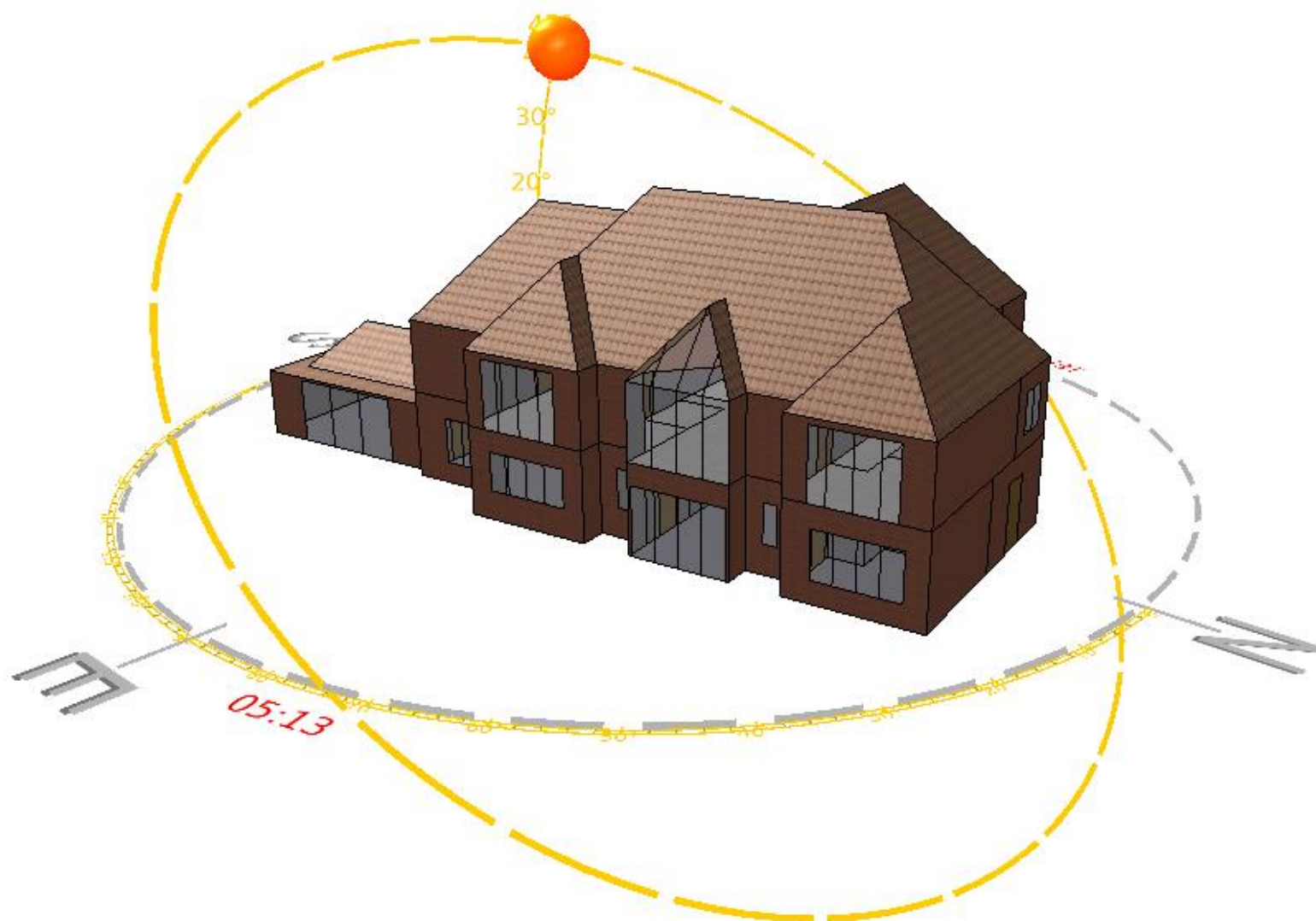


Sleepy Warren
East of Mead Farm,
Stane Street,
Slinfold,
RH13 0RE

CIBSE TM59 Overheating Analysis
in accordance with Approved Document O (2021 edition)



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Appendix A – Sleepy Warren Dwelling - Passive Measures Only – Part O Compliance Report

