CAMDEN GOODS YARD

15112-WAT-XX-XX-RP-V-59010 CGY

Overheating Assessment

March 2025

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OVERHEATING ASSESSMENT
Stage 2
15112-WAT-XX-XX-RP-V-59010

March 2025

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This document has been prepared and checked in accordance with
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EXECUTIVE SUMMARY

This report has been prepared by Waterman Building Services on behalf of St George West London Limited ('the Applicant'), to conduct an Overheating Assessment of the Proposed Development to vary the extant planning permission for the Camden Goods Yard project. The Planning Statement provides the proposed description of development.

This report assesses the Proposed Development for Blocks C, D, E1, E2 and F which are effected by the proposed changes within the previous S73 application. The conclusions reached in the previous assessment for Blocks A and B on the Main Site parcel as part of the December 2020 Planning Consent and for the PFS Site as part of the March 2023 Planning Consent remain valid and are not assessment within this report.

This assessment demonstrates compliance with CIBSE TM59 Design methodology for the assessment of overheating risk in homes (2017), the London Local Plan 2021, Policy SI4 and the Draft New Camden Local Plan 2024, Policy CC8. No previous overheating assessments have been submitted for the CGY project as this is a new submission requirement. Using CIBSE TM59 guidelines, a dynamic overheating modelling was undertaken for the energy strategy submission, taking into consideration the restrictions imposed by Building Regulations ADO when conducting the TM59 assessment.

The analysis considers various factors such as building orientation, glazing, insulation, and ventilation strategies to mitigate overheating risk. The results include compliance with TM59 criteria for both mechanically and naturally ventilated spaces in line with relevant requirements.

The overheating mitigation strategy integrates passive measures such as optimised glazing and external shading, alongside a combination of natural and mechanical ventilation. A wet heating system provided by the local district heat network is proposed for space heating with natural ventilation and boosted mechanical purge ventilation to omit the need for active cooling. The ventilation rates are in line with Approved Document Part F (ADF).

The proposed overheating strategy considers site-specific constraints such as noise and air quality, necessitating a natural ventilation during hours when allowed and boosted mechanical ventilation approach during hours when windows must remain close due to external conditions.

The stimulation undertaken demonstrates the proposed HVAC design complies with TM59 but fails to meet ADO, and the site limitations are the reason for the need to adopt a mechanical purge ventilation strategy. Further comprehensive study shall be conducted at a later stage to address the current overheating issues to ensure the Proposed Development meets regulatory requirements.

1. INTRODUCTION

This report has been prepared by Waterman Building Services on behalf of St George West London Limited ('the Applicant'), to conduct an Overheating Assessment of the Proposed Development being submitted as part of the s73 application to vary the extant planning permission for the Camden Goods Yard project.

Using CIBSE TM59 guidelines, dynamic overheating modelling was undertaken for the energy strategy submission, taking into consideration the restrictions imposed by Building Regulations Approved Document Part O 2021 (ADO) when conducting the TM59 assessment.

1.1 Proposed Development

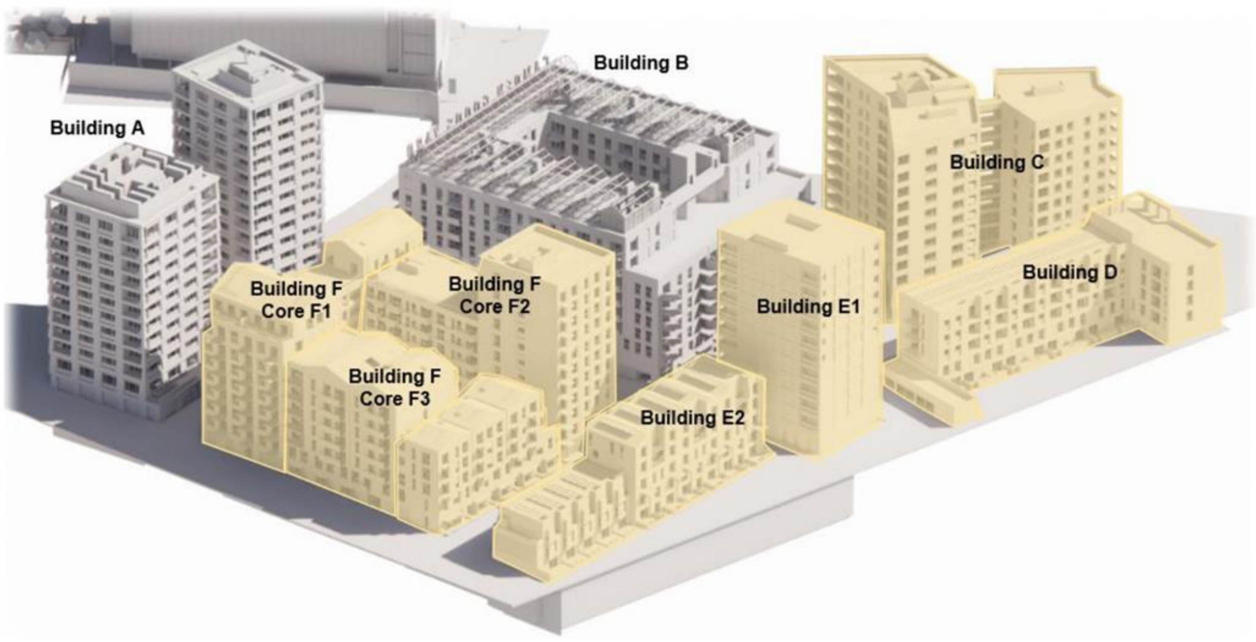
This S73 application comprises the proposed amendments as part of the Proposed Development in respect of Blocks C, D, E1, E2 and F of the Main Site parcel, explained in more detail within the DAS Addendum and summarised here for ease of reference:

- Insertion of secondary stairs to Blocks C, E1 and F in accordance with fire safety guidelines for residential buildings
- Reduction of affordable housing from 38% to 15% by habitable room (from 203 to 83 homes)
- Minor tenure and unit mix changes to approved plans
- Marginal increase to footprint of Block E1 (0.5m on the east, west and north elevations) to accommodate a secondary staircase
- Minor reduction in heights of Blocks C, D, E1, E2 and F.

