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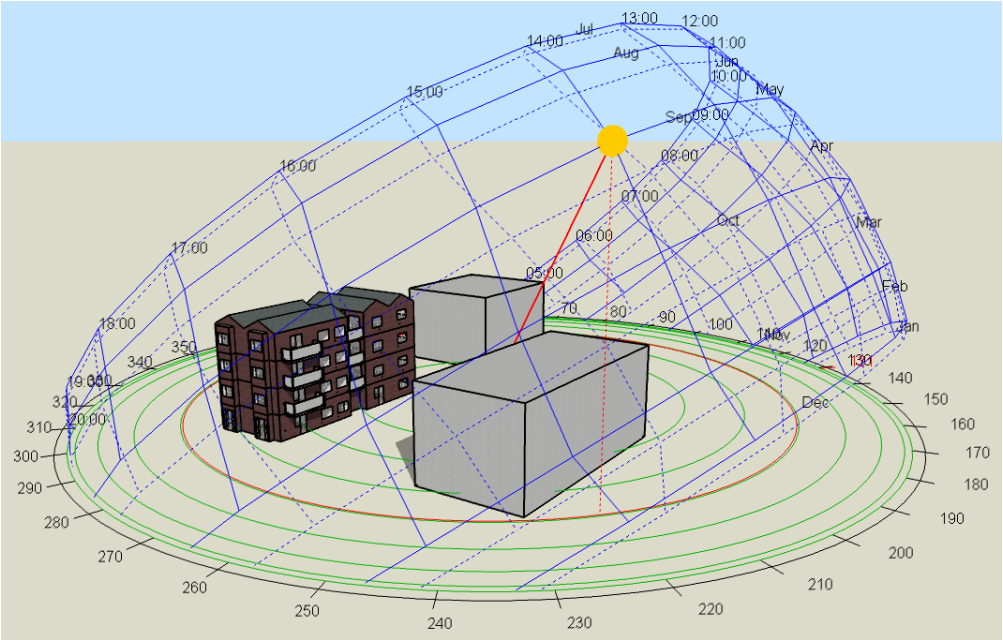

Domestic Overheating Assessment

Part O - Dynamic Thermal Modelling

Corner of Maryland Road and High Road
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1st May 2025

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Document Status

Client: Aygul Boyraz

Site: Corner of Maryland Road and High Road, London, N22 5AR

Proposals: The construction of 8No. Flats

Contents:

Appendices:

Appendix A: Dynamic Thermal Modelling TM59 results

Document Control Record:

Prepared by	Checked by	Date	Job	Revision
MH	PK	01.05.2025	13080	Rev0

1 Scope

This report has been prepared to assess the likelihood of overheating for the proposed new build flats on Maryland Road in London.

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

It is important to note that with any modelling exercise there are assumptions and approximations that must be made. As far as possible, details of all assumptions and approximations are supplied within the report. These were predominantly informed by information provided and should be reviewed carefully.

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.

Moreover, this Overheating Assessment demonstrates that the proposed development complies with the relevant current guidance CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes (2017) and the requirements of the Dynamic Simulation of the building regulation in England setting standards for overheating in new residential buildings: Overheating: Approved Document Part O.

