Kendall Kingscott

SW24
Overheating Report

University College London
Life and Medical Sciences Small Works Programme

University College London
Small Works 24

for

University College London

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INDEX

1 INTRODUCTION

Kendall Kingscott have been appointed to undertake overheating calculations for the areas of the building that are due to be refurbishment as part of a minor works programme.

Reference has been made to the Camden Local Plan Guidance on Energy Efficiency and Adaptation together with UCL design guidance.

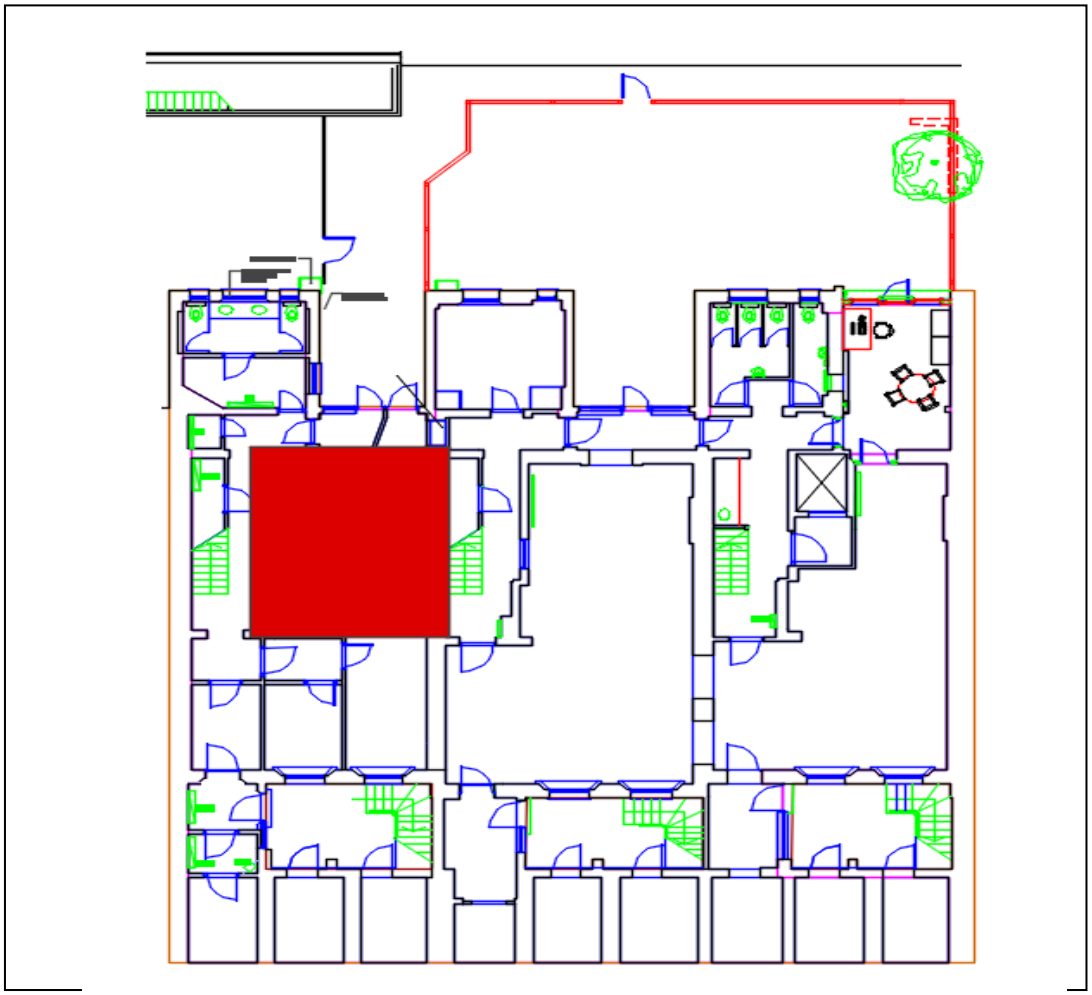
The cooling hierarchy is discussed in section 4.

The project is located within 49 Gordon Square, London, WC1H 0PN

The works comprise the refurbishment of the reception area and WCs, provision of a tea point and the reconfiguration and redecoration of a number of offices and testing rooms

2 EXISTING SYSTEMS

The drawing extract below shows the area within the building where the proposed upgrade works are located.



The existing systems include the following:

Heating is by means of radiators.

Ventilation to the larger of the two basement areas is currently provided by a ceiling mounted heat recovery unit.

Both basement rooms are internal rooms with limited room height and restricted access to the outside for air supply.

3 PROPOSED SYSTEMS

The systems proposed for the upgraded areas comprise:

To provide a ceiling mounted heat recovery unit to serve both spaces.

To replace the radiators with DX heating and comfort cooling.

4 COOLING HIERARCHY

The hierarchy shown in the London Plan, the Camden Local Plan Guide and UCL Sustainable Building Standard 2020 have been followed and are summarised in the following table.

