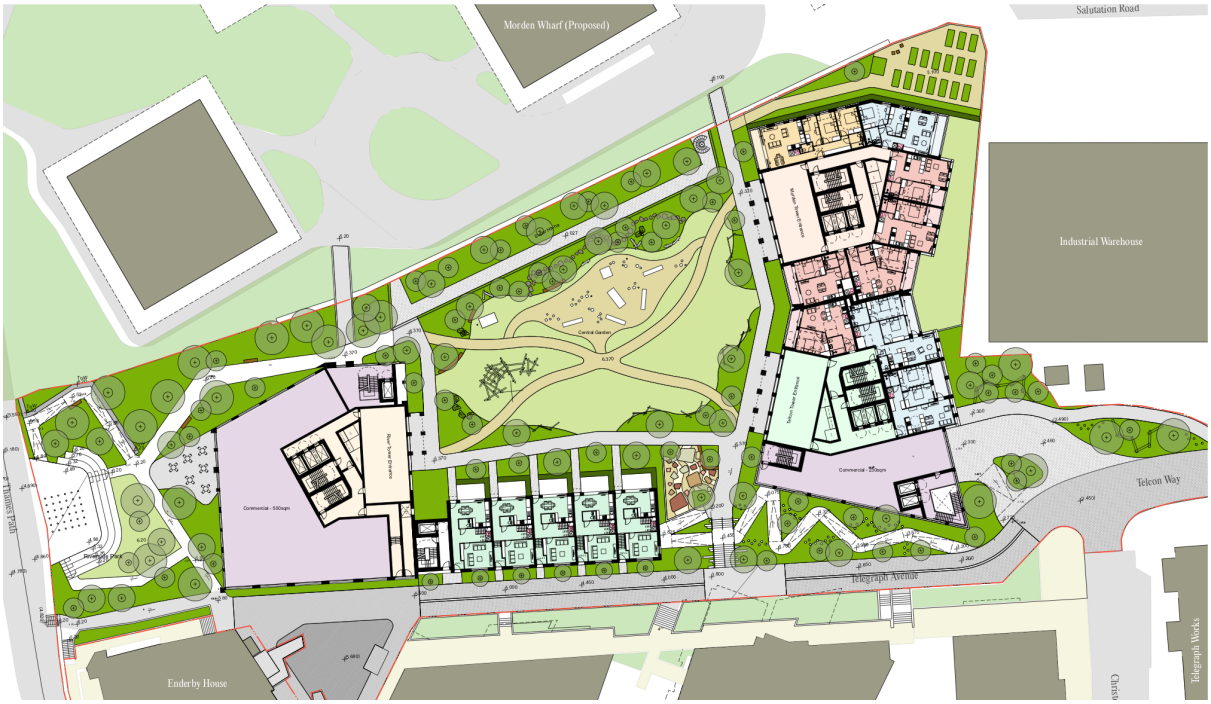

Figure 1 - Site Plan - Podium Level

2 POLICY AND METHODOLOGY

2.1 GLA Policy

The GLA policy on overheating is set out in the London Plan Policy SI 4:

Policy SI 4 Managing heat risk

A Development proposals should minimize 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) minimize internal heat generation through energy efficient design
3) manage the heat within the building through exposed internal thermal mass and high ceilings
4) provide passive ventilation
5) provide mechanical ventilation
6) provide active cooling systems.

The 2022 GLA Energy Guidance expands upon these matters:

1. Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure*. It is also expected that external shading will form part of major proposals.*

2. Minimize internal heat generation through energy efficient design*: For example, heat distribution infrastructure within buildings should be designed to minimize pipe lengths, particularly lateral pipework in corridors of apartment blocks, and adopting pipe configurations which minimize heat loss e.g. twin pipes.*

3. Manage the heat within the building through exposed internal thermal mass and high ceilings*: Increasing the amount of exposed thermal mass can help to absorb excess heat within the building. Efficient thermal mass should be coupled with night time purge ventilation.*

4. Provide passive ventilation*: For example, through the use of openable windows, shallow floor plates, dual aspect units24 or designing in the 'stack effect' where possible.*

5. Provide mechanical ventilation*: Mechanical ventilation can be used to make use of 'free cooling' where the outside air temperature is below that in the building during summer months. This will require a by-pass on the heat recovery system for summer mode operation.*

6. Provide active cooling systems*: The increased use of air conditioning systems is generally not supported, as these have significant energy requirements and, under conventional operation, expel hot air, thereby adding to the urban heat island effect. However, once passive measures have been prioritized if there is still a need for active cooling systems, such as air conditioning systems, these should be designed in a very efficient way and should aim to reuse the waste heat they produce.*

2.2 Methodology

2.2.1 CIBSE TM59

The appropriate methodology to follow for the overheating risk assessment in dwellings, student accommodation and care homes is *CIBSE TM59 (2017) – Design methodology for the assessment of overheating risk in homes*. It is described by its authors as a technical memorandum, and has been written to standardize the approach to risk assessments.

