Dynamic Simulation of Lisboeta Restaurant

At

30 Charlotte Street

London

Report prepared by

J. White

Reference: C2425409

Date: 13th February 2025

HIBEC Limited
106A high Street
Henley-in-Arden
Warwickshire
B95 5BY

Tel: 01564 795566 Fax: 01564 795557 email:enquiries@hibec.co.uk www.hibec.co.uk

1.0 Introduction

HIBEC have undertaken a Dynamic Thermal Simulation overheating analysis of Lisboeta Restaurant at 30 Charlotte Street, London.

The Thermal Model has been run to demonstrate that the building design and services strategy can deliver thermal comfort levels in "occupied spaces" in accordance with the criteria set out in 'TM52. In particular, that internal summer operative temperature ranges will be in line with the recommended comfort criteria as detailed in TM52

In particular, the occupied areas internal summer temperatures do not exceed a "threshold" temperature for more than a reasonable number of hours per year when the building is tested against the CIBSE Design Summer Year.

Also, that the "summer peak" temperatures are not excessive nor do the areas overheating above a maximum temperature due to solar and other gains.

2.0 Design Data

The building has been modelled predominately as Mechanically Ventilated, using the following construction data.

Assumed Construction U values (based on building age)

Basement / Ground Floor	1.20 W/m^{2}K
External Wall	1.70 W/m^{2}K
Flat Roof	0.68 W/m^2.K
Windows	1.60 W/m^2.K
Roof Light	1.60 W/m^{2}K

*U values referenced from RdSAP Appendix S

Glazing
Light Transmittance 80%
Solar Energy Transmittance (G Value) 70%

Thermal Mass

A medium-weight construction has been assumed to ground floor and basement elements.

Internal Gains

Occupancy Levels:

The occupancy time for staff at the Restaurant is assumed as 9am – 11pm.

The opening time of the restaurant is assumed as 12pm-3pm & 5pm - 11pm Mon-Sat

The occupancy levels have been modelled as follows;

Zone	Occupancy (persons)
Basement Private Dining Room	10 persons
Basement Staff Area	4 persons
Prep Kitchen	3 persons
Ground Floor Restaurant	26 persons
Bar Area	4 persons
Main Kitchen	5 persons
First Floor Restaurant	56 persons
First Floor Service Area	4 persons
Kitchen Office	1 persons

The occupancy gain for persons at rest is 90Watts/person sensible and 55Watts/person latent.

Lighting gains

The lighting gains have been based on CIBSE Guide A:2021 recommendations and are as follows;

The lighting gains for all zones has been assumed at 10W/m^2 during occupancy times.

Equipment gains:

The equipment levels have been modelled as follows;

Zone	Equipment Gains
Basement Private Dining Room	20W per person (50% sensible, 50% latent)*
Basement Staff Area	10 W/m^2
Prep Kitchen	50 W/m^2 (75% sensible, 25% latent)
Ground Floor Restaurant	20W per person (50% sensible, 50% latent)*
Bar Area	10 W/m^2
Main Kitchen	100 W/m^2 (75% sensible, 25% latent)
First Floor Restaurant	20W per person (50% sensible, 50% latent)*
First Floor Service Area	10 W/m^2
Kitchen Office	10 W/m^2

*gains assumed from meals referenced from CIBSE Guide A:2021

Ventilation:

The ventilation rates to zones containing mechanical ventilation or mechanical extract are as follows;

Zone	Ventilation Rates
Basement Staff Area	12 l/s/p
Basement WCs	6 ACH extract (make up air from lobby)
Ground Floor Restaurant & Bar Area	12 l/s/p
Main Kitchen	246 l/s extract
First Floor Restaurant & Service Area	12 l/s/p
Prep Kitchen	10 ACH

NB. All unoccupied areas have been modelled with lighting gains only as these areas may affect adjacent occupied areas. There are no equipment or occupancy gains in these unoccupied zones.