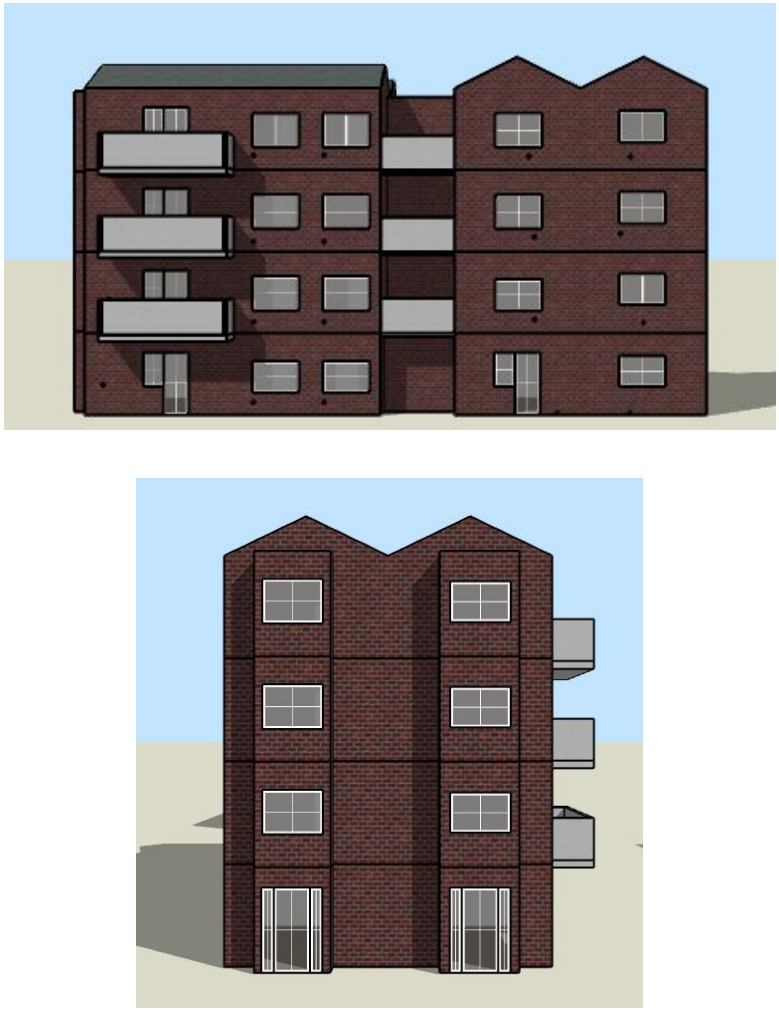


Figure 01.- *DesignBuilder Rendered visuals of the proposed development*

2 Executive Summary

An overheating assessment has been carried out to demonstrate the potential conditions and risk of overheating for the proposed development.

The overheating mitigation strategy below, which results in a pass, includes measures to ensure compliance with Approved Document Part O. This includes a glazing specification with a g-value of 0.35, security measures to easily accessible bedroom windows and MVHR ventilation with boost function to operate during peak summer periods.

The proposed overheating mitigation measures are listed below:

Overheating Strategy	TM59 / Part O Compliance	Notes
▪ MVHR Ventilation (with boost function) ▪ Glazing g value 0.35 ▪ Secure ground floor bedroom window openings	☑	Overheating strategy sufficient

The window openings have been taken from architectural drawings and applied to the model, with each openable window assumed to open to the maximum opening angle (as permitted to by Approved Documents Part O and Part K).

There are no assumed acoustical limitations to windows being opened during both day and night times (Part O window opening schedules are detailed within this report).

3 Part O: Dynamic Thermal Modelling Method

In order to demonstrate compliance with the requirements settled by the requirement O1 of the Approved document Part O, this report has used the Dynamic thermal modelling method approved by the aforementioned document.

To demonstrate compliance using the dynamic thermal modelling method, all of the following have been followed:

a) CIBSE TM59 methodology for predicting overheating risk
b) The limits on the use of CIBSE TM59 methodology set out below
c) The acceptable strategies for reducing overheating risk

Limits on CIBSE's TM59 modelling

All of the following limits on CIBSE's TM59, section 3.3 apply.

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 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 of 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.

An entrance door should be included, which should be shut all the time.

Acceptable strategies for reducing overheating risk

Limiting solar gains

Solar gains in summer should be limited by any of the following means:

a) Fixed shading devices, comprising any of the following.
   i. Shutters
   ii. External blinds
   iii. Overhangs
   iv. Awnings

b) Glazing design, involving any of the following solutions
   v. Size
   vi. Orientation
   vii. g-value
   viii. Depth of the window reveal
c) Building design – for example, the placement of balconies
d) Shading provided by adjacent permanent buildings, structures, or landscaping.