Appendix B – Sleepy Warren Dwelling – Passive Measures & Mechanical Ventilation – Part O Compliance Report

Appendix C – Sleepy Warren Dwelling – Passive Measures & Active Cooling – Part O Compliance Report

1 EXECUTIVE SUMMARY

1.1 PROJECT OVERVIEW

- Development: Detached dwelling
- Location: Sleepy Warren, East of Mead Farm, Stane Street, Slinford, RH13 0RE
- Description: Detached dwelling

1.2 ASSESSMENT METHODOLOGY

- Standard: CIBSE TM59: Design Methodology for the Assessment of Overheating in Homes (2017)
- Methodology: England Approved Document O (2021 edition)
- Weather File: London_GTW_DSY1_2020High50.epw
- Software: IES Virtual Environment 2024

1.3 OVERHEATING MITIGATION STRATEGY

- Natural Ventilation: Openable windows as per architectural drawings, with the following restrictions;

Measure	ADO Section Reference	Impact to proposed development	Report Reference
Noise	3.2 – 3.4	All bedroom windows required to close overnight for noise	See page 10
Pollution	3.5	None	See page 11
Security	3.6 – 3.7	All ground floor openings to close overnight	See page 11
Protection from falling	3.8 – 3.10	Select number of upper floor windows placed on 100mm restrictors	See page 12
Protection from entrapment	3.11	None	See page 12

- Mechanical Ventilation (in accordance with Approved Document F Volume 1: Dwellings (2021 edition):

Description	System	Cooling Hierarchy Classification	Type
Intermittent Extract Fans	System 1	Passive	Extract (kitchen + wet rooms)
Continuous Extract Fans	System 3	Passive	Extract (kitchen + wet rooms)
Mechanical Ventilation Heat Recovery (MVHR)	System 4	Passive (if AD F minimum rates) Mechanical ventilation if boosted rates	Balanced supply and extract
Additional Requirements	n/a	Mechanical Cooling	via underfloor cooling system

- Glazing: Solar glazing performance (g-value) of 0.50 to windows/doors (BS EN 410)
- Shading: Roof structures, balcony/patios and local buildings (where applicable)
- Internal doors kept open when possible (within ADO / TM59 guidelines)

1.4 ASSESSMENT RESULTS

- Criterion 1 (Adaptive method – living/kitchen/bedrooms): **Compliant**
- Criterion 2 (Fixed method – bedrooms at night): **Compliant**
- Compliance Outcome: **PASS** (See below for route to compliance through the cooling hierarchy)

Simulation	Cooling Hierarchy	Overheating Strategy Summary	Mechanical Ventilation Strategy	TM59/Part O Compliance?	Results
Simulation 1	<u>Passive Measures Only</u> - Limit unwanted solar gains - Minimise internal heat gains - Manage heat within building - Passive ventilation via window openings - External shutters as detailed on page 15 is considered to help limit solar gains to select windows	Passive Measures Only	System 1 Intermittent Extract Fans (to kitchens and wet rooms)	☒	Appendix A
Simulation 2	<u>Passive & Mechanical Ventilation</u> - All the above passive measures - Mechanical ventilation via MVHR (Part F minimum flow rates and true summer bypass mode as detailed in report)	Passive Measures & Mechanical Ventilation	MVHR with boosted overheating flow rates OR Demand controlled extract fans to ground floor bedrooms	☒	Appendix B
Simulation 3	<u>Passive Measures & Active Cooling</u> - All the above passive measures - Underfloor cooling system (UFC)	Mechanical Cooling	Underfloor cooling system to habitable rooms as detailed on page 18	☑	Appendix C

1.5 COMPLIANCE STATEMENT AND ASSESSOR COMMENTS

The assessment confirms that the proposed dwelling(s) complies with CIBSE TM59 (2017) overheating criteria and meets the requirements of Approved Document O. The assessment has shown that the assessed residential dwelling(s) presents a low chance of overheating – with the detailed dynamic thermal modelling showing where the risks are likely to occur.

The report demonstrates that the Cooling Hierarchy has been followed and can be concluded that the proposed dwelling(s) achieves Part O compliance through the use of passive measures alone, thus avoiding the requirement for an oversized mechanical ventilation system or active cooling measures.