It sets out design comfort criteria extracted from CIBSE TM52 and CIBSE Guide A, an assessment methodology and suggested reporting requirements. Key aspects include:

- Modelling should be based on a suitable sample of units;
- Building should be zoned and modelled using likely materials and build-ups;
- Standard profiles should be applied for occupancy, lighting and equipment gains;
- Operable windows should be included in the design;
- Internal and external shading should be included;
- Any mechanical ventilation should be included;
- Weather should be local Design Summer Year for the most appropriate location;
- Modeling should use hourly dynamic simulation modelling.

The suggested reporting requirements include:

- Dynamic analysis software used;
- Site location and orientation;
- Images of the model and units for testing;
- Information on constructions used including thermal mass;
- Ventilation strategy modelled including details of openings and ventilation rates;
- Weather files used;
- Category of building;
- Reports of the analysis;
- Statement of whether it passes or fails.

2.2.2 Criteria for Naturally Ventilated Homes

For naturally ventilated homes, the compliance criteria, based upon hours of exceedance, are as follows:

1. 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 of May to September inclusive shall not be more than 3pc of occupied hours (CIBSE TM52 criterion 1: hours of exceedance);
2. 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.

Criteria 2 and 3 from TM52 based upon daily weighted exceedance and upper limit temperature may fail to be met, but both of the above must be passed for relevant rooms.

2.2.3 Criteria for Mechanically Ventilated Homes

For homes with restricted openings the CIBSE fixed temperature test must be followed, ie all occupied rooms should not exceed an operative temperature of 26ºC for more than 3% of annual occupied hours (CIBSE Guide A 2015).

3 THERMAL MODEL INPUTS

3.1 Software

This assessment uses EDSL Tas version 9.5.4 which is a dynamic modelling package that has an in-built TM59 wizard that sets up the requisite parameters for reporting. An appropriate selection of units has been used in the assessment. The whole floorplate for the 23rd floor was chosen as a suitable representation of some of the higher risk units in the development as a whole. The units are unshaded by surrounding adjacent development.

3.2 Weather Files

The weather files used for assessing the overheating risk for this project are the CIBSE DSY files for London Heathrow. The specific weather file used for the assessment is the future design summer year DSY1. DSY 2 and 3 scenarios were also used to test different extreme weather scenarios.

3.3 The Units for Testing

A 3D model of the scheme was developed of the selected floorplate. A model was built of those units, replicating their location in terms of height, with party floors above and below.

