



**Management
and
Engineering
Services Ltd**

**LORDSHIP LANE
LONDON**

**THERMAL COMFORT
ASSESSMENT**

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PROJECT REVISION SHEET

Version	Details	Comments	Prepared by	Checked by	Issued
1.0	First Issue	First Issue	CC	DLM	02.02.24
2.0	Second Issue	Updated in line with comments	CC	DLM	13.02.24

1.0 Introduction

This Thermal Comfort Assessment has been prepared for Fusion Students to support their planning application for the redevelopment of the site on Lordship Lane, London. It has been developed by Amber Management and Engineering Services Limited as a response to the local planning requirements. The statement is intended to respond to the policies raised in the London Plan and Building Regulations Approved Document Part O.

1.1 Site Location

The site is currently a Mecca Bingo Hall south of Lordship Lane and north of Wellesley Road. There are residential buildings adjoined to the development to the east and a large residential building with a ground floor gym to the west.

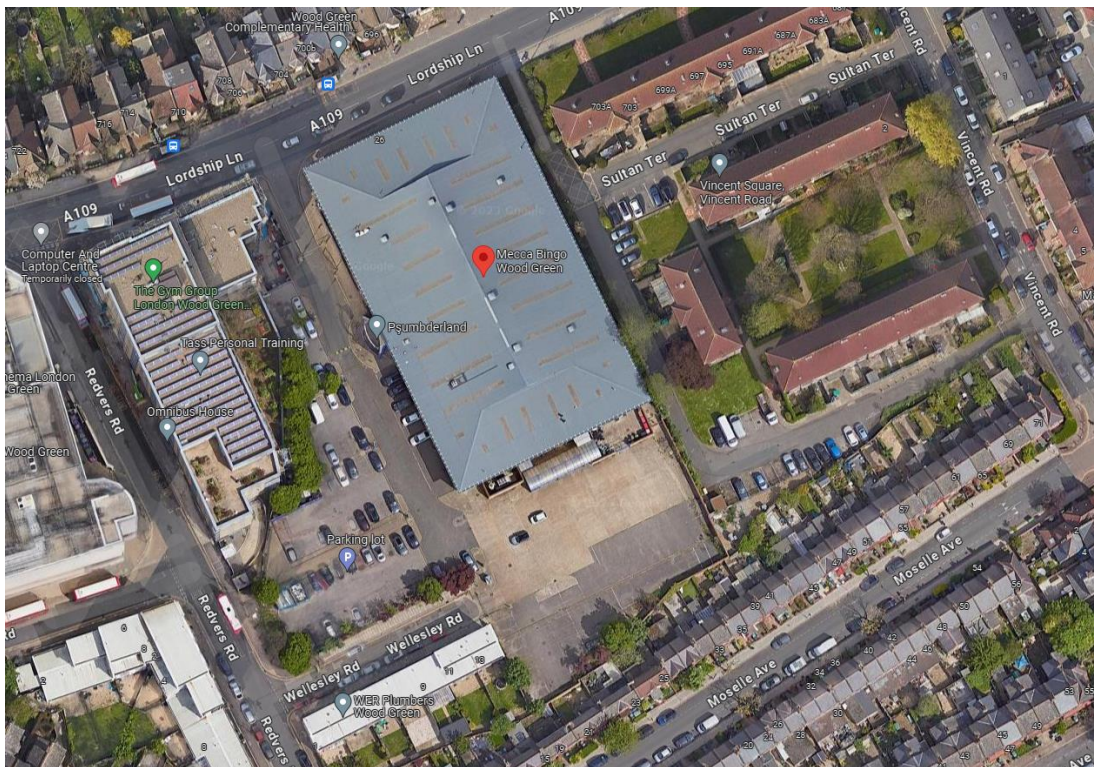


Figure 1.1 – Site Location

1.2 Development Proposal

The proposed redevelopment involves the construction of 623 beds of Purpose Build Student Accommodation (PBSA), which makes up Building A. The PBSA bed spaces are provided with en-suite facilities, and are arranged in a mix of en-suites, social studios, duplex studios, studios & accessible studios. Building A also contains a shell and core non-residential retail space on the ground floor.

Buildings B-D make up the Residential Dwelling section of the development. Building B is composed of Shared Ownership units including one beds, 2 beds (3 persons), 2 beds (4 persons) and 3 beds (5 persons). Building C is composed of social rent including one beds (2 persons), 2 beds (3 persons), 2 beds (4 persons) and 3 beds (5 persons). Building D is composed of 7 number 5 beds (8 persons).

The gross floor area of the PBSA is circa 19,500m², inclusive of various communal student facilities. The Residential buildings gross floor area is 5767m².



Figure 1.2 – Proposed Site Plan



1.3 Scope of Study

This report assesses the overheating risk of a sample of areas within the proposed development. Spaces were selected on the basis of their perceived vulnerability to overheating and to give a representative range of area types from across the development.

The intention is that this study helps inform and verify the design of the proposals, thereby providing the basis for mitigating overheating risk and producing a building that provides comfortable environmental conditions for occupants.

It is important to note that with any modelling exercise there are assumptions and approximations that have to be made. As far as possible, details of all assumptions and approximations are supplied within the report. Any assumptions have been kept to a minimum with information taken from the necessary guidance and policy documentation.

All results are based on the output from computer modelling software and should be taken as an indication of the likely final situation, but these conditions cannot be guaranteed.



