JS LEWIS LTD

Alterations to Flat 1 and Flat 2
24 Priory Road, Camden

Dynamic Thermal Modelling -
Internal Temperature Review

Revision C

July 2021

JS LEWIS LTD

Client:	Alex and Charlie Balcombe
Report:	24 Priory Road - DTM - Internal Temperature Review
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Contents

1 INTRODUCTION

1.1 Context and Scope

The applicant is seeking planning permission for alterations to Flat 1 and Flat 2, 24 Priory Road, Camden, NW6 4SG. As part of the design work, JS Lewis Ltd was commissioned to evaluate the likely internal temperatures within Bedroom 1 on the lower ground floor.

The lower ground floor of 24 Priory Road is where the bedrooms are located as shown on the floor plan below:

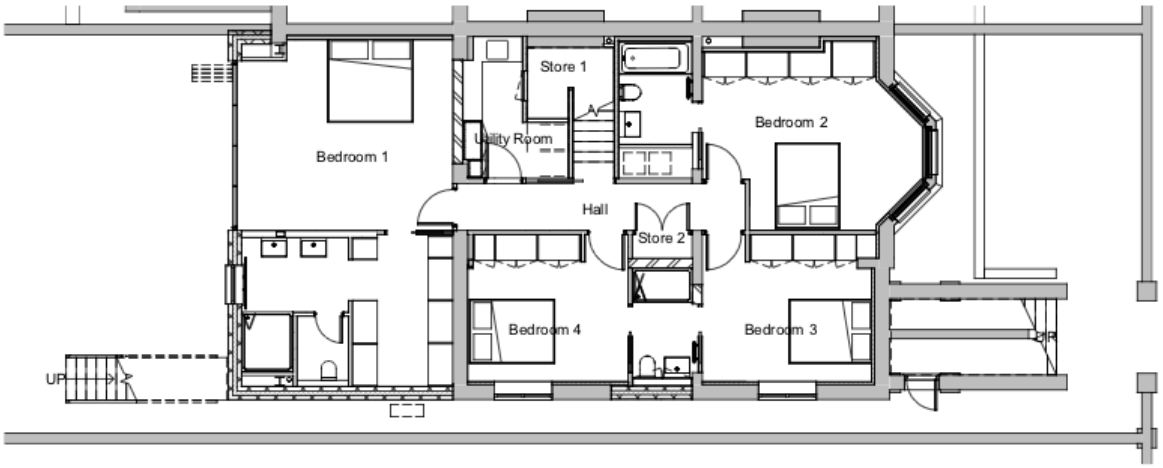

Figure 1 – Lower Ground Floor Plan

Bedroom 1 faces South East, and has bi-fold glazing to that elevation. The use of the rest of the floor as bedroom space reduces the opportunities for full cross-ventilation. As is typical in bedroom spaces, the modelling assumptions for TM59 are that bedroom doors remain closed at night. The upper ground floor level of the apartment has the ability to be cross-ventilated.

1.2 Methodology - CIBSE TM59

The appropriate methodology to follow for the overheating risk assessment 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:

- 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 for 2020 high emissions 50% scenario;
- Modeling should use hourly dynamic simulation modelling.

For naturally ventilated homes, the compliance criteria 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.

Under mechanically ventilated conditions, the requirement is as follows:

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

2 THERMAL MODEL INPUTS

2.1 Software

This assessment uses EDSL Tas version 9.5.1 which is a dynamic modeling package that has an in-built TM59 wizard that sets up the requisite parameters for reporting.

2.2 Weather Files

The weather files used for assessing the overheating risk for this project are the CIBSE DSY files for London Heathrow.

2.3 3D Model

A model was built to replicate the building in terms of orientation, floor areas, adjacent buildings, and the construction types:

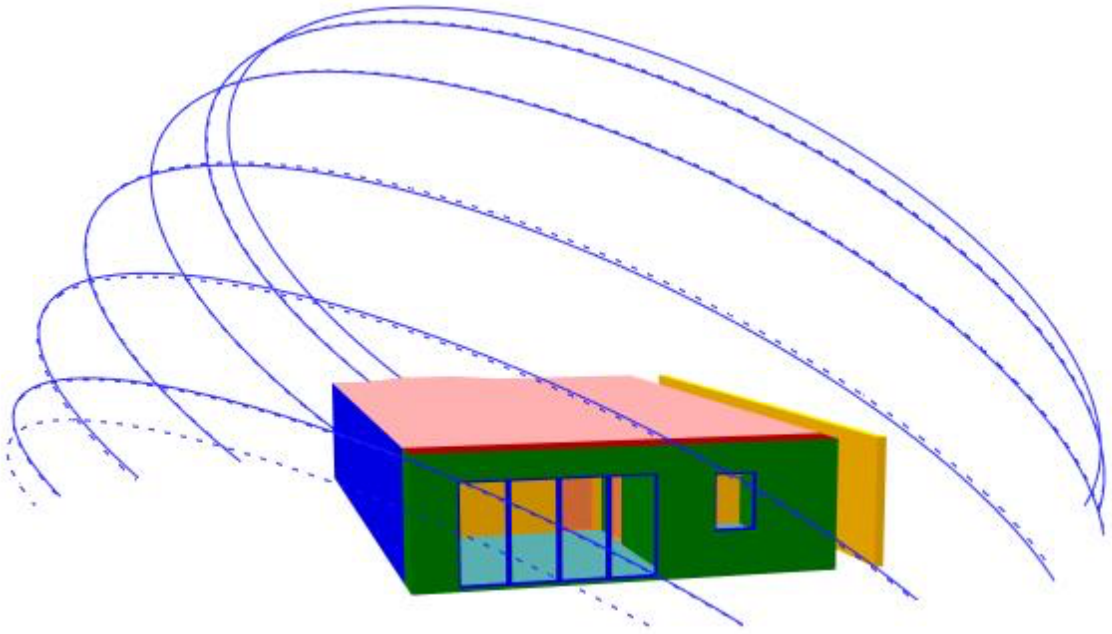

Figure 2 - Bedroom Elevation from 3D Model Showing Sunpath

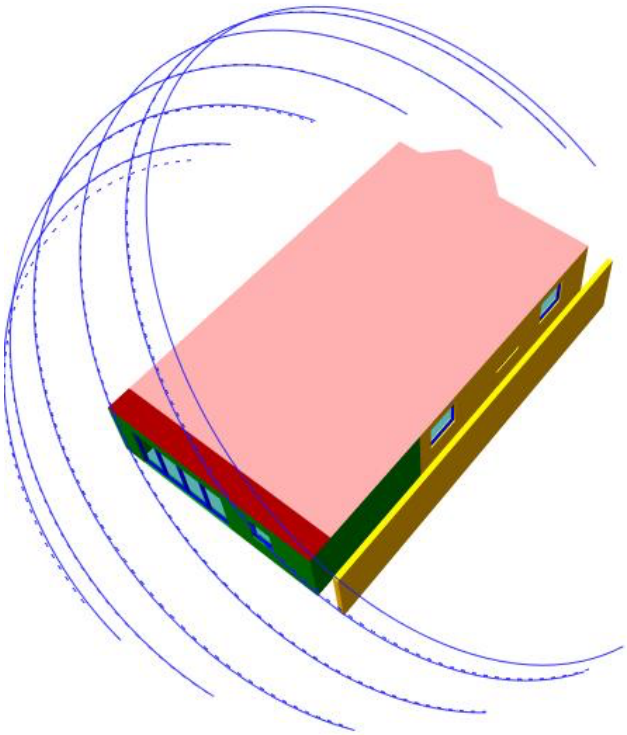

Figure 3 - Aerial View of Lower Ground Floor Model with Sunpath

2.4 Modelling Inputs

2.4.1 Drawings Used

The tests were based upon the following drawings:

- 2018-P03-Front and Rear Elevations as Proposed
- 2018-P04-Side Elevations as Proposed
- 2018-P07-Proposed Floor Plans

2.4.2 Constructions

The construction types used in the model are therefore as follows:

- Internal wall - Some light weight partitions, some masonry;
- Existing external wall - solid masonry;
- New external wall - insulated masonry cavity;
- Roof – insulated single ply warm roof, plasterboard ceiling with plaster skim;
- Windows – variety of single glazed extant and double-glazed (proposed)

2.4.3 Ventilation

The design aim is for natural with intermittent extract fans. A mechanical ventilation scenario was also tested.

3 RESULTS

3.1 Natural Ventilation Scenario – DSY1 2020High 50

The results of the overheating assessment are set out below:

Domestic Overheating (CIBSE TM59)

Project Details

Building Designer File (.tbd): Priory Rd LGF_London_LHR_DSY1.tbd
Simulation Results File (.tsd): Priory Rd LGF_London_LHR_DSY1.tsd
Date: 02 July 2021
Building Category: Category II

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
Dwell_DomBed 1	Bedroom	3672	110	107	3285	32	276	Fail

The assessment indicates that whilst the bedroom achieves a pass in terms of the number of hours that comfort levels are exceeded, it fails the second criteria regarding the number of hours the bedroom exceeds 26 degrees.

3.2 Mechanical Ventilation Scenario – DSY1 2020High 50

The results were as follows:

Domestic Overheating (CIBSE TM59)

Mechanical Ventilation Overheating Results

Zone Name	Room Use	Annual Occupied Hours	Max. Exceedable Hours	Criterion 1: Number of Hours Exceeding 26 °C	Result
Dwell_DomBed 1	Bedroom	8760	262	512	Fail

Under a mechanically ventilated scenario, the room fails to meet the TM59 criteria.

3.3 Discussion

The result of the assessment is not atypical of buildings within London where constraints regarding openable windows due to security, and high external air temperatures within the test year (DSY1 2020 High 50). The main reason for the failure is the high temperatures within the test scenario, which cannot be mitigated, combined with the south facing aspect of the bedroom and the inability to cross-ventilate. Providing low g-glass will help to reduce

the extent of overheating but is not sufficient in itself. As a result, it may be pragmatic to incorporate some level of comfort cooling into the bedroom. Any cooling option should be limited to reduce the associated energy demand and carbon emissions.

4 CONCLUSION

4.1 Proposals

The applicant is proposing alterations to Flat 1 and Flat 2, 24 Priory Road. An assessment of bedroom 1 on the lower ground floor has been requested by the applicant to understand more in terms of overheating risks. This document addresses that request.

4.2 Results

For the natural ventilation scenario the requirements are as follows:

1. For living rooms, kitchens and bedrooms: the number of hours during which the temperature difference is greater than or equal to one degree (K) during the period of May to September inclusive shall not be more than3 pc 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.

Bedroom 1 meets the first criteria but fails on the second criteria due to the high temperatures in the test year, and the inability to cross ventilate due to the nature of the other spaces on that floor. This finding is not atypical.

Whilst mecahnical ventilation is not proposed, the scenario was tested as the next step on the cooling hierarchy. Under mechanically ventilated conditions, the requirement is as follows:

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

The bedroom fails to mee this.

4.3 Conclusion

With the risk highlighted by the assessment, it may be pragmatic to install a limited comfort cooling system that serves the bedroom alone. Limiting the extent of the cooling to just the bedroom should minimise the associated energy use and carbon emissions.

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