The following conditions attached to the Operative Permission control development and are the subject of this S73 Application:

- Condition 3, 4 and 6 - approved drawings and documents – these contains drawings which identify affordable homes (references amended) and new drawings are submitted to comply with fire regulations including a second stair core introduced into Blocks C, E1 and F and associated changes.
- Condition 5 - contains drawings which identify affordable homes (references amended). The condition also refers to the 'affordable housing statement (June 2017)' which is amended.
- Condition 73 refers to '203 affordable' homes. This will be revised to '83 affordable homes'. The condition also refers to a total of 27,983sqm GEA of non-residential floorspace. This is revised to 28,792sqm, a de minimis increase of 809sqm following re-measurement of the scheme and marginal building footprint increase to building E1. We also note that the 2,769 sqm GEA of ancillary floorspace (gym, concierge, plant room, parking and energy centre) previously referred to in condition 73 (2020/3116/P, dated 3rd December 2020) has unintentionally been omitted from the Operative Permission and is proposed for reinserted

Figure 1: Blocks forming part of the Proposed Development (shaded yellow) (Main Site only. PFS Site also forming part of Camden Goods Yard not shown)



1.2 Report Objectives

The objective of the report is to meet Building Regulation Part O requirements. ADO aims to protect the health and welfare of the building occupants by mitigating overheating risk. This is achieved by designing and constructing the building to achieve both of the following:

- Limiting unwanted solar gains in summer.
- Providing an adequate means of removing excess heat from the indoor environment

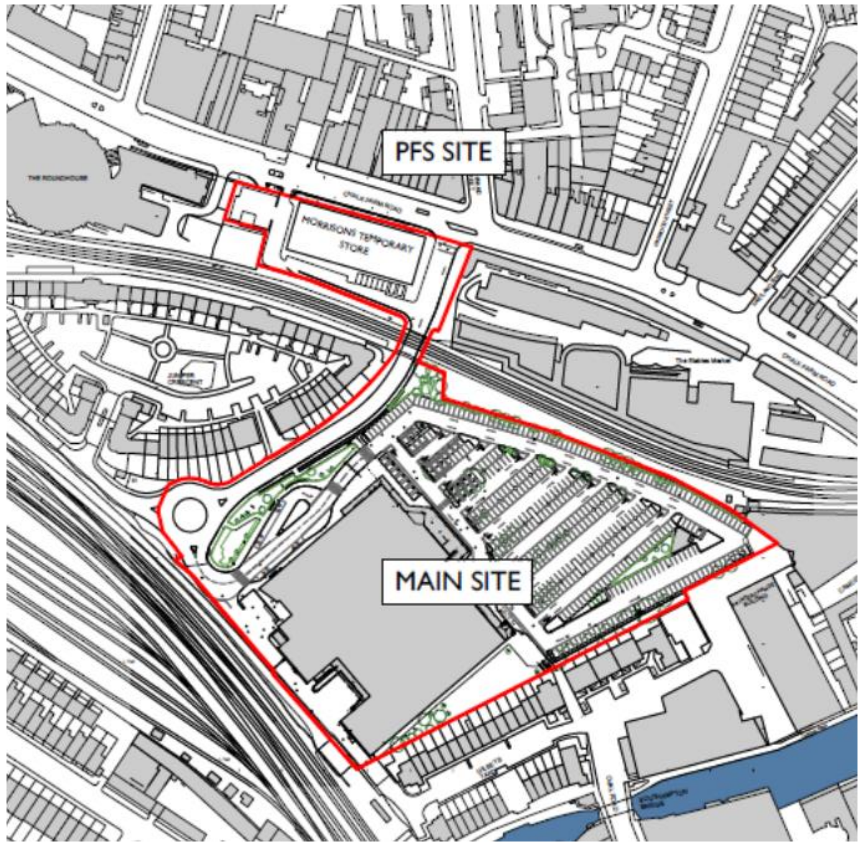


Figure 2: Site location

For the assessment of overheating risk, a Dynamic Thermal Model has been created using the IES-VE version 2023.5.2.0 software. The development located in Camden, and as such, the closest available weather data source is London Heathrow, London_LHR_DSY1_2020High50.epw weather file was used for the overheating assessment.

The overheating assessment is based on the CIBSE TM59 Methodology, which is a standardised approach that aims to encourage good design and propose a consistent process for assessing overheating in residential properties, that would be common across the industry.

The overheating assessment should demonstrate:

- The building should be designed to limit risk of overheating, in accordance with CIBSE TM59, these criterions are mentioned in section 4.2 with consideration of ADO limitations on CIBSE TM59.
- Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to

  (a) limit unwanted solar gains in summer,

  (b) provide an adequate means to remove heat from the indoor environment.

2. PLANNING POLICY AND PROJECT REQUIREMENTS

2.1 Building Regulations: Approved Document Part O

In December 2021 the government published a new Approved Document (ADO) for overheating in residential building called ‘Part O’. The primary aim of the requirement of ADO is to protect health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

The requirement of ADO is met by designing and constructing the building to achieve one of the following:

- The simplified method for limiting solar gains and providing a means of removing excess heat as set out below.
- The dynamic thermal modelling method.

The overheating AD provides two routes for compliance, a simplified approach which is based on a ratio between window and dwelling areas and dynamic simulation closely following the CIBSE TM59 methodology.

The window ratios stated for the simplified approach provide a reasonably good starting point, which will also improve the building energy efficiency by avoiding excessive glazed areas.

Single aspect apartments should be avoided, particularly on the South and West elevations. In addition to this, the following design features should be avoided where possible:

- Rooms with large glazing areas.
- Have rooms with large sun-facing windows.
- Have limited opening windows.
- Approved Documentation Part O’s limits on the use of CIBSE TM59 methodology as set out below.
- Adopting acceptable strategies for reducing overheating risk as set out below.

Simplified Method

To limit those solar gains the following standards should be followed.

- The maximum glazing area of the building or part of the building as shown in Table 1 or 2. This should be determined using the orientation of the façade that has the largest area of glazing.
- The maximum glazing area of the most glazed room given in Table 1 or 2. This should be determined using the orientation of the façade that has the largest area of glazing.

Dynamic Thermal Modelling

This section details a dynamic thermal modelling method for demonstrating compliance with requirement O1. It provides a standardised approach to predicting overheating risk for residential buildings using dynamic thermal modelling as an alternative to the simplified method.

The methodology is suitable for all residential buildings and offers additional flexibility over the solutions outlined in the simplified approach in the following situations:

- Residential buildings with very high levels of insulations and airtightness
- Residential buildings with specific site conditions that means the building is not well represented within the high or medium risk areas.

To demonstrate compliance using the dynamic thermal modelling method the following guidance needs to be followed: CIBSE’s TM59 methodology for predicting overheating risk.