2.0 Planning Policy Compliance & Analysis

The London Plan, last updated in March 2021, outlines the councils land use strategy and provides the criteria to assess planning applications through a series of development policies. This Thermal Comfort Assessment uses the guidance of Policy SI4 (Managing Heat Risk), which illustrates the Design, Layout, orientation, and green infrastructure to be utilised with the goal of minimising adverse impacts on the urban island along with Policy 5.9.

2.1 National Planning

The government has outlined planning policy guidance in the National Planning Policy Framework (NPPF) as of July 2021, serving as a framework for planning authorities to formulate and implement their development plans. Central to this guidance is the drive to achieve sustainable development goals.

The NPPF addresses various planning issues, ranging from promoting sustainable transport to facilitating the responsible utilization of minerals. Section 14 of the framework, titled 'Meeting the challenge of climate change, flooding, and coastal change,' specifically focuses on climate change. In essence, the framework recommends the following:

1. Plans should adopt a proactive stance in mitigating and adapting to climate change, considering the long-term implications for flood risk, coastal change, water supply, biodiversity, and landscapes. Policies should support measures ensuring the future resilience of communities and infrastructure to climate change impacts.
2. New developments should be planned to avoid increased vulnerability to climate change impacts, particularly in vulnerable areas. Care should be taken to manage risks through suitable adaptation measures, including green infrastructure planning. Additionally, developments should aim to reduce greenhouse gas emissions through thoughtful location, orientation, and design.
3. Local requirements for the sustainability of buildings should align with national technical standards.
4. Plans should have a positive strategy for renewable and low carbon energy, maximizing development potential while addressing adverse impacts. Identifying suitable areas for such energy sources and supporting infrastructure is crucial. Moreover, plans should explore opportunities for drawing energy supply from decentralized, renewable, or low carbon systems and consider co-locating potential heat customers and suppliers.
5. Local planning authorities should endorse community-led initiatives for renewable and low carbon energy, even beyond areas specified in local plans or strategic policies.

2.2 London Planning Policy

In March 2021, London Mayor Sadiq Khan formally adopted London Plan Spatial Development Strategy for Greater London. This plan outlines legislation regarding Housing, Spatial Development, Social Infrastructure, Sustainable Infrastructure, and cultural conservation. It is a legal part of each of London's Local Planning Authorities' Development Plan and must be taken into account when planning decisions are taken in any part of Greater London.

The driving principle of the London Plan is to provide a transition to a net zero carbon economy through delivering sustainable buildings, alongside conserving the culture and history of Greater London. There are a variety of policies within the London Plan to ensure the delivery of sustainable buildings, some have been outlined below that apply to thermal comfort:

- Policy SI 4 – Managing Heat Risk: Design, Layout, orientation, and green infrastructure to be utilised with the goal of minimising adverse impacts on the urban island. Energy strategies must be used to highlight how the development will reduce the adverse effects of internal overheating.



- Policy 5.9 relates to overheating and reducing reliance on air-conditioning systems through use of the cooling hierarchy:
 - 1) minimise internal heat generation through energy efficient design.
 - 2) reduce the amount of heat that can enter the building through orientation, shading, insulation, green roofs & walls.
 - 3) passive or mechanical ventilation.
 - 4) active cooling systems (where absolutely necessary from an overheating perspective).

Applicants should apply the cooling hierarchy in Policy SI 4 of the London Plan to the development. 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:

1. Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.
2. 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.
3. 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.
4. Provide passive ventilation: For example, through the use of openable windows, shallow floorplates, dual aspect units or designing in the 'stack effect' where possible.
5. 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.
6. 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.

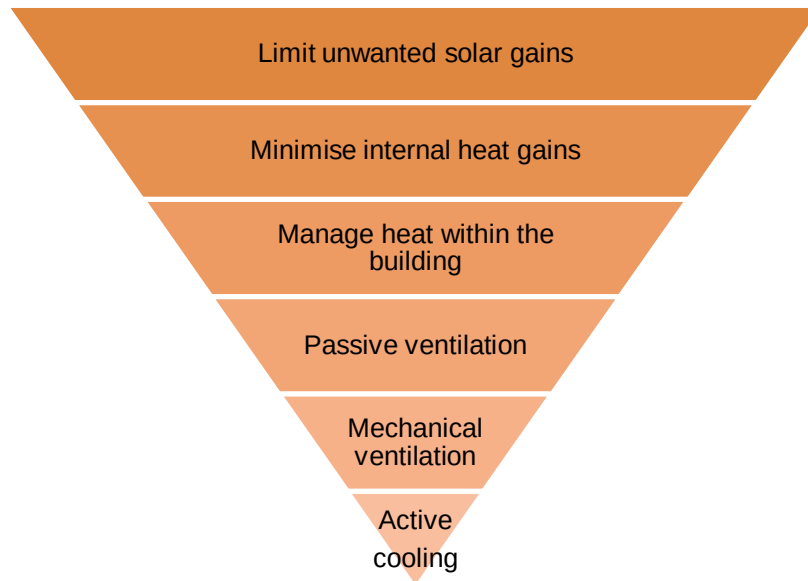


Figure 2.1 – Cooling hierarchy

2.3 Building Regulations

In December 2021, the HM Government released a new Approved Document for England to cover overheating mitigation, Approved Document O applies to new residential buildings.



3.0 Assessment Criteria

3.1 General

The building is to be constructed to the energy performance standards set out under Approved Document Part L 2021. As the development is residential in nature this therefore means that compliance with Approved Document Part O – Overheating is mandatory.

Part O largely follows the requirements of CIBSE Technical Memorandum (TM) 59 – ‘*Design methodology for the assessment of overheating risk in homes*’. This is the industry recognised standard for assessing the risk of overheating within residential buildings.