Removing excess heat

Excess heat should be removed from the residential building by any of the following means.

a) Opening windows (the effectiveness of this method is improved by cross-ventilation)
b) Ventilation louvres in external walls
c) A mechanical ventilation system
d) A mechanical cooling system

4 CIBSE TM59 Assessment Criteria

This report includes only occupied spaces such as the Kitchen/Living Room and Bedrooms. The analysis has been based on CIBSE Technical Memorandum 59 (TM59) 'Design methodology for the assessment of overheating risk in homes', that states:

Compliance is based on passing both of the following criteria:

a) For living rooms, kitchens and bedrooms: the number of hours during which DT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 percent of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).

b) 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 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).

In accordance with TM59 guidance, a sample set of apartments have been assessed to cover all scenarios; the second floor apartments have been ommited from this analysis as they are duplicates of the first floor.

5 The Model

The building was modelled using DesignBuilder Energyplus software. The software complies with CIBSE Application Manual AM11: 1998 Building Energy and Environmental Modelling and provides a full dynamic simulation of thermal conditions in the dwellings.

Geometry

A three-dimensional analysis model has been generated for the proposed scheme. The model was developed using drawn information supplied by Aygul Boyraz Architecture.

As with any modelling exercise, some approximations have been made, but care has been taken to ensure the scale and internal dimensions of the model are as close as practicable to the design drawings, and that glazing areas are as accurately represented as the provided information allows.