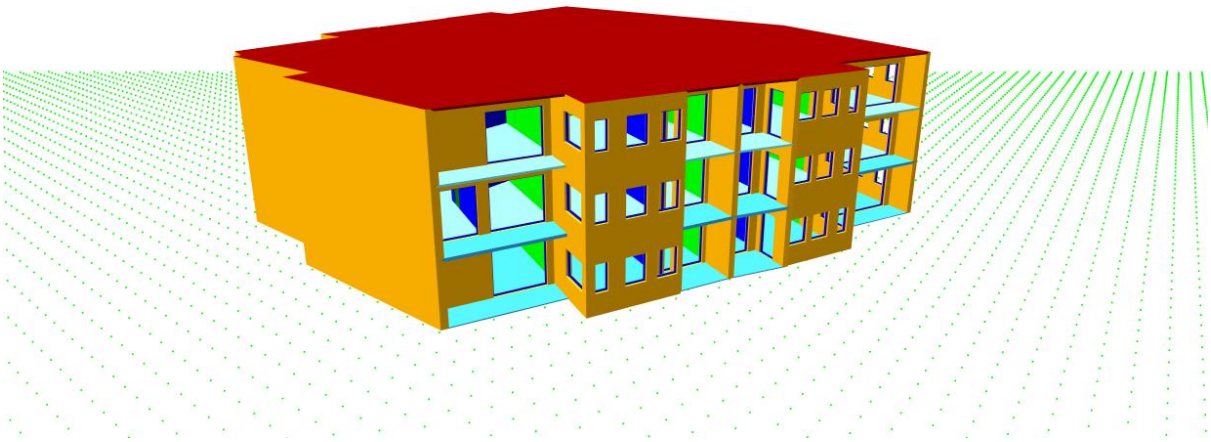

Figure 2 - East Facade of Modelled Units

3.4 Modelling Inputs

3.4.1 Drawings Used

The tests were based upon the following drawings from the November 2023 scheme fix:

Level 23 GA Plan

Project Elevations

Project Bay Studies

3.4.2 Constructions

The modelling has been undertaken at the planning stage, and not all design information is decided by this stage. Therefore, some assumptions have had to be made. The construction types used in the model are therefore as follows:

- Party floor – floor finish on concrete frame, acoustic insulation;
- Party wall – lightweight party wall;
- Wall to communal areas - light-weight insulated wall;
- External wall - light-weight wall construction, insulation - U=0.18W/m2K;
- Windows – double-glazed with g < 0.4 to outer layer, U=1.3W/m2K.

3.4.3 Noise and Air Quality Considerations

The advice of 'Acoustics, Ventilation and Overheating - Residential Design Guide' published by the Institute of Acoustics is to take a risk-based approach to assessing overheating and the interactions with acoustic restrictions.[1]

It suggests that where acoustic levels from transport noise sources are lower than 53dB (07.00 - 23.00) and lower than 48dB (23.00-07.00), then the use of openable windows as the primary means of mitigating overheating is not likely to result in adverse effects.

From a noise perspective, there are no constraints in terms of overheating ventilation. This is also the case for Air Quality. Separate reports on these disciplines are being prepared by Hawkins Environmental.

3.4.4 Ventilation

All units will have mechanical ventilation with heat recovery (with a summer bypass) as part of the energy strategy, but will also have openable windows. Natural and purge ventilation through openable windows will be available to all occupants, and likely to be used by them if overheating becomes substantial.

The infiltration rate is modelled at 0.25ACH following the guidance in CIBSE Guide A and the ventilation rate from the MVHR is set at 1ACH.

[1] Acoustics, Ventilation and Overheating - Residential Design Guide, Institute of Acoustics, Jan 2020

3.5 Zoning and Reporting Annotations

The room reference numbers used in the reporting from the dynamic modelling package represent the 23rd floor.

Figure 3 - Floorplan of Modelled Units

4 DESIGN MEASURES AND RESULTS

4.1 Design Measures

In line with the cooling hierarchy, the following measures have been used to minimise overheating risks:

- Reduce the amount of heat entering the building:
  - Bedrooms largely have significant recesses and self-shading from the balconies above;
  - Glazing to higher risk facades to have low g-value glass;
  - Glazing levels are not excessive - window heights of 1.375m are used, except where full height access to balconies is provided.
- Minimise internal heat gain:
  - Low temperature heat distribution system based on heat pumps and an ambient loop to be used;
  - Pipe work to be optimised in line with CIBSE CP1 Guidance.
- Manage heat within the building:
  - Use of thermal mass where possible;
  - Night ventilation can be combined through the mechanical ventilation system which will include a summer bypass for free cooling.
- Passive ventilation:
  - Openable windows will be provided - either sliding doors or side-hung windows with an average openable proportion of 50%.
- Mechanical ventilation:
  - Provided to all units;
  - Night ventilation can be combined through the mechanical ventilation system which will include a summer bypass for free cooling.
- Active cooling
  - Not anticipated across the board at this stage - it may be required for the one room highlighted as a risk, but cooling via the MVHR system may be sufficient, thus avoiding a separate cooling system;
  - If a separate cooling system is required, it could reject heat into the DHW system as a carbon efficient solution.

The comprehensive set of measures above will help to reduce the risk of summer time overheating.

4.2 Detailed Results

The results of the TM59 assessment can be found in Appendix 1.

4.3 Natural Ventilation Scenario – DSY1

Whilst mechanical ventilation with heat recovery is designed in for its energy efficiency benefits, the apartments have the ability to be naturally ventilated through openable windows as per the CIBSE guidance. When assessed under this scenario, all rooms bar one bedroom pass the overheating test criteria for the design summer year DSY1.