Some areas of the building do not fall under the remits of TM59 and therefore these have been reviewed against the requirements of CIBSE TM52 – ‘*The limits of thermal comfort: avoiding overheating*’

3.2 Residential – TM59 Analysis (Predominantly Naturally Ventilated)

To meet the requirements of Part O / CIBSE TM59 for residential areas the rooms have been assessed as being predominantly naturally ventilated, therefore the following criteria must be met which align with the adaptive method based on TM52 and as described within section 4.2 of TM59 as below:

In kitchens, living rooms and bedrooms: Between 1st May and 30th September the number of occupied hours during which the indoor operative temperature (T_{op}) exceeds the threshold comfort temperature (T_{max}) by 1°C or more must be no more than 3% of occupied hours. This is the same as criterion one from CIBSE TM52.

In bedrooms only: The indoor operative temperature (T_{op}) in the bedroom from 22:00 to 07:00 shall not exceed 26°C for more than 1% of annual hours. (*Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours*).

In corridors: If the indoor operative temperature (T_{op}) exceeds 28°C for more than 3% of total annual hours this should be highlighted as a significant risk, although this is not a mandatory compliance requirement.

The operating temperature (T_{op}) is calculated using the formula:

$$T_{op} = \frac{T_a \sqrt{10v} + T_r}{1 + \sqrt{10v}}$$

Where:

T_a = indoor air temperature (°C)

T_r = mean radiant temperature (°C)

v = Air speed (m/s)

The threshold comfort temperature (T_{max}) is calculated using the following formula:

$$T_{max} = 0.33T_{rm} + 21.8$$

Where T_{rm} = exponentially weighted running mean of the daily mean outdoor air temperature

For an explanation of how both T_{rm} and the weighted exceedance for compliance with criterion two are calculated please see appendix 1.



3.3 Non-Residential – TM52 Analysis

Non-residential areas of the development shall be assessed under the guidance of TM52.

As previously mentioned, the industry recognised standard for avoidance of overheating is CIBSE technical memorandum 52 – The limits of thermal comfort: avoiding overheating in European buildings. To meet the requirements of CIBSE TM52 at least two of the following criteria must be met during the period 1st May to 30th September:

1. The number of occupied hours during which the indoor operative temperature (T_{op}) exceeds the threshold comfort temperature (T_{max}) by 1°C or more must be no more than 3% of occupied hours.
2. To allow for the severity of overheating in any one day the weighted exceedance must be less than or equal to 6 degree-hours in any one day.
3. The indoor operative temperature (T_{op}) must not exceed 4°C above the threshold comfort temperature (T_{max}) at any time.

The operating temperature (T_{op}) is calculated using the formula:

$$T_{op} = \frac{T_a \sqrt{10v} + T_r}{1 + \sqrt{10v}}$$

Where:

T_a = indoor air temperature (°C)

T_r = mean radiant temperature (°C)

v = Air speed (m/s)

The threshold comfort temperature (T_{max}) is calculated using the following formula:

$$T_{max} = 0.33T_{rm} + 21.8$$

Where T_{rm} = exponentially weighted running mean of the daily mean outdoor air temperature.

For an explanation of how both T_{rm} and the weighted exceedance for compliance with criterion 2 are calculated please see CIBSE TM52: 2013 guidance for further details.

4.0 Overheating Modelling

4.1 General

3D models of the development have been constructed within IES Virtual Environment software using the ModelIT tool. IES VE is a dynamic simulation modelling software, which has been selected and applied in accordance with CIBSE AM11.

Engagement has occurred with all applicable design team members to refine the design of the development to ensure all stakeholder, design and policy requirements have been assessed and optimised in a carefully balanced and managed approach.

4.2 Geometry

Figures 4.1, 4.2 and 4.3 below show the three-dimensional analysis model that has been generated for the proposed PBSA development. Similar models have been created for the residential buildings. The models have been developed using the drawn information produced by Corstorphine & Wright architects during the design development process leading up to the planning submission.