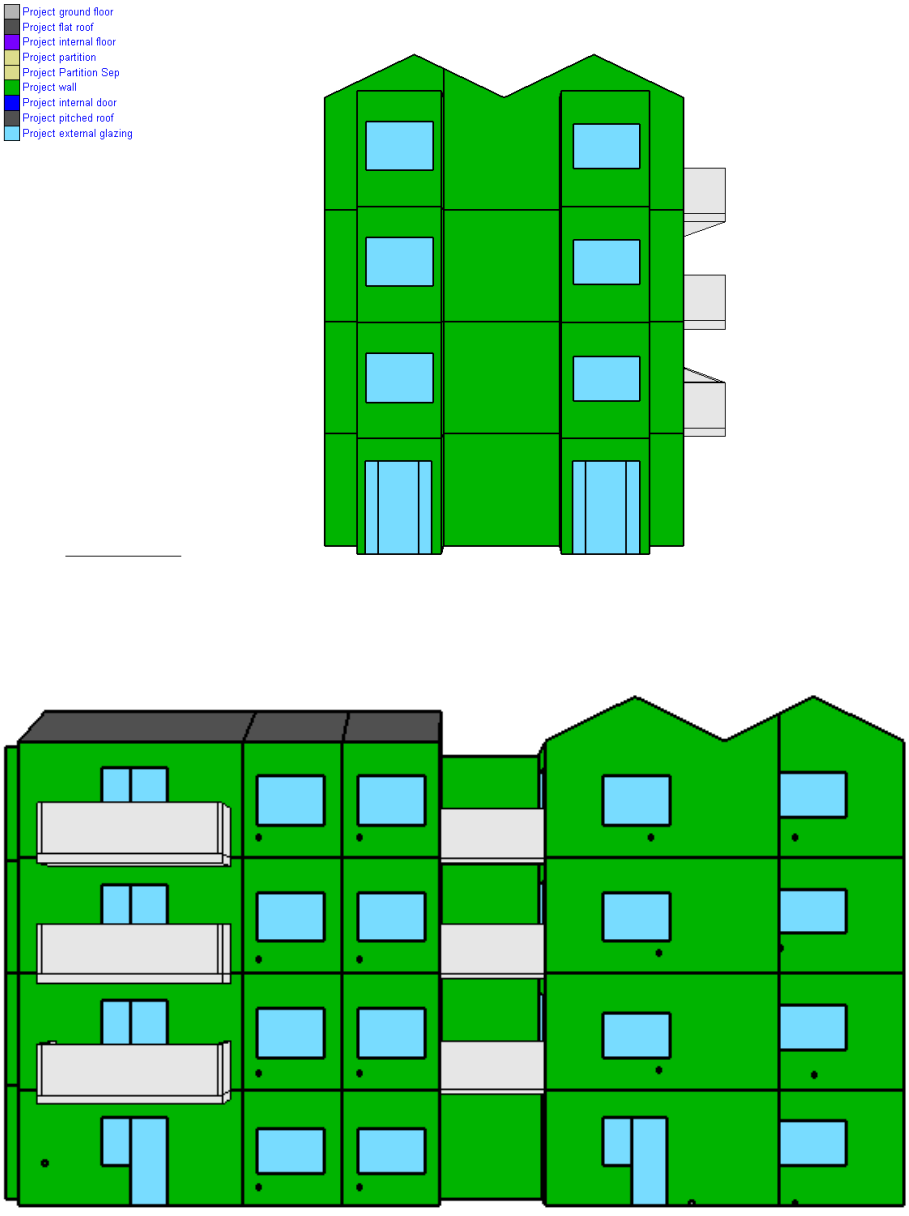


Figure 02.- Thermal Model images

Site Location and Climate Data

The CIBSE DSY weather file London Heathrow (London_LHR_DSY1_2020High50) has been selected as this is the most appropriate weather file for the site.

The weather file contains hourly data for air temperatures (wet bulb and dry bulb), wind speed and direction, atmospheric pressure, solar irradiation and cloud cover.

DSY (Design Summer Year) is the industry standard weather file for use in overheating assessments. It should be noted that the current DSY was used, and future weather files based on various predicted climate change scenarios are available. Usage of these future weather files would result in higher predicted internal temperatures than reported here as the climate is predicted to encounter more prolonged warm spells and higher peak temperatures as time progresses.