Cooling:

Cooling has been applied, with a set point of 24°C in the following areas:

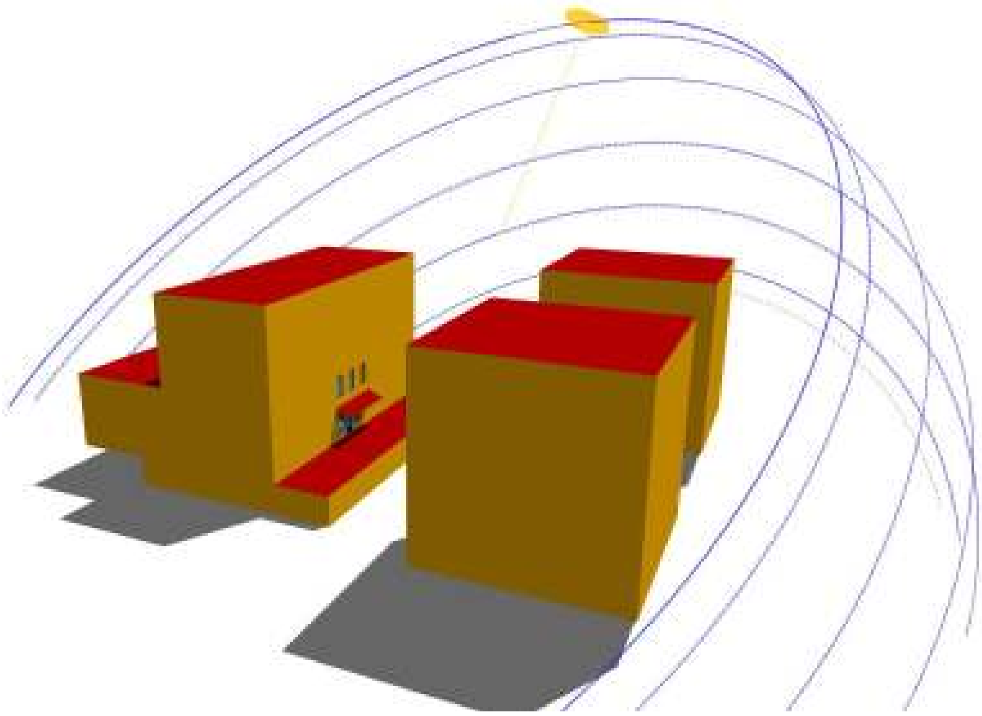
- Basement Staff Area
- Private Dining Room
- Prep Kitchen
- Ground Floor Restaurant
- First Floor Restaurant

Operational Factors

The first floor windows on the front of the building have been assumed to be open 50% of the total area (assumed sash windows) during the occupied times of the restaurant.

3.0 The Model

The 3D Model was developed using EDSL TAS which is approved by CIBSE AM11, and has been developed in accordance with the architects drawings and design data issued.



3D Model of the Building (Day 170 @ 12.00pm)

4.0 Simulation Period and Weather Data

The model is based on the operational hours for the building detailed below;

Hours Occupied	Whole Building, 9am-11pm, Mon-Sat
Simulation Period	Day 1 to Day 365 (1st January - 31 December)
Weather Data	London LWC-2020 High 50% Percentile DSY1 – obtain from CIBSE
Reporting Interval	Hourly

The results are an indication of the buildings likely response to thermal gains based on the information provided for input to the model and CIBSE weather data set for the London City Region (Design Summer Year).

The simulation has been run to accommodate the operational hours and the results are presented for the entire building.

Each zone modelled and listed in the attached results are based on the above data set and architectural drawings.

5.0 'TM52' Performance Criteria

The performance standards for summertime overheating in compliance with CIBSE TM52 and CIBSE Guide A 2015.

1) The Number of Hours during which ΔT 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. Where $\Delta T = T_{op} - T_{max}$, where T_{op} = actual operative temperature & T_{max} = the limiting maximum acceptable temperature.