4.4 Natural Ventilation Scenarios –DSY2 and DSY 3

All units have been tested under these scenarios.

4.5 Discussion

Generally the scheme performs very well across the board. All dwellings will have the ability to be naturally ventilated through openable windows. According to the model, all bar 1 rooms pass the requisite overheating test under this scenario. The room that fails is very marginal and could be addressed through specific lower g glazing values. The scheme therefore achieves the standards required under TM59 without recourse to active cooling with the exception of the bedroom to the unit on the SW corner. The reasons for this are down to the slightly lower level of natural shading achieved and the larger expanse of glazing.

Figure 4 - Floorplan with Proposed Cooled Area

The proposed approach for the bedroom that doesn't quite meet the criteria is to assess both enhanced g-value glass and comfort cooling for that room specifically provided via the MVHR system at the detailed engineering stage that takes place at the Building Control stage of the project.

The risk assessment is a planning stage risk assessment. As the project progresses, it is recommended that the exercise be revisited as the design progresses and more information is known regarding the various materials and systems characteristics.

4.6 Extreme Weather Mitigation Strategy

4.6.1 Planning for Extreme Weather

The following measures should be considered by occupants when a period of extreme weather is forecast:

- Set up fans in living areas and bedrooms;
- Ensure A/C is well maintained, check and reset thermostats if required.
- Ensure access to fluids including cool drinks/ water in the refrigerator;
- Plan food, drink and medications if very hot weather is forecast;
- Ensure refrigerated medicines are kept in the fridge at all times;
- Utilise blinds and openable windows where available in a means that allows cooler night air in, and prevents hot daytime air coming in;
- Plan for what to do in an electricity black-out including how to have access to a mobile when power is down, and who to ask for help.

4.6.2 Acting During Extreme Weather

Information should be prepared for occupants setting out how best to act during periods of extreme weather, including:

- Keep in touch with friends and family;
- Stay hydrated – drink plenty of fluids, avoiding alcohol, tea and coffee;
- Stay out of the sun, especially during the hottest part of the day, and do any essential outdoor jobs early in the morning when it's cooler;
- Use air-conditioning and fans. Cooling one room is cheaper and more carbon efficient than cooling the whole dwelling. Cool bedrooms before bedtime, open windows for ventilation in the evening when it's cooler;
- Avoid unnecessary travel in the heat;
- Use damp towels and water to cool down, being mindful of people who can't do this for themselves such as disabled people, children and babies.
- Eat frequent small meals and avoid cooking. Store food in the refrigerator;
- Avoid unnecessary work and rest (e.g. siesta);
- Listen to the radio and television for heatwave information.

Further information can be found at the following link:

https://www.gov.uk/government/publications/heatwave-plan-for-england/beat-the-heat-staying-safe-in-hot-weather

5 CONCLUSION

5.1 Proposals

Maritime View Ltd is seeking to develop the Enderby Place site into a mixed-use development. The scheme consists of the erection of part-3, part-23, part-35 storey buildings, providing up to 564 residential apartments (Class C3), light industrial (Class E(g)(iii)) and community / café use (Sui Generis), and associated highways, landscaping and public realm works. This report is a planning-stage risk assessment of the overheating risks in line with policy expectations.

TM59 calls for the testing of a suitable sample of units. In this case, the entire 23rd floor was modelled to provide an assessment of a range of units and orientations. Due to the location of the site, a higher storey without shading from the adjacent development was selected.

The design of the scheme involves a range of measures to minimise overheating risks:

- Reduce the amount of heat entering the building:
  - Bedrooms largely have significant recesses and self-shading from the balconies above;
  - Glazing to higher risk facades to have low g-value glass;
  - Glazing levels are not excessive - window heights of 1.375m are used, except where full height access to balconies is provided.
- Minimise internal heat gain:
  - Low temperature heat distribution system based on heat pumps and an ambient loop to be used;
  - Pipe work to be optimised in line with CIBSE CP1 Guidance.
- Manage heat within the building:
  - Use of thermal mass where possible;
  - Night ventilation can be combined through the mechanical ventilation system which will include a summer bypass for free cooling.
- Passive ventilation:
  - Openable windows will be provided - either sliding doors or side-hung windows with an average openable proportion of 50%.
- Mechanical ventilation:
  - Provided to all units;
  - Night ventilation can be combined through the mechanical ventilation system which will include a summer bypass for free cooling.
- Active cooling
  - Not anticipated across the board at this stage - it may be required for the one room highlighted as a risk, but cooling via the MVHR system may be sufficient, thus avoiding a separate cooling system;
  - If a separate cooling system is required, it could reject heat into the DHW system as a carbon efficient solution.