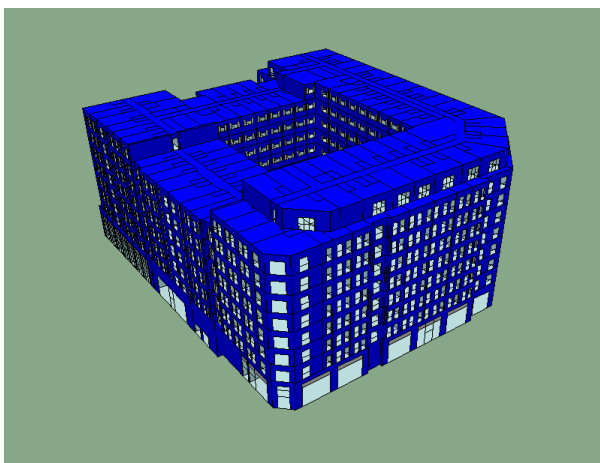


Figure 4.1 – 3D Analysis model viewed from the North-East

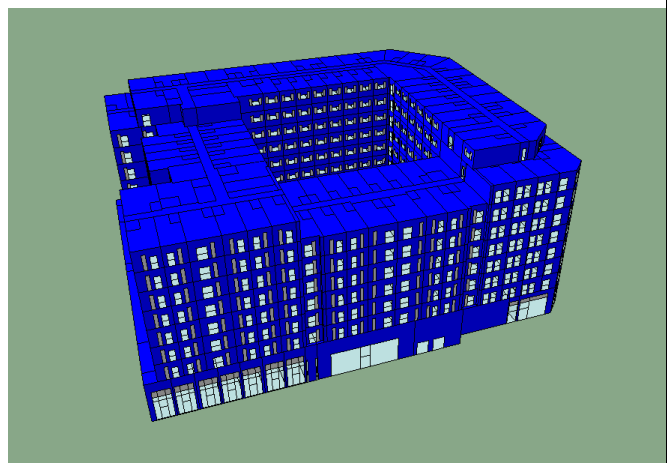


Figure 4.2 – 3D Analysis model viewed from the East

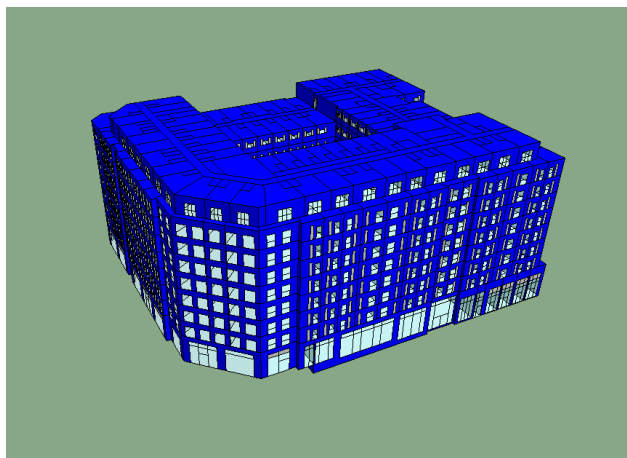


Figure 4.3 – 3D Analysis model viewed from the West



4.3 Building Fabric

The thermal insulation standards will be specified to exceed the minimum standards contained within the Part L Document to limit the heat loss through the building fabric. This will reduce the heat energy required to maintain internal comfort levels and so reducing the CO₂ emissions associated with space heating.

Table 4.1 – Building Fabric Performance		
Parameter	Part L Minimum Standard	Design Proposal
Ground Floor U-Vales (W/m ² K)	0.18	0.12
Roof U-Value (W/m ² K)	0.16	0.1
External Wall U-Value (W/m ² K)	0.21	0.14
Window U-Value (average including frame) (W/m ² K)	1.6	1.21
Glazing G-Value	-	0.35
Glazing Visible Light Transmission	-	0.7
Air Permeability (m ³ /hr/m ² @50 Pa)	8.0	2.0 (2.5 for residential)

Table 4.1 – Building Fabric Performance

The building will also be designed to achieve air permeability standards in excess of the Part L Requirements, targeting an air permeability of 2 m³/(h.m²) at 50 Pa for the PBSA and 2.5 m³/(h.m²) at 50 Pa for the residential buildings. This will reduce the infiltration of external ambient air and so reduce the heating requirement of the building.

4.4 Solar Gain

Solar control glazing will be provided to all windows throughout the development to limit summertime solar gains and overheating, so reducing the requirement for mechanical cooling systems and increased mechanical ventilation rates. The G-value proposed is for an enhanced solar engineering glass that is typically twice as good as a typical Building Regulations compliant glass.

Design development has also occurred to refine window size, shape and quantum. The initial design rationale had far more windows on the development of a large and tall nature, typically two to every PBSA bedroom. Through the design process and overheating modelling this has been refined alongside the requirement for good natural daylight provision to reduce the number of windows significantly and within the internal courtyard rooms reduce the height to maintain good daylight but remove any un-needed solar gain.

4.5 Building Orientation

Due to the fairly constrained nature of the site and access requirements for a mixed-use development there has been limited scope to refine building orientation to limit solar gain. However, the layout of the buildings results in the South elevation of the PBSA Building A having very limited windows facing that direction limiting the solar gain significantly to rooms.

4.6 Internal Heat Gain Mitigation

Various servicing strategies have been investigated for the development. The primary piped services shall be primarily routed vertically to remove significant heat gains of pipework from corridors. Horizontal distribution will occur every third floor, significantly reducing heat loss from pipework to save energy and removing the need to increase cooling requirements to offset the heat gains.

All pipework distribution throughout the development shall be highly insulated with increased thicknesses above the British Standard requirements. This will further reduce heat loss from pipework.

4.7 Passive Ventilation

Significant design development has occurred with the architect to refine the façade design to minimise solar gain via optimised window size, introduction of a louvre to connect Mechanical Extract Ventilation (MEV) ventilation to serve the bathroom and kitchens, and the introduction of a manually operated ventilator to provide passive ventilation.

The size of these ventilators have been optimally sized to provide good levels of ventilation whilst not impacting the use of the rooms. The ventilators are provided with a safety mesh style screen of a feature design to provide fall protection to occupants.

The design of the exterior facing elevations has maintained a tall thin window to ensure the overall design aesthetic of the architectural philosophy is maintained which has been carefully cultivated in tandem with numerous design reviews with the local authority. Whereas, the courtyard facing rooms have allowed more flexibility to create a shallower window with ventilator panels either side which further encourage passive ventilation via room circulation.