Solar gains and limited natural ventilation opportunity (especially overnight) were found to be the leading contributor to the overheating risk and should the glazing specification not match that recommended in this assessment then the results detailed in this report may be invalidated. Analysis has found two significant design features that must be met:

- 1) The glazing g values outlined in the schedule are met.
- 2) Underfloor cooling system as detailed on page 18 to be considered

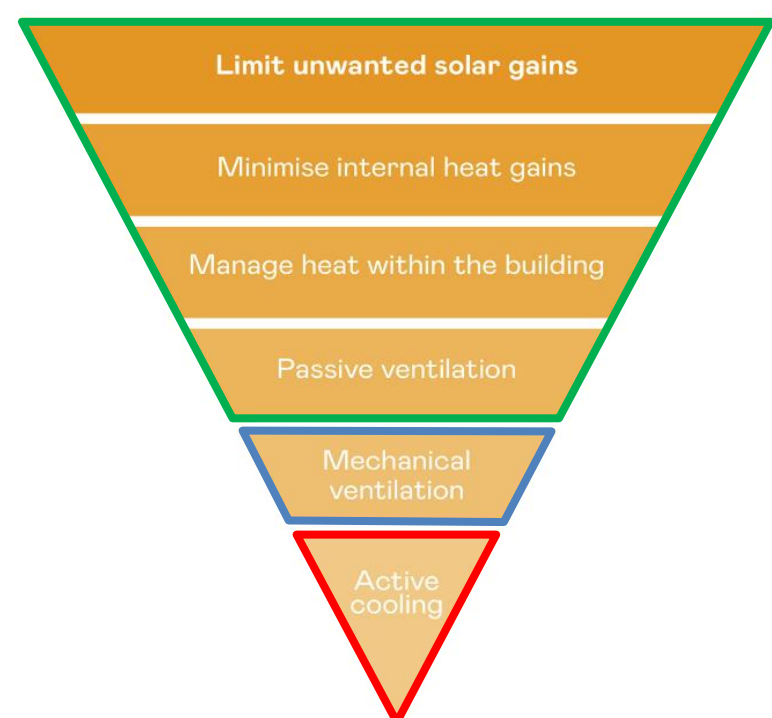


Figure 1: Cooling hierarchy (adopted from GLA London Plan) – showing the priority for actions to mitigate overheating risk

2 INTRODUCTION

2.1 BACKGROUND AND CONTEXT

The proposed development comprises a detached dwelling located at Sleepy Warren, East of Mead Farm, Stane Street, Slinfold, RH13 0BU. The assessment has been commissioned to evaluate the risk of overheating within the dwelling, in line with the latest regulatory requirements and best practice guidance.

Overheating risk has become an increasingly important consideration in residential design due to rising summer temperatures, urban heat island effects, and the drive towards more airtight, energy-efficient building fabric. As a result, building regulations and industry standards now require robust analysis of thermal comfort to ensure that dwellings remain habitable under future climate conditions.

This report presents the outcomes of a dynamic thermal modelling study undertaken using the IES Virtual Environment (VE) software package. The study follows the guidance in CIBSE TM59: Design Methodology for the Assessment of Overheating in Homes (2017) and demonstrates compliance with the requirements of the Approved Document O.

The modelling has been based on design information provided by the project team and includes appropriate assumptions regarding construction performance, ventilation strategy, and glazing specification. The objective is to provide assurance that the dwelling has been designed to limit overheating risk, prioritising passive measures wherever possible.

2.2 PURPOSE OF ASSESSMENT

The purpose of this assessment is to evaluate the potential risk of overheating within the proposed dwelling and to confirm whether the design complies with the relevant overheating criteria.

The analysis has been carried out in accordance with CIBSE TM59: Design Methodology for the Assessment of Overheating in Homes (2017), using the dynamic thermal simulation capabilities of the IES Virtual Environment (VE) software. The study applies the relevant compliance criteria as set out in the Approved Document O ensuring that the design meets current regulatory requirements.

By identifying periods where the dwelling may be at risk of elevated internal temperatures, the assessment provides evidence to support the planning application and informs the design process. The outputs demonstrate the effectiveness of the proposed ventilation and glazing strategy and highlight whether further mitigation measures are required to achieve compliance.