An extreme weather mitigation strategy has also been set out.

5.2 Results

All rooms tested pass the overheating tests under CIBSE TM59 under the natural ventilation scenario with the exception of the bedroom identified.

5.3 Conclusion

The proposed scheme has been assessed at the planning stage for overheating risks and performs well under design summer year conditions and natural ventilation scenarios.

There is an expectation that active cooling is avoided in residential developments as far as possible. The scheme has looked to design out risks of overheating through the design measures set out above.

As the scheme progresses, any cooling load should be minimised. As a result, it is recommended that the bedroom that does not meet the criteria is analysed for the ability to be cooled via the MVHR system, and for the cooling to be restricted to that one room.

APPENDIX 1 - NATURAL VENTILATION RESULTS

LHR DSY1

LHR DSY2

LHR DSY3

Domestic Overheating (CIBSE TM59)

Project Details

Building Designer File (.tbd): P574 OH 161123_London_LHR_DSY1.tbd

Simulation Results File (.tsd): P574 OH 161123_London_LHR_DSY1.tsd

Date: 21 November 2023

Building Category: Category II

Natural Ventilation Overheating Results

Zone Name	Room Use	Wind Speed (m/s)	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
L23 Bed 1a	Bedroom	0.1	3672	110	5	3285	32	3	Pass
L23 Bed 1b	Bedroom	0.1	3672	110	11	3285	32	3	Pass
L23 Bed 2	Bedroom	0.1	3672	110	13	3285	32	6	Pass
L23 Bed 3	Bedroom	0.1	3672	110	16	3285	32	7	Pass
L23 Bed 4	Bedroom	0.1	3672	110	13	3285	32	8	Pass
L23 Bed 5	Bedroom	0.1	3672	110	113	3285	32	10	Fail
L23 Bed 6	Bedroom	0.1	3672	110	46	3285	32	6	Pass
L23 Bed 7	Bedroom	0.1	3672	110	37	3285	32	5	Pass
L23 Bed 8a	Bedroom	0.1	3672	110	7	3285	32	3	Pass
L23 Bed 8b	Bedroom	0.1	3672	110	5	3285	32	3	Pass
L23 Bed 8c	Bedroom	0.1	3672	110	4	3285	32	3	Pass
L23 KLD 1	Living Room / Kitchen	0.1	1989	59	25	N/A	N/A	N/A	Pass
L23 KLD 2	Living Room / Kitchen	0.1	1989	59	2	N/A	N/A	N/A	Pass
L23 KLD 3	Living Room / Kitchen	0.1	1989	59	2	N/A	N/A	N/A	Pass
L23 KLD 4	Living Room / Kitchen	0.1	1989	59	0	N/A	N/A	N/A	Pass
L23 KLD 5	Living Room / Kitchen	0.1	1989	59	10	N/A	N/A	N/A	Pass
L23 KLD 6	Living Room / Kitchen	0.1	1989	59	9	N/A	N/A	N/A	Pass
L23 KLD 7	Living Room / Kitchen	0.1	1989	59	1	N/A	N/A	N/A	Pass
L23 KLD 8	Living Room / Kitchen	0.1	1989	59	21	N/A	N/A	N/A	Pass

*Zone names that have an orange coloured font are bedrooms which do not have 24/7 365 days a year occupancy, as per the TM59 guidance.

Domestic Overheating (CIBSE TM59)