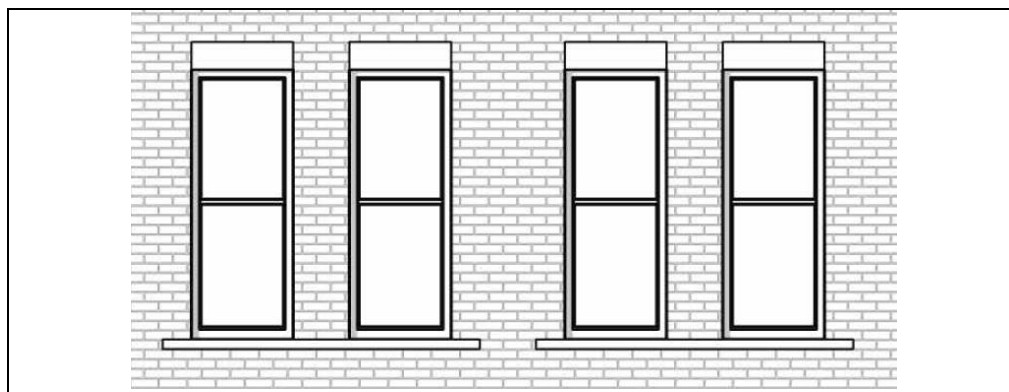


Figure 4.4 – Previous Window and Louvre to Exterior PBSA Room

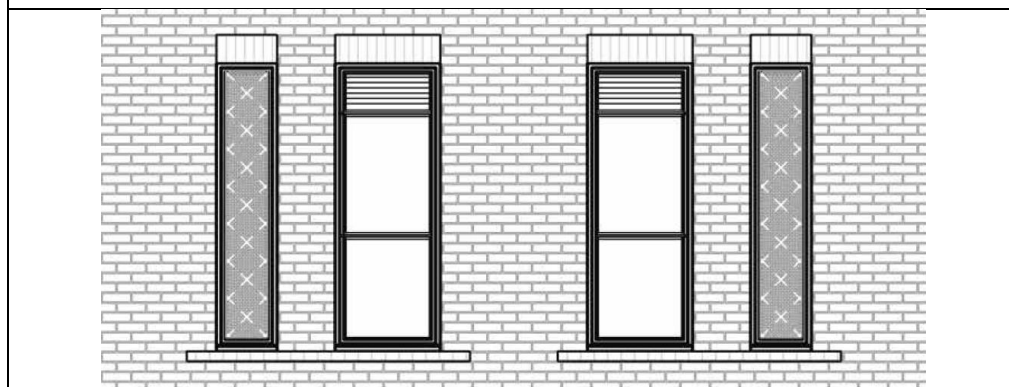


Figure 4.5 – Typical Window, Louvre and Ventilator to Exterior PBSA Room

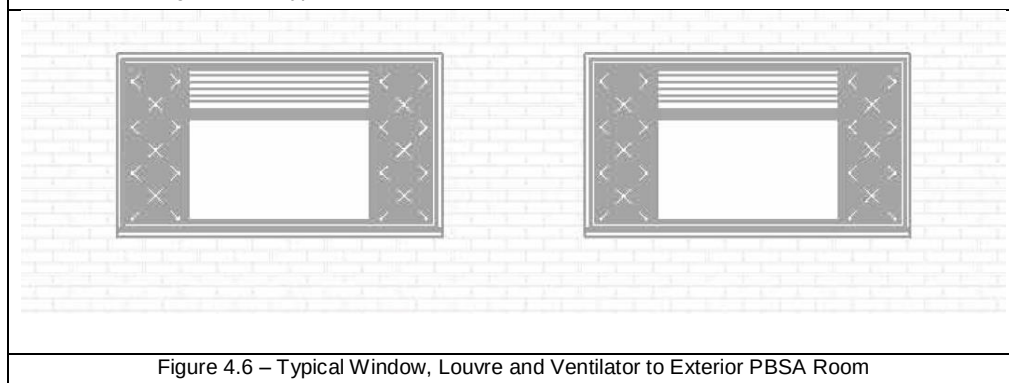


Figure 4.6 – Typical Window, Louvre and Ventilator to Exterior PBSA Room



The Lordship Lane facing façade is to be a key feature of the townscape and has been under very close scrutiny within the design office of the local authority during the pre-app process. To maintain the key architectural aesthetic of this façade there has been limited opportunity to introduce passive ventilation devices and therefore these rooms have had to look further down the cooling hierarchy to ensure satisfactory thermal comfort.

The window design and choice of high performing solar control glazing has reduced solar gain considerably to a point where it is a small fraction of the heat gains experienced in the room. Solar shading features have been considered but due to their limited impact and negative effect to the external architectural design they have been discounted on this scheme.

4.8 Room Location

Location of rooms has also been considered as part of the design process. The majority of PBSA rooms are studios which have a small kitchenette with cooking facilities. These have spikes of higher internal equipment gains when cooking activities are occurring than a 'en-suite' type bedroom which have a shared kitchen, but these are a far small percentage of the proposed room mix on this development.

As described above, the Lordship Lane façade has limited opportunity for passive ventilators and will therefore have to look at alternative cooling measures. It was therefore assessed whether the en-suite bedrooms could be located along this façade as they would have a slightly reduced heat gain than a studio room.

However, due to numerous factors it hasn't been possible to locate the en-suites on that elevation including; issues with room stacking for services requiring multiple offsets, issues with structural efficiency, high quality façade design with window layout not suiting the smaller en-suite rooms and overall floor layouts not working with difficulties with access and circulation routes.

However, as solar gains are a small fraction of overall room gains and the fact that the Lordship Lane elevation is North facing, their location has very minimal effect on cooling loads so overall not enough to offset the negative impacts of the other design issues that would be imposed.

In considering the impact of solar gains on cooling loads, it is crucial to acknowledge that these gains constitute only a small fraction of the total room gains. Furthermore, the specific orientation of the Lordship Lane elevation, facing North, significantly diminishes the influence of solar exposure on the cooling requirements. Despite the presence of solar gains, their minimal contribution is insufficient to counterbalance the adverse effects stemming from other design issues. It is important to note that the North-facing aspect of the Lordship Lane elevation makes external solar shading impractical and ineffective in addressing overheating concerns. Additionally, implementing such shading measures may compromise the previously agreed upon Architectural Aesthetics with the Urban Design Officer of the local authority who has had significant involvement with the development of this elevation design.