2.2 The London Plan Policy SI4

It is important to identify potential overheating risk, particularly in residential accommodation, early in the design process, and then incorporate suitable passive measures within the building envelope and services design to mitigate overheating and reduce cooling demand, in line with London Plan Policy SI 4

The Cooling Hierarchy

Whilst the cooling hierarchy applies to major developments, the principles can also be applied to minor developments. Measures that are proposed to reduce the demand for cooling should be set out under the following categories:

- 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.
- Minimise internal heat generation through energy efficient design: For example, heat distribution infrastructure within buildings should be designed to minimise pipe lengths, particularly lateral pipework in corridors of apartment blocks, and adopting pipe configurations which minimise heat loss e.g. twin pipes.
- 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.
- Provide passive ventilation: For example, through the use of openable windows, shallow floorplates, dual aspect units or designing in the ‘stack effect’ where possible.
- 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.
- 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 prioritised 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.

The GLA Energy Assessment Guidance

The Greater London Authority's (GLA) Energy Assessment Guidance provides comprehensive instructions for preparing energy assessments as part of strategic planning applications. A critical component of this guidance is addressing overheating in buildings to ensure occupant comfort and resilience against rising temperatures.

The GLA emphasises the importance of mitigating overheating through a structured approach:

1. **Dynamic Thermal Modelling:** Applicants are required to conduct dynamic thermal modelling to assess overheating risks. For residential developments, the assessment should align with CIBSE TM59, which provides a standardised methodology for evaluating overheating in homes. Non-residential buildings should refer to CIBSE TM52 for guidance.
2. **Weather Files:** The modelling must utilise appropriate weather files to simulate future climate scenarios. Specifically, the Design Summer Year (DSY1) weather file for the 2020s, high emissions, 50th percentile scenario is recommended. Additionally, assessments should consider DSY2 and DSY3 scenarios to evaluate performance under more extreme conditions.
3. **Cooling Hierarchy:** The guidance advocates for a cooling hierarchy to minimise overheating risks:

- **Passive Design Measures:** Prioritise building orientation, shading, natural ventilation, and thermal mass to reduce heat gains.
- **Active Cooling Systems:** Consider mechanical cooling only when passive measures are insufficient. However, the GLA expects that, even in warmer conditions, most spaces should comply using passive strategies, and active cooling is generally discouraged for residential developments.

4. **Reporting and Compliance:** Energy assessments must detail the strategies employed to mitigate overheating, including the results of thermal modelling and justification for any active cooling proposed. The aim is to demonstrate that the development will maintain comfortable internal temperatures without excessive reliance on energy-intensive cooling systems. The report should demonstrate that the cooling hierarchy has been followed and include information demonstrating that the risk of overheating has been mitigated through the incorporation of passive design measures.

2.3 Camden Local Plan (2017)

The Camden Local Plan 2017 is the planning document guiding development in the borough. It sets out the Council's planning policies and replaces earlier Core Strategy and Development Policies documents. Covering the period from 2016 to 2031, the Local Plan reflects Camden's characteristics and aligns with its broader vision to ensure sustainable growth, reduce inequalities, and promote communities. The key policies related to overheating in the Camden Local Plan 2017 are the following:

- **Policy CC2: Adapting to Climate Change**

New developments must be designed to cope with climate change impacts, including increased temperatures and the risk of flooding. Encourages green infrastructure, such as green roofs and sustainable drainage systems.

- **Policy D1: Design**

Emphasises energy efficiency and environmental performance as integral parts of high-quality design.

2.4 Draft New Camden Local Plan – Regulation 18 Consultation Version

The Draft New Camden Local Plan (Regulation 18 Consultation Version, January 2024) outlines Camden Council's strategic vision for development over a 15-year period, from 2026 to 2041. This plan is set to replace the Camden Local Plan (2017) and Site Allocations Plan (2013), ensuring Camden maintains up-to-date, robust planning policies that align with changing circumstances and the borough's distinctive characteristics. This version is not yet adopted. The key policies related to overheating in the Draft New Camden Local Plan are the following:

- **Policy CC8: Overheating and Cooling**

Requires developments to:

- Minimise overheating risks through passive design strategies.
- Avoid reliance on air conditioning where possible.
- Provide detailed assessments and measures for overheating resilience as part of sustainability documentation.

3. METHODOLOGY

CIBSE's TM59 methodology for the assessment of overheating risk in homes is a standardised approach to predicting overheating risk for residential building designs (new-build or major refurbishment) using dynamic thermal analysis. The methodology provides a baseline for all domestic overheating risk assessments. It should be noted that the weather file will have the largest impact on the overheating results.

3.1 CIBSE's TM59 Criteria

TM59 introduces two sets of compliance criteria for assessing overheating which are based on the ventilation type of the home:

For houses predominantly naturally ventilated:

- **Criteria 1:** The number of hours for living rooms, kitchens and bedrooms, for which the difference between the internal and external temperatures (∆T) is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3%of the occupied hours (TM52 criterion 1).
- **Criteria 2:** For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 °C will be recorded as a failure).

For homes predominantly mechanically ventilated:

- **Criteria A:** For dwellings with restricted window openings CIBSE Guide A fixed temperature test must be followed, i.e. all occupied rooms should not exceed an operative temperature of 26 degrees Celsius for more than 3 per cent of the annual occupied hours.

The assessment should be carried out using a dynamic thermal analysis software which must comply with CIBSE AM11: Building performance modelling (2015b).

3.2 AD Part O – Limits on CIBSE's TM59 Modelling

ADO sets out a number of limitations on CIBSE's TM59 method. This includes the following:

When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following:

- Start to open when the internal temperature exceeds 22°C
- Be fully open when the internal temperature exceeds 26°C
- Starts to close when the internal temperature falls below 26°C
- Be fully closed when the internal temperature falls below 22°C

At nighttime (11pm to 8am), it should be modelled as fully open if both of the following apply:

- The opening is on the first floor or above and not easily accessible
- The internal temperature exceeds 23°C, at 11pm

When a ground floor or easily accessible room is unoccupied, the following applies:

- In the day windows, patio doors and balcony doors should be modelled as open, if this can be done securely i.e., using fixed or lockable shutters, window grilles or railings.
- At night, windows patio doors and balcony doors should be modelled as closed.
- An entrance door should be included, which should be shut all the time.

Although internal blinds and curtains do provide some mitigation of solar gains, they cannot be considered as part of the overheating assessment for ADO compliance.