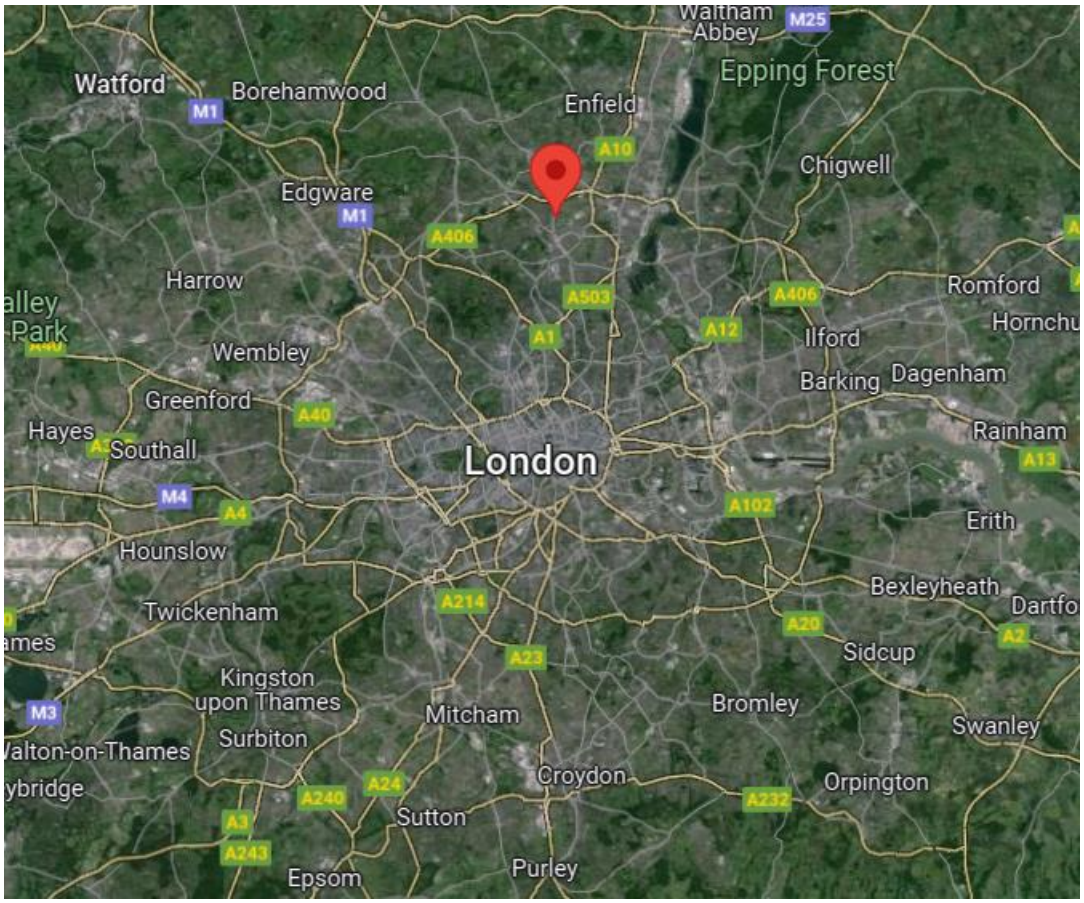


Figure 03.- Site Location

The site is located in North London.

Building Construction and U-Values

Drawings have been provided by the architect which were used to create the thermal model.

Table 1 shows the construction U-values and air infiltration used in the thermal model.

Table 02: *U Values applied to the Dynamic Simulation Model*

Element	Modelled U Value (W/m^2K)
External Wall	0.17
Roof	0.10
Ground Floor	0.11
Glazing	1.20
Doors	1.40
Air Leakage ($m^3(h.m^2)$ @ 50Pa	4
Glazing g Value	35%

Internal Gains

The internal heat gains and operating profiles that are applied to each occupied space have been taken from the prescriptive templates outlined in CIBSE TM59 (Design methodology for the assessment of overheating risk in homes).

Mechanical Ventilation

Mechanical ventilation in the form of MVHR is proposed to provide fresh air to the dwellings.

This is a low energy, continuous mechanical ventilation system designed to replace conventional extract ventilation systems (such as intermittent systems) by drawing moisture laden air out of the kitchen and wet rooms while supplying fresh air to habitable rooms such as Bedrooms and Living spaces.

An additional benefit is an air pathway is also formed drawing warm out of habitable spaces and evacuated from the dwelling, with the makeup air being provided by mechanically supplied air from the unit in addition to any windows in habitable spaces (when opened).

The minimum whole house ventilation rates can be seen in table 1.3 – these have been taken from *Approved Document F.*
For more information, please refer to Approved Document F, Volume 1: Dwellings.

The MVHR should be designed to ensure that the minimum rates in Part F are met.

The following rates have been assumed in the overheating model:

Living/Kitchens: 20 l/s (boost function to 40 l/s)
Bedrooms: 10 l/s (boost function to 20 l/s)

Table 1.3 Minimum whole dwelling ventilation rates by no. of bedrooms

Number of bedrooms[1][2]	Minimum ventilation rate by no. of bedrooms (l/s)
1	19
2	25
3	31
4	37
5	43

NOTES:
1. If the dwelling only has one habitable room, a minimum ventilation rate of 13l/s should be used.
2. For each additional bedroom add 6l/s to the values in Table 1.3

▲ *Total Combined rate of continuous ventilation in the dwelling needs to meet the above minimum rates.*

Ensuring the Overheating Strategy is Usable

Approved Document O lists a number of measures to ensure the overheating mitigation strategy can be feasibly implemented in reality, as well as complying with overlapping building codes. The full literature can be found in *Section 3: Ensuring the overheating mitigation strategy is usable* of Approved Document O. A summary of these standards has been compiled below:

1.1 Noise

- **3.2)** In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

- **3.3)** Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits: A) 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am). & b) 55dB LAFmax, more than 10 times a night (between 11pm and 7am).