2) The severity of overheating with any one day, which is a function of both temperature rise and it's duration. This criterion sets a daily limit for acceptability. To allow for the severity of overheating the weighted exceedance shall be less than or equal to 6.

ie. 1 hour at 1°K over the operative temperature = 1
2 hour at 2°K over the operative temperature = 4

The Maximum allowed exceedance = 6

3) *Maximum indoor operative temperature* - To set an absolute maximum value for indoor operative temperature the value of ΔT shall not exceed 4K

In order to show that the proposed building will not suffer overheating two of these three criteria must be met.

6.0 Results without cooling

Zone Name	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: #Hours Exceeding Absolute Limit	Result
Private Dining Room	1834	55	1521	39.0	5	Fail
Basement Staff Area	1834	55	60	7.0	2	Fail
Prep Kitchen	1834	55	911	33.0	5	Fail
GF Restaurant	1179	35	1165	27.0	716	Fail
Bar	1834	55	1636	32.0	780	Fail
Main Kitchen	1834	55	1707	34.0	930	Fail
Office	1834	55	478	42.0	17	Fail
FF Restaurant	1179	35	997	25.0	421	Fail
Service Area	1834	55	1190	32.0	366	Fail

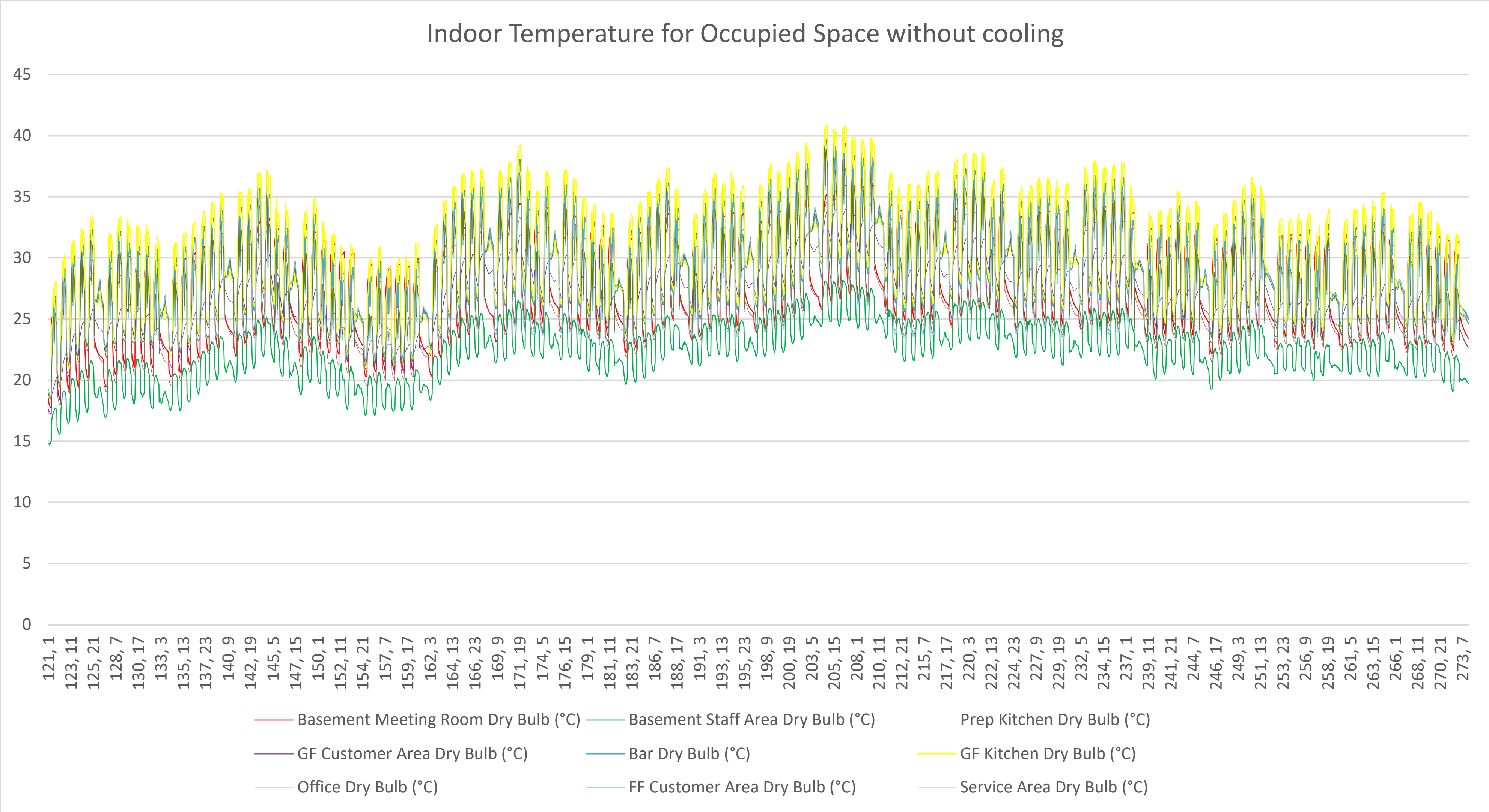
6.1 Results with cooling

Zone Name	Occupied Summer Hours	Max. Exceedable Hours	Criterion 1: #Hours Exceeding Comfort Range	Criterion 2: Peak Daily Weighted Exceedance	Criterion 3: #Hours Exceeding Absolute Limit	Result
Private Dining Room	1834	55	0	0.0	0	Pass
Basement Staff Area	1834	55	0	0.0	0	Pass
Prep Kitchen	1834	55	0	0.0	0	Pass
GF Restaurant	1179	35	0	0.0	0	Pass
Bar	1834	55	0	0.0	0	Pass
Main Kitchen	1834	55	0	0.0	0	Pass
Office	1834	55	0	0.0	0	Pass
FF Restaurant	1179	35	0	0.0	0	Pass
Service Area	1834	55	0	0.0	0	Pass

All occupied zones within the building without cooling fail to achieve at least 2 of the 3 criteria of TM52. However, as cooling has been installed all occupied spaces **PASS** at least 2 of the 3 criteria and therefore the building is compliant with TM52.

7.0 Additional information

Indoor Temperature Distribution for occupied spaces without cooling



7.1 Cooling Hierarchy