3.3 Key Constraints

The building should be constructed to meet ADO, using passive means as far as reasonably practicable. Building control requires the development to demonstrate that all practicable passive means of limiting unwanted solar gains and removing excess heat have been utilised first before adopting mechanical ventilation. Any mechanical ventilation is expected to be used only where ADO cannot be met using openable windows.

Limitations on openable windows

In instances where security, air quality or noise concerns pose limitations to the opening of windows, it is required to demonstrate that all passive design measures have been thoroughly investigated.

Noise at night

There are external noise considerations which would pose limitations to the opening of windows for the purposes of mitigating overheating risk. The site is close to sources of noise emissions from the surrounding area.

The Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020) states that the windows are likely to be closed if the noise within the bedrooms exceeds the following limits:

- 40 dB LAeq1 averaged over 8 hours (between 11pm and 7 am)
- 55 dB LAFmax more than 10 times a night (between 11pm and 7 am)

Due to the above thresholds, and based on the external noise considerations, windows are not expected to be able to open, and modelling indicates that mechanical ventilation is required to meet ADO if natural ventilation is not permitted.

Security

When determining the free area available for ventilation during sleeping hours, only the proportion of openings that can be opened securely should be considered to provide useful ventilation. This particularly applies in the following location, where openings may be vulnerable to intrusion.

- Ground floor bedrooms
- Easily accessible bedrooms

Open windows or doors can be made secure by using any of the following:

- Fixed or lockable louvred shutters.
- Fixed or lockable windows grilles or railings.

Protection from entrapment

Louvered shutters, window railings and ventilation grilles should not allow body parts to become trapped. They should comply with the following:

- Not allow the passage of a 100mm diameter sphere.

- Any hole which allows the passage of an 8mm diameter rod should also allow the passage of a 25mm, such wholes should not taper in a way that allows finger entrapment.
- Any looped cords must be fitted with child safety devices.

4. OVERHEATING STRATEGY

It is important to identify potential overheating risk, particularly in residential accommodation, early in the design process, and then incorporate suitable passive measures within the building envelope and services design to mitigate overheating and reduce cooling demand.

A full list of passive measures employed within the design have been detailed below within the following Section 4.1 which specifically addresses the London Plan Cooling hierarchy, and the steps taken at each stage.

4.1 The Cooling Hierarchy

The following measures were proposed to reduce the demand for cooling:

- Reduce the amount of heat entering the building through orientation, high albedo materials, fenestration, insulation, and shading from balconies.
- Minimise internal heat generation through energy efficient design: Heat distribution infrastructure within buildings will be designed to minimise pipe lengths, particularly lateral pipework in corridors of apartment blocks, and adopting pipe configurations which minimise heat loss e.g. twin pipes.
- Optimise G-values for fenestration to balance natural light and solar heat gain.
- 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.
- Passive ventilation has been prioritised where possible through the use of openable windows.
- Mechanical ventilation: Mechanical ventilation with heat recovery (MVHR) has been 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 bypass on the heat recovery system for summer mode operation.

4.2 Proposed Strategy

The proposed development has been thoughtfully planned to minimise the amount of heat that enters the structure.

Given its location in Camden Town Centre, the North London Line railway line runs parallel to Chalk Farm Road, while the railway lines along the south-western boundary connect to Euston station to the south. The Noise and Vibration Addendum (document reference: 196121-03) states that overnight noise levels surpass 55dB LAeq1, therefore passive ventilation is provided via the openable windows, but these openings are only allowed to be used for short duration (daytime).

To ensure acceptable indoor air quality a mechanical system is proposed for general ventilation and overheating mitigation to the private and affordable homes.

Mechanical ventilation with is proposed to provide general ventilation. This system shall run continuously providing background ventilation and shall be provided with bypass' to benefit from free night cooling in the warmer months. Communal corridors shall be tempered via a roof mounted mechanical ventilation system, extracting air from the stairwells and supplying to the corridors via the smoke shafts. The system shall include a for tempered fresh air to be provided in order to target the design internal temperature of 24°C. The system shall include sophisticated controls to maximise energy efficiency and ensure that the whenever suitable, external air is used to maintain a comfortable temperature. In periods of excessive external temperature, the air shall be mechanically cooled by the system and recirculated in order to minimise cooling demand.

The following table details the proposed fabric performance figures for the thermal envelope on the Energy Strategy specification for the development.:

Table 1: Proposed Fabric Thermal Performance

Fabric Performance		
Element	Notional Building Part L 2021	Proposed Measures
Air Tightness	8.0 $m^3/hr/m^2$	3.0 $m^3/hr/m^2$
External Wall	0.26 W/m^2k	0.18 W/m^2k
Exposed Floor	0.18 W/m^2k	0.11 W/m^2k
Roof	0.18 W/m^2k	0.14 W/m^2
Glazing	1.60 W/m^2K	1.20 W/m^2K
Doors	1.60 W/m^2K	1.20 W/m^2K
Glazing G Value	N/A	0.45 KLDs 0.35 Bedrooms

A target of 0.35 has been set for glazing G-values (solar transmittance) for the bedrooms, which is seen to be a best practice value to balance heat loss, daylighting, and overheating reduction.

5. OVERHEATING ANALYSIS

5.1 Overview

The overheating analysis specially addresses Blocks C, D, E1, E2 and F which form part of the Proposed Development forming part of this S73 application. The conclusions reached in the previous assessment for Blocks A and B assessed as part of the December 2020 Planning Consent remain valid, unchanged and are not assessment within this report.

Whilst the whole building was modelled to correctly account for building mass and internal heat transfer, to streamline the process, selected worst case apartments.

Dwellings that are typically at risk of overheating are those that are:

- South and west facing dwellings
- Dwellings that are single aspect
- Dwellings with large glazing to floor ratios.

The buildings that are being sampled in this assessment Blocks C, D, E1, E2 and F. It was assumed that mid and higher floor samples represent a reasonable worst-case, and that the results are a valid representation of overheating risk within the scheme.

Below is a picture that highlights the assessed apartments.