5.0 Thermal Comfort Assessment

5.1 Climate Data

IES VE software uses CIBSE weather files to assess the thermal comfort levels during simulations. There are generally two types of weather file, a TRY (Test Reference Year) file and a DSY (Design Summer Year) file. Weather files are available for 12no. separate locations throughout the UK. The weather file that has the closest representation to the site climate should be applied to the model.

The DSY is a single continuous year rather than a composite one made up from average months. The DSY is used for overheating analysis during the summer months. There are three types of DSY file:

- DSY1: Moderately warm summer
- DSY2: Short, intense warm spell
- DSY3: Long, less intense warm spell

CIBSE TM59 states that the most appropriate DSY1 weather file for the 2020s, high emissions, 50% percentile scenario should be used to undertake the analysis. The most appropriate weather file for this development has been considered carefully and in collaboration with CIBSE TM49. It has therefore been determined that the London Weather Centre (LWC) file is to be used.

The file used is: London_LWC_DSY1_2020High50

Solar gains are calculated automatically by the modelling software based on the geometry, location and orientation of the building, the solar transmission factor of the glazing and the solar angles. The IES VE SunCast module is used to calculate solar gains, with the results file utilised by the dynamic simulation model.

5.2 Mechanical Ventilation

Continuous background mechanical ventilation is proposed to the majority of occupied spaces.

In the majority of PBSA rooms this will be via MEV which will extract adjacent to the bathroom pod and kitchen facilities. Make up air will be via acoustic rated background ventilators. Additional ventilation for thermal comfort control and purge shall be via manually operated passive ventilators.

Each passive ventilator can be fully opened inwards by 90°. This has been reflected within the model, with the MacroFlo tool of IES VE suite used to calculate the air flow through these openings throughout the year.

Residential units will be provided with Mechanical Ventilation with Heat Recovery (MVHR) serving the whole dwelling. Extract to wet rooms and kitchen and supply to habitable rooms. Purge and overheat control will be via higher ventilation rates and openable windows and doors (where applicable).

Rooms on the Lordship Lane façade and neighbouring flanks will be provided with MVHR due to higher ambient acoustic constraints in this area due to the adjacent road. Purge rates will be provided by MVHR but modelling has concluded that the MVHR flow rates to these rooms to offset very high equipment gains would result in undesirable air velocities that would be a nuisance. Therefore, a limited number of studios will be provided with very high efficiency mechanical comfort cooling systems to control thermal comfort.

All MVHR units will include a 100% summer bypass mode to avoid recovering heat when conditions are warm. For the purpose of the thermal comfort modelling it is assumed that summer bypass is activated and that fresh air is provided to the space at ambient external air temperature. Mechanical ventilation rates within each of the room types assessed are as follows, with boost ventilation rates in operation in accordance with CIBSE TM59 requirements.



Corridors with higher heat gains shall be provided with means of ventilation either via the smoke vent AOV window panel where applicable or via mechanical ventilation to ensure a comfortable environment can be maintained.

Room Type	Mechanical ventilation supply rate	
	Normal (l/s)	Boost (ac/h)
Apartment Bedrooms	13	Min 4 for purge.
Apartment Kitchens	21	Min 4 for purge.
Studio	21	Min 4 for purge.

Table 5.1 – Mechanical Ventilation Rates

Approved Document Part O sets out how windows should open under clause 2.6a to 2.6d. The requirements for window opening are as follows:

- a. *When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following:*
 - i. *Start to open when the internal temperature exceeds 22°C*
 - ii. *Be fully open when the internal temperature exceeds 26°C*
 - iii. *Start to close when the internal temperature falls below 26°C*
 - iv. *Be fully closed when the internal temperature falls below 22°C*
- b. *At night (11pm to 8am), openings should be modelled as fully open if both of the following apply:*
 - i. *The opening is on the first floor or above and not easily accessible.*
 - ii. *The internal temperature exceeds 23°C at 11pm*
- c. *When a ground floor or easily accessible room is unoccupied, both of the following apply:*
 - i. *In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely, following the guidance in paragraph 3.7 below*
 - ii. *At night, windows, patio doors and balcony doors should be modelled as closed*
- d. *An entrance door should be included, which should be shut all the time.*

Therefore, within the dynamic simulation model windows to all rooms that have MVHR have been set on an opening profile as per requirement 2.6a (in accordance with clause 3.2 as discussed above), windows to bedrooms that have MEV have been set on an opening profile as per requirements 2.6a and 2.6b and windows to kitchens and living rooms that have MEV have set on an opening profile as per requirement 2.6a only. All other glazed elements within the IES VE model are set to be fixed as indicated on the elevation drawings provided by Corstorphine & Wright.



5.3 Occupancy Gains

Table 4.2 below shows the occupancy gains and profiles within each room type that have been included within the thermal model. These have been based upon the requirements set out within CIBSE TM59, table 4.2.