In accordance with Camden Local Plan air conditioning is only permitted where dynamic thermal modelling demonstrates there is a clear need for it after all of the preferred measures are incorporated in line with the cooling hierarchy.

The cooling hierarchy is as follows;

1. Minimise internal heat generation through energy efficient design
2. Reduce the amount of heat entering the building in summer through orientation, shading albedo, fenestration, installation and green roofs and walls.
3. Manage the heat with the building through exposed internal thermal mass and high ceilings
4. Passive or Natural ventilation via opening windows
5. Mechanical Ventilation
6. Active Cooling

The building has been newly fitted out to suit the occupiers' needs. The fabric of the building has not been improved as this would increase overheating as heat loss would be significantly reduced.

Changes to orientation and window sizes were not permitted as the fit out needed to be in keeping with the surrounding buildings. A large canopy to the frontage has been installed in an attempt to reduce solar gains through the large, glazed entrance.

The building already offers large amounts of internal thermal mass via concrete floors and solid brick walls, no further additions to thermal mass could be included.

Opening windows are only possible at the front of the building. These opening windows have been included in the model. However, these windows do not provide sufficient natural ventilation to purge excess heat gains in the occupied spaces.

Passive shading has been added to the front by way of the large canopy. This has been included in the calculations to reduce the solar gains.

Mechanical Ventilation has been added in all occupied spaces including the Commercial Kitchen to purge the heat gains and reduce the overall cooling load required in the building. However, Mechanical Ventilation alone is not sufficient to ensure the building does not overheat.

8.0 Conclusion

It can be seen from the results that following fit-out works and after considering the cooling hierarchy of the Camden Local Plan to mitigate the need for mechanical cooling the building would overheat significantly without cooling being present.