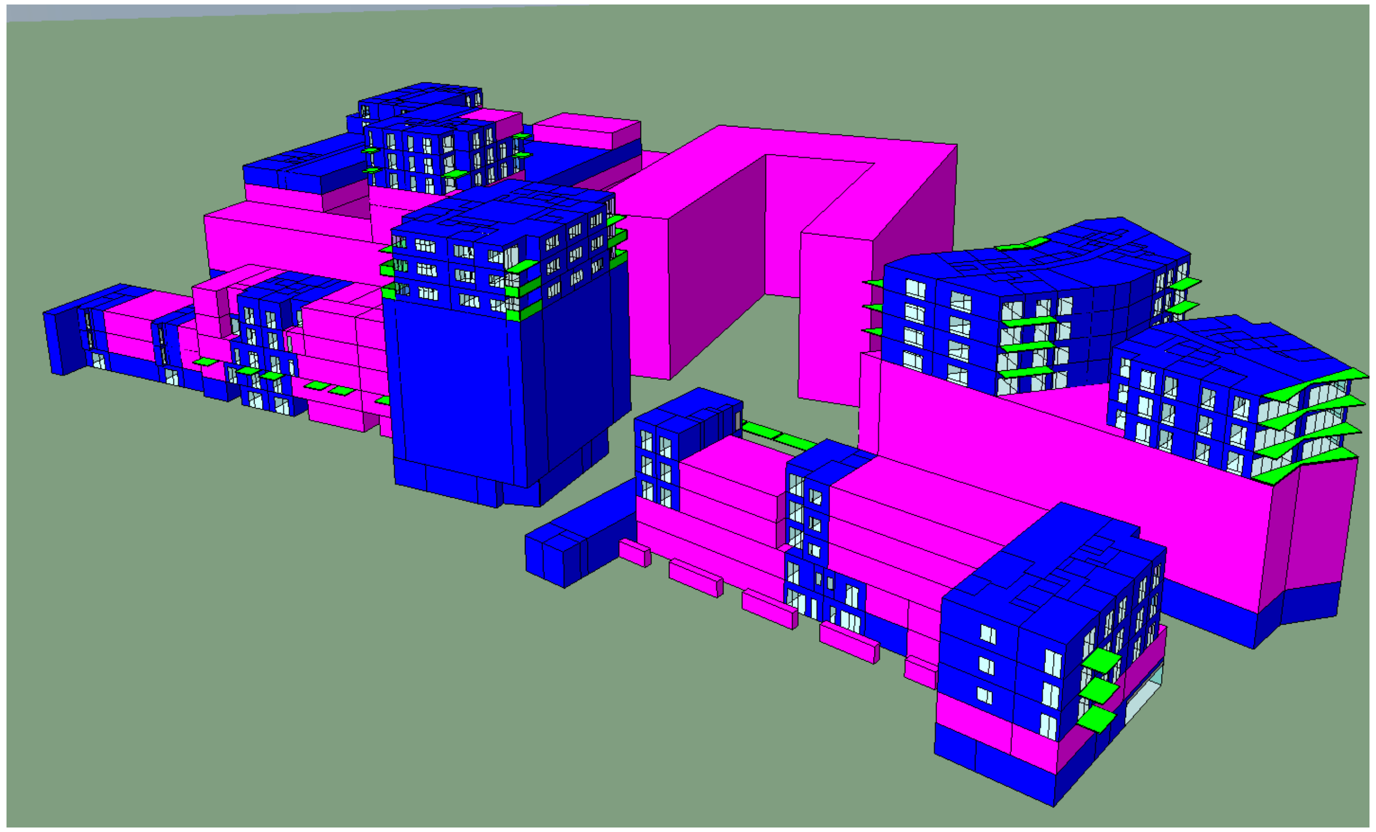


Figure 3: 3D Model of the Proposed Development

The dwellings with balconies shall benefit the dwellings below from external shading in the form of a horizontal projection, and that it shall be developed in detail as part of the design development, ensuring compliance with the planning and regulatory requirements.

Communal corridors should be included in the overheating assessment.

According to TM59 chapter 5.1: “A maximum sensible heat 75 W/person and a maximum latent heat gain of 55 W/person are assumed in living spaces”.

According to TM59 chapter 3.6, the modelled air speed should be set to 0.1 m/s. To meet this requirement, an appropriate air velocity schedule can be set at building level on the Activity tab to define air speed in all zones.

A total of 39 apartments—including those on the top floors, facing south or west, single-aspect, or heavily glazed have been chosen for evaluation for overheating based on worst-case scenarios. From studio apartments to 3B6P family homes, a representative range of unit sizes and tenures has also been chosen.

Table 2: Overheating Dwellings used for Sample

Building	No. of Floors	No. of Dwellings Sampled
Block C	10	12
Block D	5	6
Block E1	10	8
Block E2	4	8
Block F	10	5

5.1.1 Window Openings

The following parameters have been assigned to the differing window and door types within the thermal model.

- Type 1 Fixed Panel Glazing that have been assigned as inoperable.
- Type 2 Openable Windows have been assigned as side hung, and openable to a maximum angle of 90°.
- Type 3 Balcony Doors Balcony doors have been assigned as sliding doors.
- Type 4 Balcony single Doors assigned as side hung, and openable to a maximum angle of 90°.

Internal doors have been modelled between rooms within the apartments. These have been set as open during the day, to promote airflow throughout the home

Due to noise concerns, it is proposed that the windows are simulated as only openable during the day and shut at night. This means that mechanical ventilation must be present in order to comply with AD Part O**.**

The ventilation rates were taken from Approved Document Part F (ADF) and as following:

Table 3: Dwelling Mechanical Ventilation rates

Room	Ventilation Rate
Kitchen	60 l/s
Utility room	30 l/s
Bathroom	15 l/s
Bedroom	4ACH*
	(in addition to 8 l/s as background ventilation)

*From ADF - 1.26 A system for purge ventilation should be provided in each habitable room. 1.27 Purge ventilation should be capable of extracting at least four air changes per hour per room directly to the outside.

5.2 Results

The openings have however been sized to allow compliance with the ADO overheating risk assessment, to demonstrate passive measures have suitably reduced risk and to provide a future potential option, should there is no external noise consideration.

For the breakdown of the criteria's, refer to Section 3.1.

Proposed Strategy – Natural Ventilation with Mechanical Purge

Due to the inability to cool naturally during the night as the windows are shut closed, mechanical ventilation was investigated to provide purge ventilation to the spaces. The mechanical ventilation units were modelled with tempered air during the nighttime to prevent the space overheating. This ensures meeting the ADO risk requirements of room temperature is for no more >26°C for less than 1% of operational hours and that comfortable conditions can be provided without excessively increasing energy use. It is also proposed that communal corridors are also mechanically ventilated with tempered air to prevent overheating.

The assessed units comprise of bedrooms and living, kitchen and dining rooms (LKDs). All occupied rooms within the sample dwellings were included in the assessment excluding ensuites, stores and in flat circulation areas.