1.2 Pollution

- **3.5)** Buildings located near to significant local pollution sources should be designed to minimise the intake of external air pollutants. Guidance is given in Section 2 of Approved Document F, Volume 1: Dwellings.

1.3 Security

- **3.6)** 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 locations, where openings may be vulnerable to intrusion by a casual or opportunistic burglar.

a) Ground floor bedrooms
b) Easily accessible bedrooms

1.4 Protection from Falling

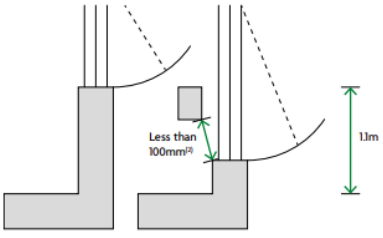
- **3.8)** Openings which are intended to be open for long periods to reduce overheating risk might pose a higher risk of falls from height. Only the proportion of openings which can be opened with a very low risk of occupants falling from height should be considered to form part of the overheating mitigation strategy.
- **3.9)** Openings that can be opened wider than 100mm may form part of the overheating mitigation strategy where they meet all of the following conditions:

a) Window handles on windows that open outwards are not more than 650mm from the inside face of the wall when the window is at its maximum openable angle.
b) Guarding meets the minimum standards in Table 3.1
c) Guarding does not allow children to easily climb it. For example, horizontal bars should generally be avoided.

For more information, please refer to *Approved Document K.*

Table 3.1 Guarding heights

Change in floor level between inside and outside	Guarding height[1]
Less than 600mm	See Approved Document K
More than 600mm	1.1m



NOTES:

1. This approved document has increased levels of protection from falling compared to Approved Document K. Where applicable, the higher standard applies.
2. Guarding should be sized to prevent the passage of a 100mm sphere.

6 Results

A full set of results can be seen in Appendix A of this report.

The following table presents an overheating mitigation strategy to ensure compliance with Part O.

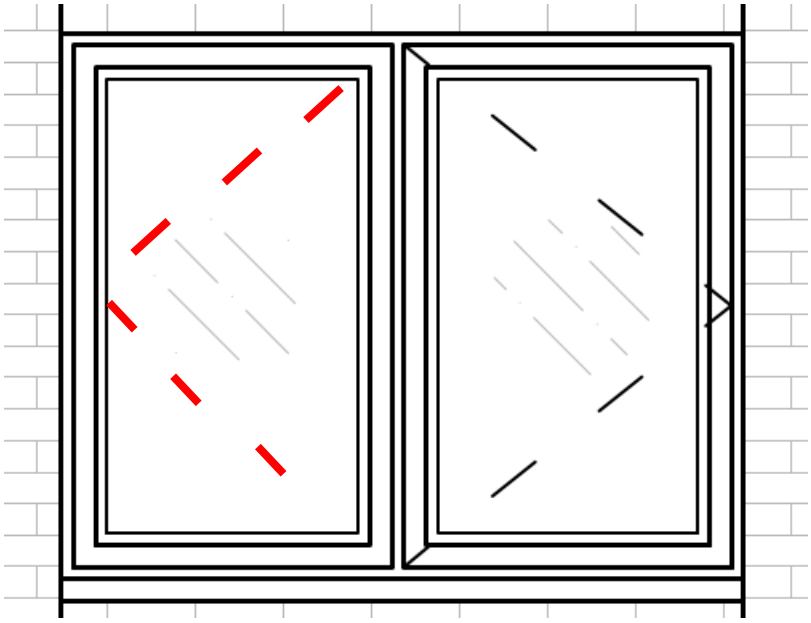
Overheating Strategy	TM59 / Part O Compliance	Notes
▪ MVHR Ventilation (with boost function) ▪ Glazing g value 0.35 ▪ Secure ground floor bedroom window openings	☑	Overheating strategy sufficient

7 Summary

The assessment has shown that the proposed residential dwellings on the corner of Maryland Road in London present a low risk of overheating provided that the overheating mitigation strategy detailed within this report is implemented.