Room Type	Occupancy	Gains (W/person)		Profile
	People	Sensible	Latent	
Apartment Bedrooms	1	75.0	55.0	70% gain 23:00 to 08:00 100% gain 08:00 to 23:00 (modified from TM59 to assume occupancy all day for study)
Studio	1	75.0	55.0	
Apartment kitchens	3	75.0	55.0	25% gain from 09:00 to 22:00 Unoccupied at other times of day
Unique Studio Living Rooms	3	75.0	55.0	5% gain from 09:00 to 22:00 Unoccupied at other times of day
Commercial Unit (TM52)	NCM Database	NCM Database	NCM Database	NCM Database
PBSA Amenity (TM52)	NCM Database	NCM Database	NCM Database	NCM Database

Table 5.2 – Occupancy gains within each occupied room type

5.4 Equipment / Pipework Gains

Equipment gains have been included within the model for each occupied space as shown in table 4.2 below. These figures are taken from table 2 within section 6 of CIBSE TM59.

Within corridors, the average heat loss from Domestic Hot Water (DHW) supply and return pipework will be 7.2W/m, or 14.4W/m for both supply and return combined. For a typical corridor width, the gain to corridors from pipework has been calculated to be 5.76W/m². As the overheating risk occurs outside of the heating season it is assumed that there are no internal gains from space heating flow and return pipework.

Room Type	Peak Gain (W)	Profile
Apartment rooms	80	80W from 08:00 to 23:00 10W gain at all other times
Studio / Unique Studio / 1 bed	450	450W from 18:00 to 20:00 200W from 20:00 to 22:00 110W from 09:00 to 18:00 and 22:00 to 24:00 85W at all other times
Apartment Kitchens	300	300W from 18:00 to 20:00 50W at all other times
Unique Studio Living Rooms	150	150W from 18:00 to 20:00 60W from 09:00 to 18:00 and 22:00 to 24:00 35W at all other times



Corridors	5.76 W/m ²	At all times
Amenity/ Commercial	NCM Database	NCM Database

Table 5.3 – Equipment gains within each occupied room type

5.5 Infiltration

An infiltration rate of 0.10 air changes per hour (ac/h) at 3m/s wind speed has been assumed, based on the targeted air permeability rate of 2m³/hr/m² at 50Pa. This is derived from empirical data published in CIBSE Guide A Table 4.23 and the rule of thumb of 20:1.

5.6 TM52 Assessments to Commercial Unit and Amenity Spaces

Various TM52 assessments have been carried out on the proposed commercial unit and PBSA amenity spaces. As the commercial spaces are subject to future lease holder fit-outs and the amenity is subject to future detailed design, the NCM modelling databases have been used to define use of the spaces.

Passive ventilation was initially explored but fairly quickly discounted due to the deep footprint spaces, acoustic issues and security issues.

Next, the spaces were assessed to ascertain whether mechanical ventilation could provide thermal comfort but due to relatively high occupancy and equipment gains the air change requirements would be too substantial to deliver into the space in a satisfactory manner without producing a 'wind tunnel' effect.

Therefore, it has been deduced that the ground floor commercial unit and PBSA amenity spaces shall be comfort cooled via high efficiency systems.



6.0 Part O Thermal Comfort Assessment Results

6.1 General

Approved Document Part O states that an assessment should be completed of all residential plot types. Therefore, the modelling has been undertaken upon a sample of rooms that represent the room types within the development. Where floors are repeated the highest floor has been selected for analysis, as this will have the least shading and may also potentially have higher external conduction gains than identical rooms at lower levels. Where rooms are identical to other modelled but have MVHR rather than MEV the highest floor example has again been modelled.

The following sections provide the results of the overheating modelling and analysis.

6.2 PBSA Studios

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 26°C
06 Accessible Studio	25	32	0.8%
06 Accessible Studio	26	32	0.8%
06 Accessible Studio	24	32	0.7%
06 Accessible Studio	24	32	0.7%
06 Accessible Studio	27	32	0.8%
06 Accessible Studio	27	32	0.8%
06 Social Studio	24	32	0.7%
06 Social Studio	29	32	0.9%
06 Social Studio	24	32	0.7%
06 Social Studio	24	32	0.7%
06 Social Studio	24	32	0.7%
06 Social Studio	24	32	0.7%
06 Social Studio	30	32	0.9%
06 Social Studio	24	32	0.7%
06 Social Studio	30	32	0.9%
06 Social Studio	29	32	0.9%
06 Studio 01	25	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	28	32	0.9%
06 Studio 01	25	32	0.8%



06 Studio 01	25	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	24	32	0.7%
06 Studio 01	25	32	0.8%
06 Studio 01	27	32	0.8%
06 Studio 01	27	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	24	32	0.7%
06 Studio 01	27	32	0.8%
06 Studio 01	16	32	0.5%
06 Studio 01	18	32	0.5%
06 Studio 01	26	32	0.8%
06 Studio 01	27	32	0.8%
06 Studio 01	26	32	0.8%
06 Studio 01	26	32	0.8%
06 Studio 01	27	32	0.8%
06 Studio 01	27	32	0.8%
06 Studio 01	26	32	0.8%
06 Studio 01	18	32	0.5%
06 Studio 01	16	32	0.5%
06 Studio 01	18	32	0.5%
06 Studio 01	25	32	0.8%
06 Studio 01	27	32	0.8%
06 Studio 01	25	32	0.8%
06 Studio 01	30	32	0.9%
06 Studio 01	27	32	0.8%
06 Studio 02	26	32	0.8%
08 Accessible Studio	19	32	0.6%
08 1 Bed Studio	11	32	0.3%
08 1 Bed Studio	19	32	0.6%
08 Studio 01	29	32	0.9%