Internal Blinds

In line with Approved Document Part O, blinds and curtains should not be taken into account when considering whether the CIBSE TM59 criteria has been met.

The following are the results for the sample dwellings tested, using a g value of 0.35 for bedrooms and a relaxed g value of 0.45 for the KLDs:

Table 4: Proposed Strategy Results Summary

Space	Criterion 1	Criterion 2
KLDs	Pass	N/A
Bedrooms	Pass	12/75 rooms pass

Even with the proposed strategy: Mechanical Ventilation Purge System due to external noise considerations, the assessment illustrated that the bedrooms operative temperature exceeds the temperature limit of 26 ºC for 1% of occupied hours.

Several g-values were examined as part of the evaluation to see whether the window specification helped lower the risk of overheating. The g-values that were tested are stated below:

*AD Part O relates to bedrooms only.

Table 5: g -values considered

Scenario	Part O Compliant*
g value 0.45	Non-Compliant
g value 0.40	Non-Compliant
g value 0.35	Non-Compliant
g value 0.32	Non-Compliant

The full set of results can be found in Appendix A. It can be noticed that the bulk of the spaces are close to passing ADO compliance. The graph below, extracted for one of the failing bedrooms (C10803), indicates that solar gain is the major attributer of internal heat gains, increasing the room temperature to exceed 30ºC by mid-noon. Some solar shading is provided by way of overhanging balconies, however no specific architectural solar shading (brise soleil, external shutters etc.) is proposed within the design.

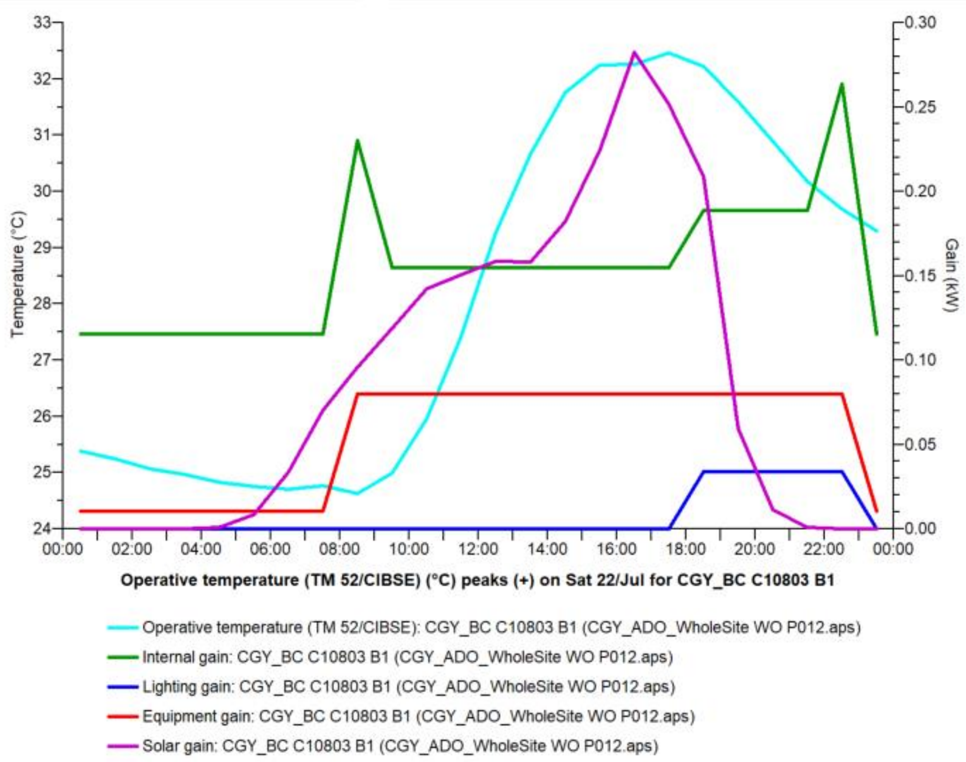


Figure 4: Graph illustrating internal gains (bedroom)

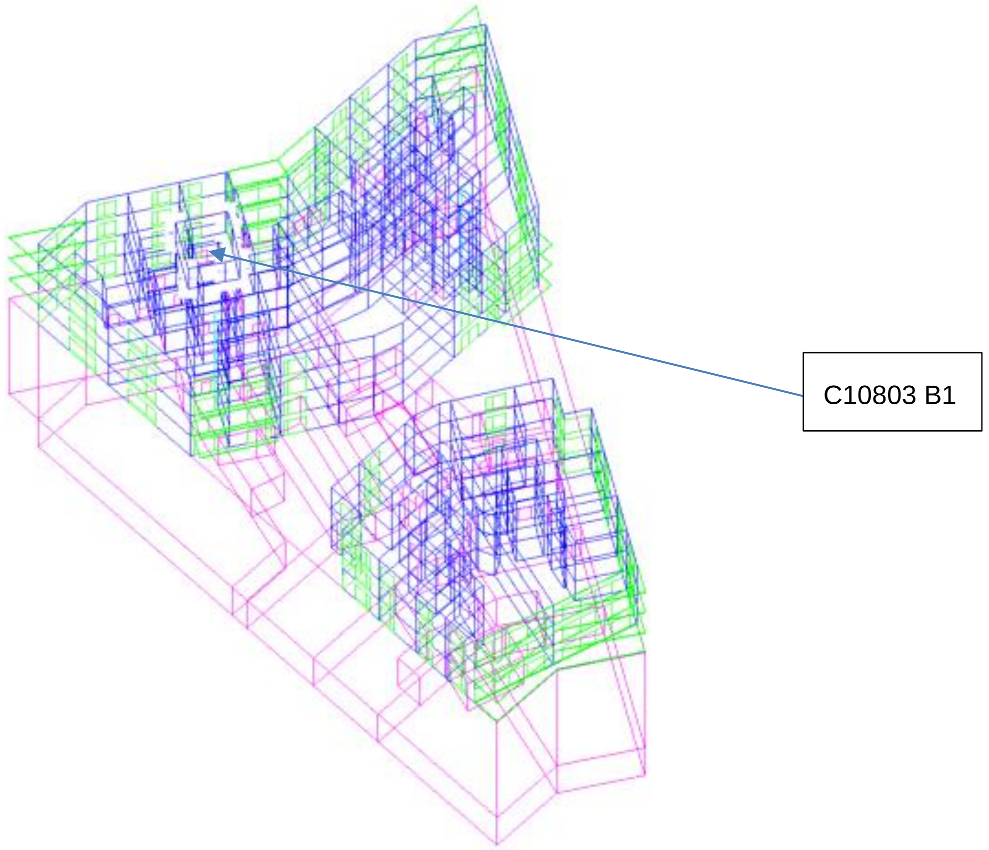


Figure 5: Dwelling C10803

The inclusion of corridors in the overheating analysis is mandatory where community heating pipework runs through them. The overheating test for corridors should be based on the number of annual hours for which an operative temperature of 28 °C is exceeded. Whilst there is no mandatory target, if an operative temperature of 28 °C is exceeded for more than 3% of total annual hours, this should be flagged as a significant risk.