The overheating mitigation strategy includes MVHR mechanical ventilation and glazing with a g-value of 0.35.

It is recommended that all windows are fully openable with an example shown in the image below.



It is also recommended for the ground floor bedroom windows to be made secure with either of the following security devices to ensure the windows are openable at night without any security issues:

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

Implementing the recommendations above shall ensure that all the dwellings can achieve compliance with TM59 criteria.

Though the regulations do not permit the use of blinds and curtains in the calculations, if the sun shines directly into a living space, the occupant should consider closing the curtains or blinds to limit solar gains and try and keep rooms as cool as possible.

Appendix A: Dynamic Thermal Modelling TM59 Results

Scenario 1: Recommended Overheating Mitigation Strategy

Dwelling	Room	Criterion 1 (%)	Criterion 2 (Hr)	Pass/Fail
Flat 1	Kitchen/Living/Dining	0.96	N/A	Pass
Flat 1	Bed 1	0.22	25.50	Pass
Flat 1	Bed 2	0.05	25.00	Pass
Flat 1	Bed 3	0.16	30.50	Pass
Flat 2	Kitchen/Living/Dining	0.18	N/A	Pass
Flat 2	Bed 1	0.12	32.00	Pass
Flat 2	Bed 2	0.14	25.50	Pass
Flat 3	Kitchen/Living/Dining	0.80	N/A	Pass
Flat 3	Bed 1	0.11	32.00	Pass
Flat 3	Bed 2	0.15	28.00	Pass
Flat 3	Bed 3	0.19	30.50	Pass
Flat 4	Kitchen/Living/Dining	0.58	N/A	Pass
Flat 4	Bed 1	0.16	27.50	Pass
Flat 4	Bed 2	0.27	22.50	Pass
Flat 7	Kitchen/Living/Dining	0.80	N/A	Pass
Flat 7	Bed 1	0.10	30.00	Pass
Flat 7	Bed 2	0.16	31.00	Pass
Flat 7	Bed 3	0.23	32.00	Pass
Flat 8	Kitchen/Living/Dining	0.80	N/A	Pass
Flat 8	Bed 1	0.35	23.50	Pass
Flat 8	Bed 2	0.16	31.00	Pass

Maryland Road Overheating Strategy: Cooling Hierarchy Addendum

This addendum should be read in conjunction with Part O Overheating report and outlines how the proposed development has incorporated the cooling hierarchy in the design.

#	Cooling Hierarchy measure	Implementation of measure	Measure effect
1	Reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure	▪ Solar control glazing to limit solar gains. ▪ Balcony overhangs providing shading ▪ Deep window reveals to provide local shading	Reduction in solar gains entering the dwellings
2	Minimise internal heat generation through energy efficient design	▪ This can be achieved by measures such as fully insulated pipework. ▪ Low energy lighting with reduced heat gains ▪ Occupancy sensor controls to communal area lighting to reduce communal circulation heat gain	N/A
3	Manage the heat within the building through exposed internal thermal mass and high ceilings	▪ At the jurisdiction of the site architect	N/A
4	Provide passive ventilation	▪ Passive ventilation via unrestricted opening windows and balcony doors (as permitted by ADO and ADK) ▪ Ensure that easily accessible windows are made secure for nighttime opening	Ensures all rooms comply with criterion a.
5	Provide mechanical ventilation	▪ Mechanical ventilation via extract systems to bathrooms/kitchens ▪ MVHR potential where there are noise restrictions	MVHR provided with boost function for peak summer periods to ensure all bedrooms can comply with criterion b.
6	Provide active cooling systems	▪ Mechanical cooling strategy only if passive measures cannot be implemented.	No Mechanical/active cooling required.