08 Studio 01	23	32	0.7%
08 Studio 01	28	32	0.9%
08 Studio 01	23	32	0.7%
08 Studio 01	31	32	0.9%
08 Studio 01	28	32	0.9%
08 Studio 01	30	32	0.9%
08 Studio 01	32	32	1.0%
08 Studio 01	29	32	0.9%
08 Studio 01	23	32	0.7%
08 Studio 01	31	32	0.9%
08 Studio 01	23	32	0.7%
08 Studio 01	30	32	0.9%
08 Studio 01	23	32	0.7%
08 Studio 01	32	32	1.0%
08 Studio 01	34	32	1.0%
08 Studio 01	31	32	0.9%
08 Studio 01	32	32	1.0%
08 Studio 01	30	32	0.9%
08 Studio 01	31	32	0.9%
08 Studio 02	30	32	0.9%
08 Studio 02	25	32	0.8%
08 Studio 02	32	32	1.0%
08 Studio 02	27	32	0.8%
08 Studio 02	25	32	0.8%
08 Studio 02	27	32	0.8%
06 1 Bed Studio	24	32	0.7%
06 1 Bed Studio	24	32	0.7%
06 1 Bed Studio	25	32	0.8%
06 1 Bed Studio	22	32	0.7%
06 1 Bed Studio	21	32	0.6%
06 1 Bed Studio	25	32	0.8%
06 1 Bed Studio	25	32	0.8%
06 1 Bed Studio	23	32	0.7%



06 1 Bed Studio	19	32	0.6%
08 Studio 01	25	32	0.8%
08 Studio 02	31	32	0.9%
08 Studio 02	28	32	0.9%

Table 6.1 – PBSA Studios

6.3 PBSA En-suite Rooms

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 26°C
06 Ensuite	20	32	0.6%
06 Ensuite	18	32	0.5%
06 Ensuite	18	32	0.5%
06 Ensuite	18	32	0.5%
06 Ensuite	18	32	0.5%
06 Ensuite	18	32	0.5%
06 Ensuite	18	32	0.5%
06 Ensuite	18	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%
08 Ensuite	15	32	0.5%

Table 6.2 – PBSA En-suite Rooms

6.4 PBSA Duplex Studios

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 26°C
0M Duplex Studio Bedroom	31	32	0.9%
0M Duplex Studio Bedroom	31	32	0.9%
0M Duplex Studio Bedroom	31	32	0.9%



0M Duplex Studio Bedroom	32	32	1.0%
0M Duplex Studio Bedroom	32	32	1.0%
0M Duplex Studio Bedroom	30	32	0.9%
0M Duplex Studio Bedroom	30	32	0.9%
0M Duplex Studio Bedroom	31	32	0.9%
0M Duplex Studio Bedroom	31	32	0.9%
0M Duplex Studio Bedroom	31	32	0.9%
0M Duplex Studio Bedroom	30	32	0.9%

Table 6.3 – PBSA Duplex Studios

6.5 PBSA Kitchens/Common Areas

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 26°C
06 E.S. Common Area	122	142	2.6%
06 S.S. Common Area	70	142	1.5%
08 E.S. Common Area	115	142	2.4%

Table 6.4 – PBSA Kitchens/Common Areas

6.6 PBSA Corridors

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 28°C
08 Corridor	206	263	2.4%
07 Corridor	96	263	1.1%
07 Corridor	152	263	1.7%
07 Corridor	162	263	1.8%
07 Corridor	198	263	2.3%
07 Corridor	128	263	1.5%
08 Corridor	221	263	2.5%

Table 6.5 – PBSA Corridors



6.7 Commercial Unit (TM52)

Room Name	TM52 Criteria			TM52 Compliant?
	Criterion 1 (%Hrs $T_{op} - T_{max} \geq 1K$)	Criterion 2 (Max. Daily Deg.Hrs)	Criterion 3 (Max. DT)	
<i>TM52 Max. Permissible Value</i>	3.0%	6	4	
Commercial Unit	4.6%	21	4	No

Table 6.6 – Commercial Unit (TM52)

6.8 Residential Bedrooms

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 26°C
C04 Bedroom	12	32	0.4%
C04 Bedroom	17	32	0.5%
C04 Bedroom	17	32	0.5%
C04 Bedroom	17	32	0.5%
C04 Bedroom	17	32	0.5%
C04 Bedroom	17	32	0.5%
C04 Bedroom	29	32	0.9%
C04 Bedroom	35	32	1.1%
C04 Bedroom	37	32	1.1%
C04 Bedroom	16	32	0.5%
C04 Bedroom	16	32	0.5%

Table 6.7 – Residential Bedrooms

6.9 Residential Kitchen / Living

Location	> 26.00	Max permissible hours	% of annual occupied hours Top > 26°C
C04 Kitchen / Living	140	142	3.0%
C04 Kitchen / Living	120	142	2.5%
C04 Kitchen / Living	123	142	2.6%
C04 Kitchen / Living	110	142	2.3%
C04 Kitchen / Living	106	142	2.2%
C04 Kitchen / Living	105	142	2.2%
C04 Kitchen / Living	140	142	3.0%
C04 Kitchen / Living	143	142	3.0%
C04 Kitchen / Living	92	142	1.9%

Table 6.8 – Residential Kitchen/ Living



7.0 Conclusion

The proposed development at Lordship Lane has been assessed for thermal comfort against Approved Document Part O / CIBSE TM59 / CIBSE TM52 criteria.

The thermal analysis completed confirms that the bedrooms, studios, living rooms and kitchens within the buildings all comply with the CIBSE TM59 criterion utilising the proposed fabric and building services strategy. The commercial unit and PBSA amenity spaces fail the CIBSE TM52 assessment and therefore comfort cooling is proposed to these spaces where applicable.

The results of this analysis therefore confirm that the risk of overheating within occupied areas has been mitigated to be within the limits set by the prevailing legislation and guidance.