Table 6: Proposed Strategy Results Summary – Communal Corridors

Corridor	Max Hours >28°C	TM59 Compliant
Sample Corridors	73	Pass

6. CONCLUSIONS

This report has been prepared by Waterman Building Services on behalf of St George West London Limited ('the Applicant'), to conduct an Overheating Assessment of the Proposed Development to vary the extant planning permission for the Camden Goods Yard project via a s73 application.

The relevant overheating requirement is Approved Document O (ADO) of the Building Regulations.

The overheating approach must be consistent with the building's acoustic and air-quality policies. The Main Site parcel within the Site's location prevents the usage of opening windows for ventilation or overheating mitigation during the night.

As part of the assessment, the KLDs were tested against Criterion 1, bedrooms were tested against Criterion 1 and 2. It was also established whether the corridors' operational temperature exceeded 28 degrees for more than 3% of the year.

The stimulation undertaken demonstrates the proposed HVAC design complies with TM59 but fails to meet ADO, and the site limitations are the reason for the need to adopt a mechanical purge ventilation strategy. With the proposed design strategy, the KLDs and corridors areas comply with TM59.

Several g-values were investigated as part of the study to see whether the window specification reduced the risk of overheating in the bedrooms. The g-values that were examined are given below:

Table 7: g -values considered

Scenario	Part O Compliant*
g value 0.45	Non-Compliant
g value 0.40	Non-Compliant
g value 0.35	Non-Compliant
g value 0.32	Non-Compliant

*AD Part O relates to bedrooms only.

Further study shall be conducted at a later stage to provide mitigation solutions to ensure the design is ADO compliant.

It should also be noted that the actual overheating risk is expected to be lower than assumed in the model, as the dwellings are expected to have internal blinds fitted for additional solar control, however due to AD Part O methodology blinds have not been permitted in the overheating assessment. However, as the windows are physically openable, the residents have the option to use them for the purposes of overheating mitigation.

The full set of results can be found in Appendix A.

APPENDICES

A. OVERHEATING DETAILED RESULTS

Results: KLD's

Room Ref	Criterion 1: Max = 3% No. and % hours >1K above tmax		
CGY_BD D10004 KLD	14	0.7%	Pass
CGY_BD D10203	21	1.1%	Pass
CGY_BD D10402 2B KLD	24	1.2%	Pass
CGY_BD D10401 KLD	24	1.2%	Pass
CGY_BD D10410 KLD	41	2.1%	Pass
CGY_BD D10407 KLD	32	1.6%	Pass
CGY_BD D10005 KLD	17	0.9%	Pass
CGY_BC C10805 2B KLD	27	1.4%	Pass
CGY_BC C10804 1B KLD	25	1.3%	Pass
CGY_BC C10803 1B KLD	28	1.4%	Pass
CGY_BC C10802 2B KLD	30	1.5%	Pass
CGY_BC C10806 2B KLD	23	1.2%	Pass
CGY_BC C10801 2B KLD	25	1.3%	Pass
CGY_BC C10905 1B KLD	36	1.8%	Pass
CGY_BC C10908 1B KLD	39	2.0%	Pass
CGY_BC C10906 2B KLD	29	1.5%	Pass
CGY_BC C11004 2B KLD	29	1.5%	Pass
CGY_BC C11001 2B KLD	33	1.7%	Pass
CGY_BC C11002 3B KLD	54	2.7%	Pass
CGY_BC C11003 3B KLD	41	2.1%	Pass
CGY_BE2 E20203 1B KLD	16	0.8%	Pass
CGY_BE2 E20202 1B KLD	18	0.9%	Pass
CGY_BE2 E20001 KLD	11	0.6%	Pass
CGY_BE2 E20001 KLD	9	0.5%	Pass
CGY_BE2 E20004 3B KLD	14	0.7%	Pass
CGY_BE2 E20302 2B K	19	1.0%	Pass
CGY_BE2 E20303 3B K	19	1.0%	Pass
CGY_BE2 E20302 L/D	25	1.3%	Pass
CGY_BE2 E20303 L/D	40	2.0%	Pass
CGY_E1 8F2 KLD	20	1.0%	Pass
CGY_E1 8F1 KLD	7	0.4%	Pass
CGY_E1 8F4 2B KLD	19	1.0%	Pass
CGY_E1 10F2 3B KLD	37	1.9%	Pass
CGY_E1 10F1 2B KLD	27	1.4%	Pass
CGY_E1 10F1 3B KLD	39	2.0%	Pass
CGY_BC C10907 2B KLD	33	1.7%	Pass
CGY_BF_8F F10802 KLD	55	2.8%	Pass
CGY_BF_8F F10801 KLD	60	3.0%	Pass
CGY_BF_8F F20803 KLD	26	1.3%	Pass
CGY_BF_8F F20802 KLD	27	1.4%	Pass
CGY_BF_8F F21003 KLD	39	2.0%	Pass
CGY_BF_8F F21002 KLD	38	1.9%	Pass
CGY_BF_7F F10701 KLD	40	2.0%	Pass
CGY_BF_6F F30601 KLD	46	2.3%	Pass
CGY_E1 8F3 2B KLD	20	1.0%	Pass
CGY_BE2 E20007 3B Kitchen	7	0.4%	Pass
CGY_BE2 E20008 2B Kitchen	4	0.2%	Pass