2.3 APPLICABLE STANDARDS AND REGULATIONS

This assessment has been undertaken in accordance with the following standards and regulations:

- CIBSE TM59: Design Methodology for the Assessment of Overheating in Homes (2017) – provides the methodology and compliance criteria for assessing overheating risk in residential buildings.
- Approved Document O 2021 (England): the national building regulation standard relevant to overheating in new dwellings
- Approved Document F: Ventilation: Provides guidance on ensuring adequate means of ventilation in buildings, covering natural and mechanical ventilation, indoor air quality, and minimising the risk of condensation.
- Approved Document K: Protection from falling, collision and impact: Provides guidance on safety measures such as guarding of windows, stairs, ramps, and balconies, as well as protection from impact with glazing and other building elements.
- BS EN 410: Glass in Building: Determination of Luminous and Solar Characteristics – used for defining the solar performance (g-value) of glazing

3 SOFTWARE & AND MODELLING APPROACH

TM59 The overheating assessment has been undertaken using the IES Virtual Environment (IES VE). VE is a dynamic thermal analysis package that complies with the requirements of CIBSE AM11: Building Performance Modelling (2015b) and is widely recognised for building performance simulation in the UK.

The model has been developed using architectural drawings and design information provided by the project team. A representative model of the proposed dwelling was constructed, with thermal zones defined for all occupied spaces. The modelling has been carried out at a level of detail sufficient to capture:

- External envelope performance (U-values and g-values)
- Thermal mass within the construction
- Internal heat gains from occupancy, lighting, and small power
- Ventilation strategy, including window opening assumptions and/or mechanical ventilation rates

The simulation has been undertaken using the London_LWC_DSY1_2020High50.epw weather file to assess performance under design summer year conditions.

Outputs from the dynamic simulation have been used to determine compliance with the overheating assessment criteria set out in CIBSE TM59 (2017).



Figure 2: Dynamic Simulation Software

4 OVERHEATING ASSESSMENT CRITERIA

TM59 sets different overheating compliance criteria for homes that are predominantly naturally ventilated and for homes that are predominantly mechanically ventilated.

For homes that are predominantly naturally ventilated, the method with two criteria should be used to assess overheating. The first overheating criteria, which applies to both living rooms/kitchens and bedrooms, is an adaptive criteria. The second overheating criterion is a fixed temperature criteria which applies only to bedrooms. Both criteria must be met for all spaces within a home to demonstrate compliance.

For mechanically ventilated homes, the fixed temperature method with a single criterion should be used to assess overheating. This single criterion must be met for all spaces (living rooms/kitchens and bedrooms) within a mechanically ventilated home to demonstrate compliance.

The TM59 criteria for naturally and mechanically ventilated homes are summarised in the following table. The dwelling in this assessment is assessed against ‘predominantly naturally ventilated’ criteria.

All criteria must be met for all spaces within a home to demonstrate full compliance.

Assessment Type	Assessment Criteria	Applicable Rooms	Occupied Hours	Naturally Ventilated Homes (open windows)	Mechanically Ventilated Homes (closed windows)
Predominantly Natural Ventilation	Criterion 1	Living rooms, kitchens and bedrooms	Living / Kitchen / Dining rooms – 9am to 10pm (13 hours/day) Bedrooms – 24-hour occupancy	The number of hours during which external and internal temperature difference is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3% of occupied hours.	Not Applicable
	Criterion 2	Bedrooms only	Bedrooms – 24-hour occupancy	The operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. 33 or more hours above 26°C will be a fail	Not Applicable
Predominantly Mechanical Ventilation	Criterion 3	Living rooms, kitchens and bedrooms	Living / Kitchen / Dining rooms – 9am to 10pm (13 hours/day) Bedrooms – 24-hour occupancy	Not applicable	The operative temperature in occupied all occupied rooms should not exceed 26°C for more than 3% of the annual occupied annual hours. 143 or more hours above 26°C for living rooms and kitchens will be a fail. 263 or more hours above 26 °C for bedrooms will be a fail