Requirement	**Sustainability Remark**
Reduce the amount of heat entering the building from outside in summer	The rooms are internal rooms and there is no scope for reducing the heat entering from outside.
Minimise internal heat gains	New energy efficient lighting and IT equipment is proposed for the area. The space needs to be fit for the proposed purpose
Manage heat within the building through exposed thermal mass and high ceilings	The room is within an existing building and there no scope for managing the heat through thermal mass.
Provide passive ventilation	There is no scope for introducing passive ventilation in an internal basement space.
Provide mechanical ventilation	Mechanical heat recovery ventilation will be provided. Due to the space available the amount is limited.
Provide active cooling	It is proposed to install DX comfort cooling.

5 OVERHEATING ANALYSIS

5.1 GENERAL

This report details the overheating analysis that has been undertaken in line with the procedures described in CIBSE TM 52 - The limits of thermal comfort: avoiding overheating. This provides an adaptive overheating modelling approach, which has been used in conjunction with a dynamic simulation model for the proposed areas of work.

Calculations have been completed using approved National Calculation Method (NCM) data and procedures appropriate to the proposed use of the building.

The assessment has been completed assuming that limitations on window openings are as per existing. Mechanical ventilation has been modelled, where this is proposed within the services design for each space.

Where spaces cannot meet overheating compliance criteria, comfort cooling should be provided to ensure that suitable internal temperatures can be maintained.

5.2 CRITERIAN OVERVIEW

TM52’s adaptive overheating assessment tests rooms against three criteria. If a room fails any two of the three criteria then it is said to overheat.

The three compliance criteria are:

1. A limit for the number of hours that the operative temperature exceeds the comfort temperature by 1°C or more during the occupied hours over the summer period (1st May to 30th September).

2. The severity of the overheating within any one day. This sets a daily limit for acceptability.

3. An absolute maximum daily temperature for the room.

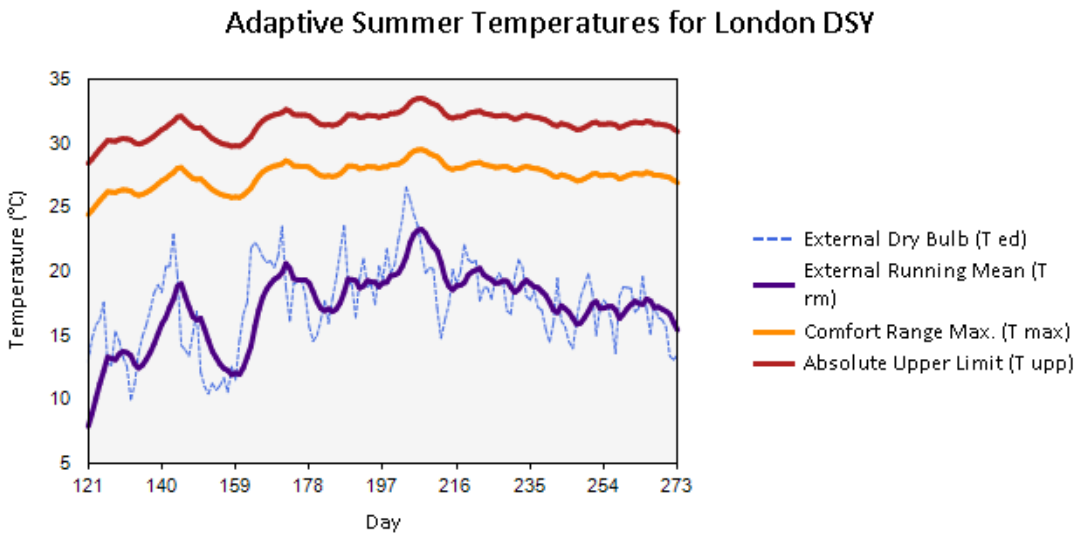


Figure 1.3: Temperature Threshold Range for London

Figure 1.3, above, illustrates the mapping of the comfort and absolute temperature ranges against external temperature during the summer period.

5.3 MODEL RESULTS

The Lab Areas are fully internal and do not include any opening windows. Mechanical ventilation with heat recovery is provided.

Fresh air provision is based on occupancy.

The results of the overheating assessment are recorded in *Figure 2.5*, below.

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
B01 lab area	792	23	286	24.0	0	Fail
B02a lab area	792	23	260	19.0	0	Fail

Figure 2.5

The results indicate a non-complaint model with excessive overheating. The modelled spaces all require comfort cooling to ensure suitable environmental conditions.

6 CONCLUSION

The results record varying levels of overheating across the modelled accommodation. Whilst bathroom models comply with Criterion 3, Criterion 1 and Criterion 2 were not met in either of the modelled spaces.

As such, overheating is deemed to be a risk as defined by CIBSE TM52. Comfort cooling will be required to mitigate the overheating risk and ensure that suitable internal conditions can be maintained.