Results: Bedrooms

Room Ref	Criterion 1: Max = 3% No. and % hours >1K above tmax			Criterion 2: Max 1% No. and % hours > 26°C			Overall Result
CGY_BD D10004 B3	19	0.5%	Pass	38	1.2%	Fail	Fail
CGY_BD D10004 B2	16	0.4%	Pass	33	1.0%	Pass	Pass
CGY_BD D10004 B1	14	0.4%	Pass	37	1.1%	Fail	Fail
CGY_BD D10203 B1	12	0.3%	Pass	28	0.9%	Pass	Pass
CGY_BD D10402 B2	15	0.4%	Pass	41	1.2%	Fail	Fail
CGY_BD D10402 B1	14	0.4%	Pass	38	1.2%	Fail	Fail
CGY_BD D10401	14	0.4%	Pass	39	1.2%	Fail	Fail
CGY_BD D10410 B1	23	0.6%	Pass	55	1.7%	Fail	Fail
CGY_BD D10410 B2	25	0.7%	Pass	59	1.8%	Fail	Fail
CGY_BC C10805 B1	20	0.5%	Pass	43	1.3%	Fail	Fail
CGY_BC C10805 B2	17	0.5%	Pass	39	1.2%	Fail	Fail
CGY_BC C10804 B1	19	0.5%	Pass	39	1.2%	Fail	Fail
CGY_BC C10803 B1	17	0.5%	Pass	38	1.2%	Fail	Fail
CGY_BC C10802 B1	20	0.5%	Pass	44	1.3%	Fail	Fail
CGY_BC C10802 B2	19	0.5%	Pass	39	1.2%	Fail	Fail
CGY_BC C10905 B1	23	0.6%	Pass	43	1.3%	Fail	Fail
CGY_BC C10908 B1	23	0.6%	Pass	43	1.3%	Fail	Fail
CGY_BC C10907 B2 S	25	0.7%	Pass	42	1.3%	Fail	Fail
CGY_BC C10906 B1	21	0.6%	Pass	42	1.3%	Fail	Fail
CGY_BC C10906 B2 S	23	0.6%	Pass	42	1.3%	Fail	Fail
CGY_BC C11003 B3	22	0.6%	Pass	50	1.5%	Fail	Fail
CGY_BC C11003 B2	22	0.6%	Pass	44	1.3%	Fail	Fail
CGY_BC C11001 B1	15	0.4%	Pass	37	1.1%	Fail	Fail
CGY_BC C10101 B2	21	0.6%	Pass	42	1.3%	Fail	Fail
CGY_BC C11002 B2	21	0.6%	Pass	42	1.3%	Fail	Fail
CGY_BC C11002 B1	21	0.6%	Pass	41	1.2%	Fail	Fail
CGY_BC C11003 B1	20	0.5%	Pass	41	1.2%	Fail	Fail
CGY_BC C11004 B2	23	0.6%	Pass	46	1.4%	Fail	Fail
CGY_BC C11004 B1	16	0.4%	Pass	41	1.2%	Fail	Fail
CGY_BC C11002 B3	22	0.6%	Pass	48	1.5%	Fail	Fail
CGY_BE2 E20008 B2	14	0.4%	Pass	40	1.2%	Fail	Fail

CGY_BE2 E20001 B1	17	0.5%	Pass	35	1.1%	Fail	**Fail**
CGY_BE2 E20004 B1	15	0.4%	Pass	36	1.1%	Fail	**Fail**
CGY_BE2 E20007 B2 S	14	0.4%	Pass	39	1.2%	Fail	**Fail**
CGY_BE2 E20007 B1	13	0.4%	Pass	40	1.2%	Fail	**Fail**
CGY_BE2 E20008 B1	13	0.4%	Pass	38	1.2%	Fail	**Fail**
CGY_BE2 E20007 B3	14	0.4%	Pass	38	1.2%	Fail	**Fail**
CGY_BE2 E20004 B2 S	14	0.4%	Pass	35	1.1%	Fail	**Fail**
CGY_BE2 E20001 B2 S	11	0.3%	Pass	35	1.1%	Fail	**Fail**
CGY_BE2 E20001 B3	19	0.5%	Pass	35	1.1%	Fail	**Fail**
CGY_BE2 E20004 B3	22	0.6%	Pass	34	1.0%	Pass	**Pass**
CGY_BE2 E20202 B1	13	0.4%	Pass	40	1.2%	Fail	**Fail**
CGY_BE2 E20203 B1	12	0.3%	Pass	40	1.2%	Fail	**Fail**
CGY_BE2 E20004 B4 S	17	0.5%	Pass	37	1.1%	Fail	**Fail**
CGY_BE2 E20001 B4 S	13	0.4%	Pass	36	1.1%	Fail	**Fail**
CGY_BE2 E20302 B3	20	0.5%	Pass	43	1.3%	Fail	**Fail**
CGY_BE2 E20302 B2	19	0.5%	Pass	41	1.2%	Fail	**Fail**
CGY_BE2 E20303 B3	22	0.6%	Pass	44	1.3%	Fail	**Fail**

Results: Corridors

Corridor Sampled	Max Hours >28°C, Max = 3%
CGY_BC 8F CORRIDOR	0
CGY_BC 9F CORRIDOR	0
CGY_BC 10F CORRIDOR	0
CGY_E1 8F CORRIDOR	0
CGY_E1 8F CORRIDOR	0
CGY_E1 10F CORRIDOR	0
CGY_E1 10F CORRIDOR	0
CGY_BF_8F CORRIDOR	73
CGY_BF_10F CORRIDOR	0
CGY_BD 4F CORRIDOR	0

B. OPERATIONAL PROFILES

Table 2 Occupancy and equipment gain descriptions

Unit/ room type	Occupancy	Equipment load
Studio	2 people at all times	Peak load of 450 W from 6 pm to 8 pm*. 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and 10 pm to 12 p Base load of 85 W for the rest of the day
1-bedroom apartment: living room/kitchen	1 person from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm t Base load of 85 W for the rest of the day
1-bedroom apartment: living room	1 person at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to Base load of 35 W for the rest of the day
1-bedroom apartment: kitchen	1 person at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
2-bedroom apartment: living room/kitchen	2 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm t Base load of 85 W for the rest of the day
2-bedroom apartment: living room	2 people at 75% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to Base load of 35 W for the rest of the day
2-bedroom apartment: kitchen	2 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm Base load of 50 W for the rest of the day
3-bedroom apartment: living room/kitchen	3 people from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 450 W from 6 pm to 8 pm 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm t Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 people at 5% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 150 W from 6 pm to 10 pm 60 W from 9 am to 6 pm and from 10 pm to Base load of 35 W for the rest of the day
3-bedroom apartment: kitchen	3 people at 25% gains from 9 am to 10 pm; room is unoccupied for the rest of the day	Peak load of 300 W from 6 pm to 8 pm base load of 50 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm 1 person at full gain in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom (too small to accommodate double bed)	1 person at 70% gains from 11 pm to 8 am 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours
Communal corridors	Assumed to be zero	Pipework heat loss only; see section 3.1 abo

* All times in GMT

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