5 SITE & BUILDING DESCRIPTION

5.1 SITE DESCRIPTION & ORIENTATION

- Development: Detached dwelling
- Location: Sleepy Warren, East of Mead Farm, Stane Street, Slinford, RH13 0RE
- Description: Detached dwelling

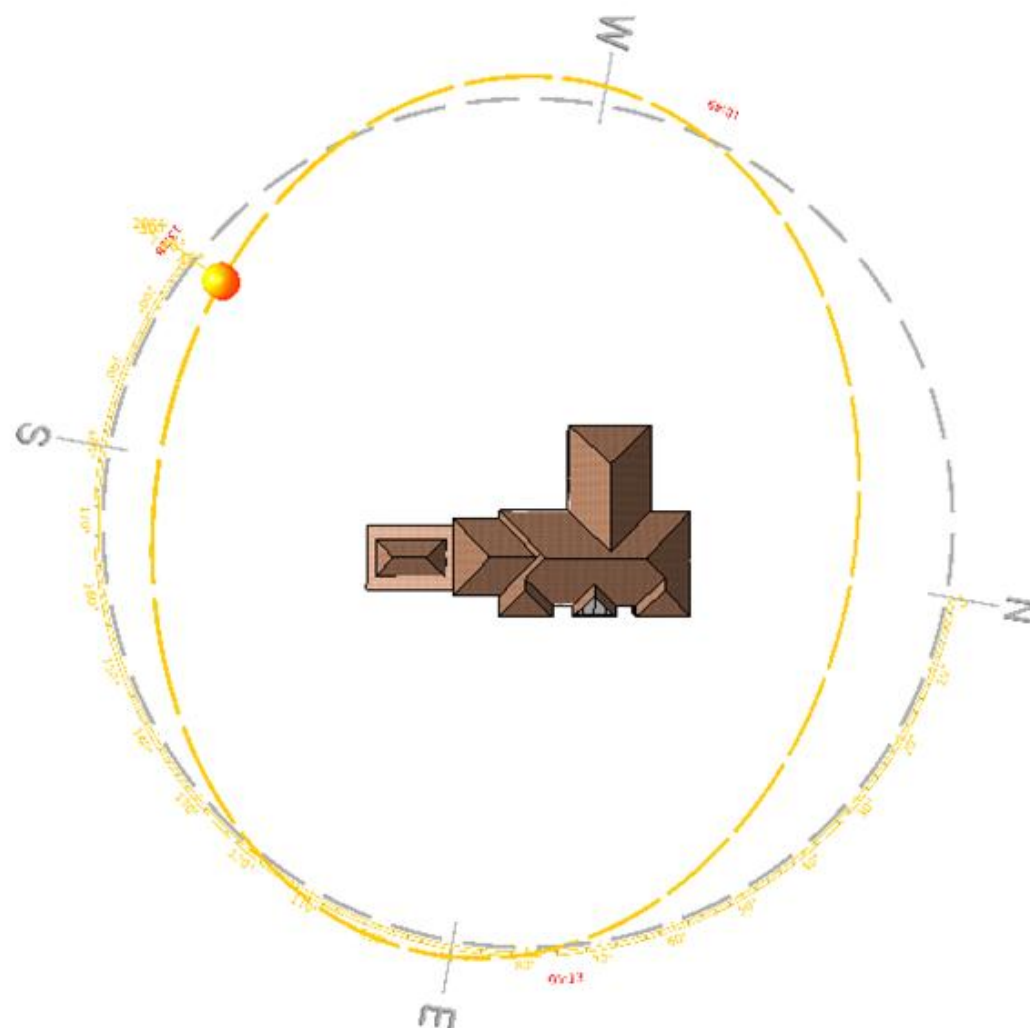
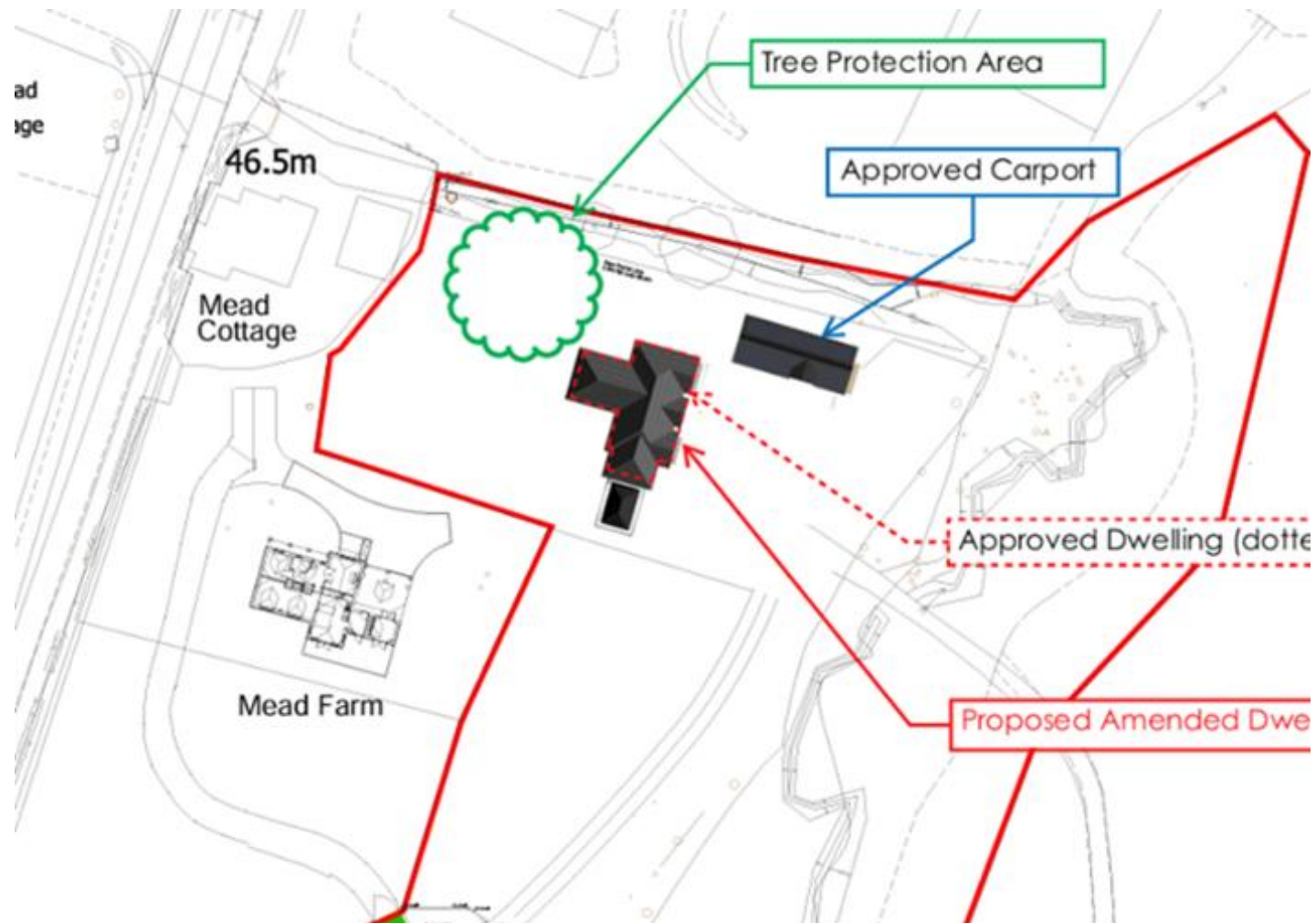