Project Details

Building Designer File (.tbd): P574 OH 161123_London_LHR_DSY2.tbd

Simulation Results File (.tsd): P574 OH 161123_London_LHR_DSY2.tsd

Date: 17 November 2023

Building Category: Category II

Natural Ventilation Overheating Results

Zone Name	Room Use	Wind Speed (m/s)	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
L23 Bed 1a	Bedroom	0.1	3672	110	27	3285	32	6	Pass
L23 Bed 1b	Bedroom	0.1	3672	110	32	3285	32	7	Pass
L23 Bed 2	Bedroom	0.1	3672	110	29	3285	32	12	Pass
L23 Bed 3	Bedroom	0.1	3672	110	33	3285	32	12	Pass
L23 Bed 4	Bedroom	0.1	3672	110	42	3285	32	21	Pass
L23 Bed 5	Bedroom	0.1	3672	110	114	3285	32	26	Fail
L23 Bed 6	Bedroom	0.1	3672	110	54	3285	32	14	Pass
L23 Bed 7	Bedroom	0.1	3672	110	43	3285	32	10	Pass
L23 Bed 8a	Bedroom	0.1	3672	110	15	3285	32	5	Pass
L23 Bed 8b	Bedroom	0.1	3672	110	10	3285	32	5	Pass
L23 Bed 8c	Bedroom	0.1	3672	110	10	3285	32	5	Pass
L23 KLD 1	Living Room / Kitchen	0.1	1989	59	48	N/A	N/A	N/A	Pass
L23 KLD 2	Living Room / Kitchen	0.1	1989	59	4	N/A	N/A	N/A	Pass
L23 KLD 3	Living Room / Kitchen	0.1	1989	59	5	N/A	N/A	N/A	Pass
L23 KLD 4	Living Room / Kitchen	0.1	1989	59	1	N/A	N/A	N/A	Pass
L23 KLD 5	Living Room / Kitchen	0.1	1989	59	20	N/A	N/A	N/A	Pass
L23 KLD 6	Living Room / Kitchen	0.1	1989	59	7	N/A	N/A	N/A	Pass
L23 KLD 7	Living Room / Kitchen	0.1	1989	59	0	N/A	N/A	N/A	Pass
L23 KLD 8	Living Room / Kitchen	0.1	1989	59	30	N/A	N/A	N/A	Pass

*Zone names that have an orange coloured font are bedrooms which do not have 24/7 365 days a year occupancy, as per the TM59 guidance.

Domestic Overheating (CIBSE TM59)

Project Details

Building Designer File (.tbd): P574 OH 161123_London_LHR_DSY3.tbd

Simulation Results File (.tsd): P574 OH 161123_London_LHR_DSY3.tsd

Date: 17 November 2023

Building Category: Category II

Natural Ventilation Overheating Results

Zone Name	Room Use	Wind Speed (m/s)	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
L23 Bed 1a	Bedroom	0.1	3672	110	44	3285	32	14	Pass
L23 Bed 1b	Bedroom	0.1	3672	110	42	3285	32	14	Pass
L23 Bed 2	Bedroom	0.1	3672	110	45	3285	32	18	Pass
L23 Bed 3	Bedroom	0.1	3672	110	55	3285	32	22	Pass
L23 Bed 4	Bedroom	0.1	3672	110	55	3285	32	33	Fail
L23 Bed 5	Bedroom	0.1	3672	110	175	3285	32	45	Fail
L23 Bed 6	Bedroom	0.1	3672	110	90	3285	32	24	Pass
L23 Bed 7	Bedroom	0.1	3672	110	94	3285	32	24	Pass
L23 Bed 8a	Bedroom	0.1	3672	110	58	3285	32	17	Pass
L23 Bed 8b	Bedroom	0.1	3672	110	55	3285	32	18	Pass
L23 Bed 8c	Bedroom	0.1	3672	110	48	3285	32	19	Pass
L23 KLD 1	Living Room / Kitchen	0.1	1989	59	85	N/A	N/A	N/A	Fail
L23 KLD 2	Living Room / Kitchen	0.1	1989	59	10	N/A	N/A	N/A	Pass
L23 KLD 3	Living Room / Kitchen	0.1	1989	59	20	N/A	N/A	N/A	Pass
L23 KLD 4	Living Room / Kitchen	0.1	1989	59	14	N/A	N/A	N/A	Pass
L23 KLD 5	Living Room / Kitchen	0.1	1989	59	57	N/A	N/A	N/A	Pass
L23 KLD 6	Living Room / Kitchen	0.1	1989	59	18	N/A	N/A	N/A	Pass
L23 KLD 7	Living Room / Kitchen	0.1	1989	59	9	N/A	N/A	N/A	Pass
L23 KLD 8	Living Room / Kitchen	0.1	1989	59	79	N/A	N/A	N/A	Fail

*Zone names that have an orange coloured font are bedrooms which do not have 24/7 365 days a year occupancy, as per the TM59 guidance.

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