# SW01
# Overheating Report

## University College London
## Life and Medical Sciences Small Works Programme

University College London
Small Works 01

for

University College London

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# 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.

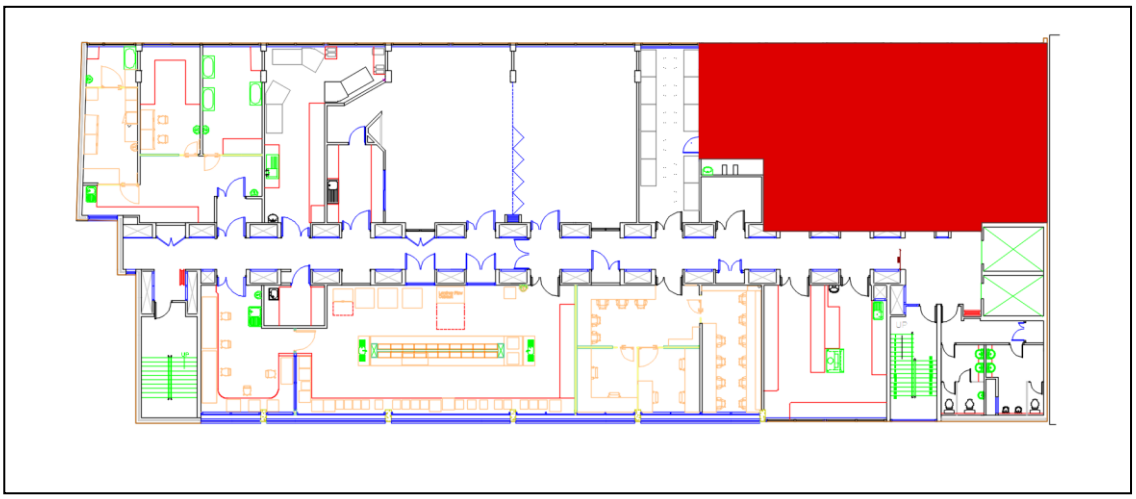
The cooling hierarchy is discussed in section 4.

The project is located within Rayne Building, 5 University Street, London WC1E 6JF

The works comprise the formation of Open Plan Office space for 20 no. staff and 4 no. offices, one of which will be combined with use as a Meeting Room on the second floor.

# 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:

Ceiling mounted DX units serving what was a laboratory. In addition the room has perimeter radiator heating together with a mechanical fresh air supply to the core of the room. Opening windows are provided for ventilation of the perimeter zone, the windows have opening restrictors for safety reasons as the room is located at second floor level.

# 3 PROPOSED SYSTEMS

The systems proposed for the upgraded areas comprise:

Retain and modify the existing core ventilation system and extend it to serve the internal meeting rooms. The existing DX heating and cooling system will be replaced with a new more efficient system. The DX system will be connected to the BMS system and the radiators to ensure that cooling only operates when the heating is off and internal temperatures are excessive.

# 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 Review/Remark |
|---|---|
| Reduce the amount of heat entering the building from outside in summer | The upgrade of existing fenestration at second floor level is considered unfeasible. |
| 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 existing exposed concrete sofit is being retained. |
| Provide passive ventilation | The model includes for the existing window openings to be utilised to assist with passive cooling of the perimeter zone. |
| Provide mechanical ventilation | The existing mechanical ventilation system is being retained. |
| Provide active cooling | Active cooling is present in the existing rooms and will be required for the proposed refurbished areas. |

# 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.

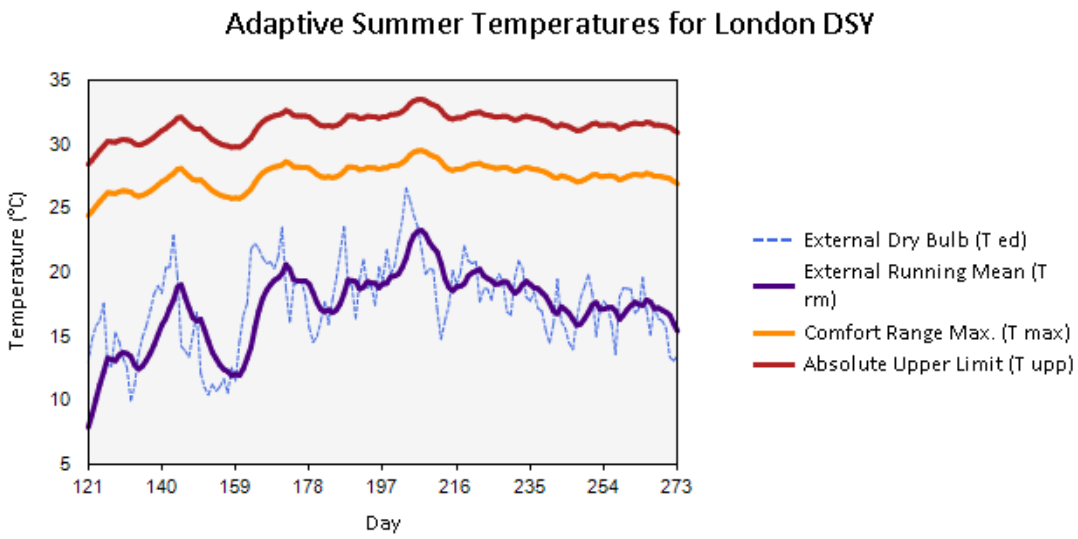



*Figure 1.3: Temperature Threshold Range for London*

*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 main open plan office 203 and Office 263C have mechanical ventilation and opening windows. Office 263D and Meeting Room 202A are fully internal and do not include any opening windows. Mechanical ventilation is provided.

Fresh air provision is based on occupancy.

The results of the overheating assessment are recorded in *Figure 2.1*, 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 |
|---|---|---|---|---|---|---|
| Office 263C | 1530 | 45 | 955 | 20.0 | 297 | Fail |
| Office 263D | 1530 | 45 | 820 | 15.0 | 13 | Fail |
| Office 23 | 1530 | 45 | 1223 | 24.0 | 469 | Fail |
| Office 203A | 1530 | 45 | 649 | 17.0 | 0 | Fail |

*Figure 2.1*

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 some Office 203A complies with Criterion 3, Criterion 1 and Criterion 2 were not met in any 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.