Figure 3: Site/Location/orientation plan of proposed development

5.2 BUILDING(S) FORM & LAYOUT



Figure 4: Reference drawings to inform the thermal model build

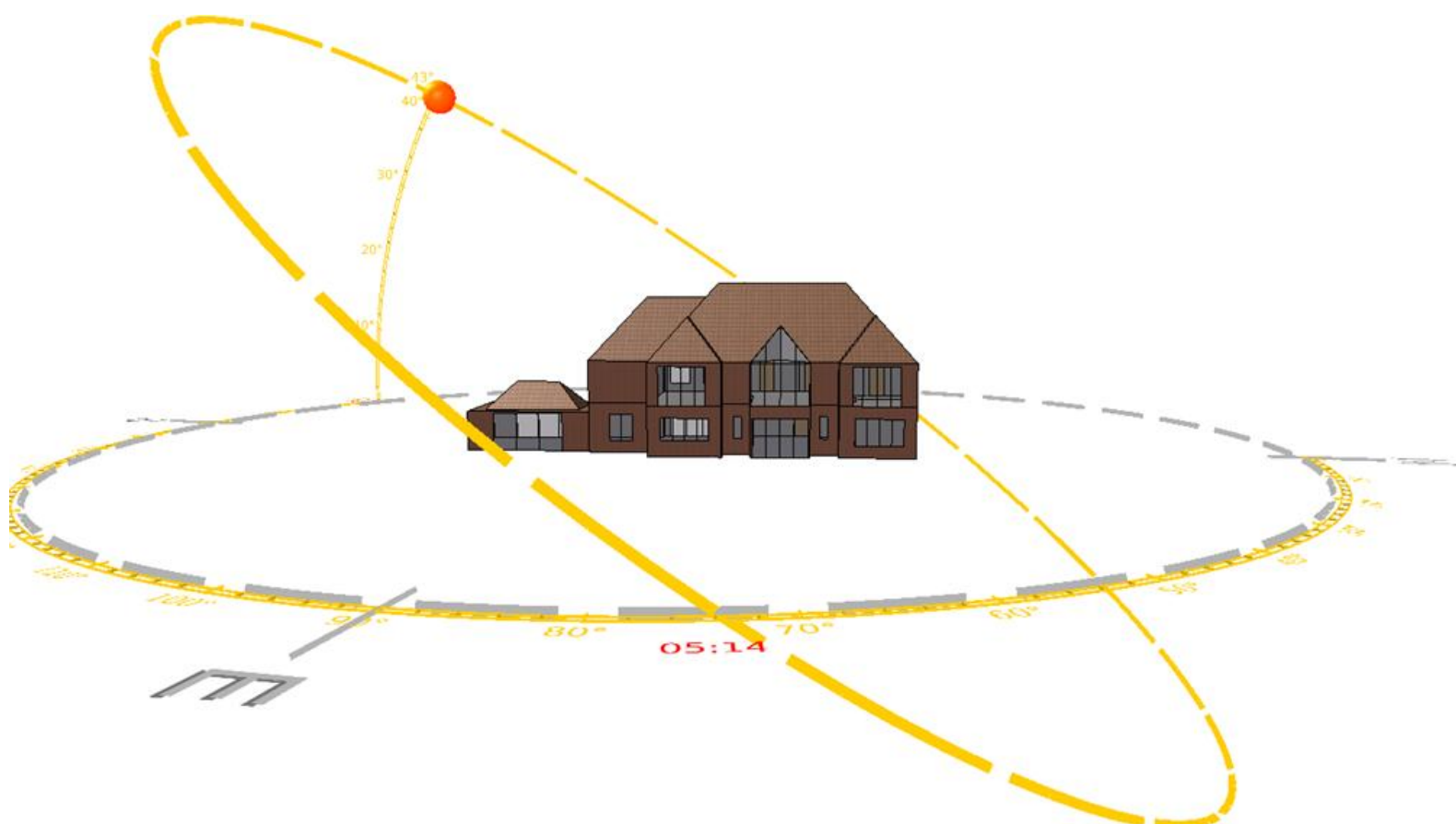


Figure 5: IES VE thermal model images of the proposed development

5.3 AIR PERMEABILITY

An air infiltration rate of 0.15ACH has been applied to the dwelling based on Table 4.24 of CIBSE Guide A.

5.4 U VALUES

Element	Proposed U-value (W/m²K)	Part L1 Notional U- value (W/m²K)	Part L1 Minimum U-value (W/m2K)	g-value (BS EN 410)
External Walls	0.16	0.18	0.26	-
Ground floor	0.12	0.13	0.18	-
Roof (flat / pitch)	0.10	0.11	0.16	-
Glazing	1.0	1.40	1.60	0.50
Rooflights	-	1.40	1.60	-

5.5 INTERNAL WINDOW BLINDS

Internal blinds have been not included in the calculations

5.6 WEATHER FILE

Weather file used in the calculation: - London_GTW_DSY1_2020High50.epw

5.7 THERMAL MASS

Utilising thermal mass has not been explored as an overheating mitigating measure in the proposed development.

6 COOLING HIERARCHY – PASSIVE MEASURES

6.1 NATURAL VENTILATION VIA OPENINGS

The openings have been modelled using an opening profile that simulates the occupants within the rooms opening the windows when the internal air temperature reaches 22°C, as stipulated by AD Part O. The same procedure operates in reverse as the air temperature cools.

The free area is a way of measuring what the equivalent completely open area is for a glazing assembly. Sufficient free area to the opening windows in a dwelling is vital to the overheating mitigation strategy and can be calculated using the combined areas of A+B (in m²).

Opening angle is the degree of opening of area B. Windows have been modelled to be either top or side hung as shown on the architectural drawings.

Dimension c refers to the opening length that windows reach when opened. As referenced in AD Part O section 3.9, if the maximum opening angle (B) exceeds 100mm of dimension length c then the following three criteria must be met:

- 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.*
- Guarding meets the minimum standards in Table 3.1*
- Guarding does not allow children to easily climb it. For example, horizontal bars should generally be avoided.*

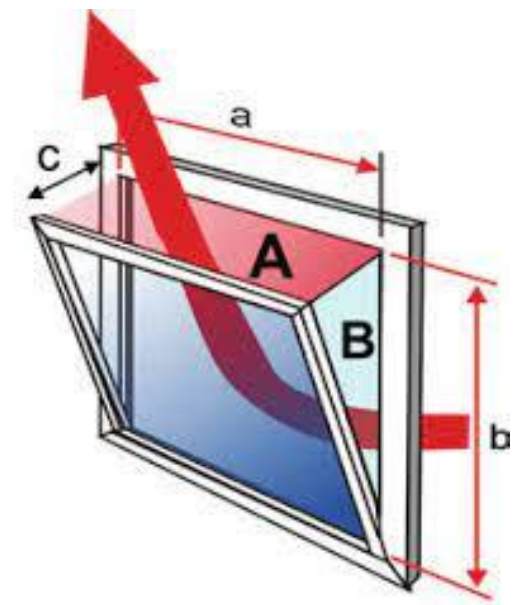


Figure 6: Window opening diagram (note for illustration only)

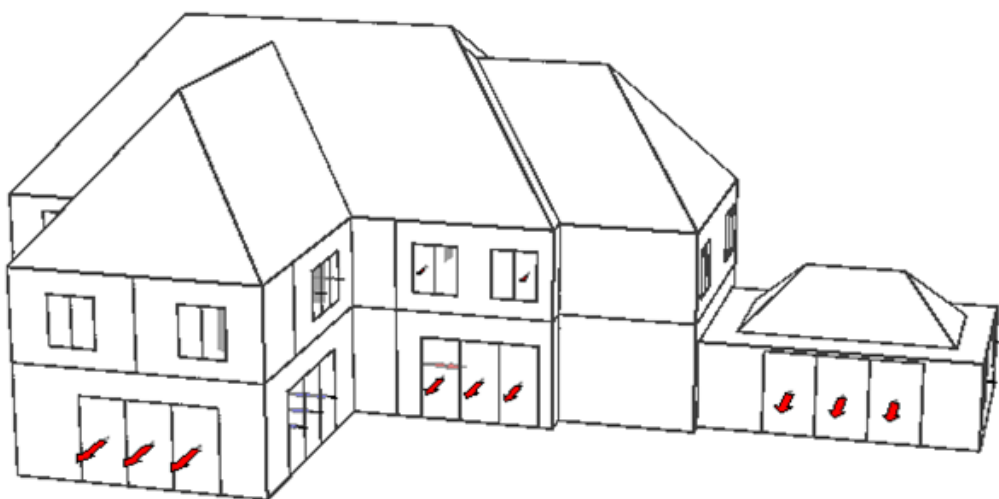


Figure 7: Natural ventilation graphic of proposed development

6.2 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.

6.2.1 Noise (ADO section 3.2 - 3.4)

Part O stipulates in section 3.2 *Noise* 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).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

- a) 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- b) 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).

On the proposed development, an acoustical assessment has found that all of the proposed bedrooms to the site are anticipated to trigger the requirement for windows to be closed during sleeping hours, and have been modelled as such.

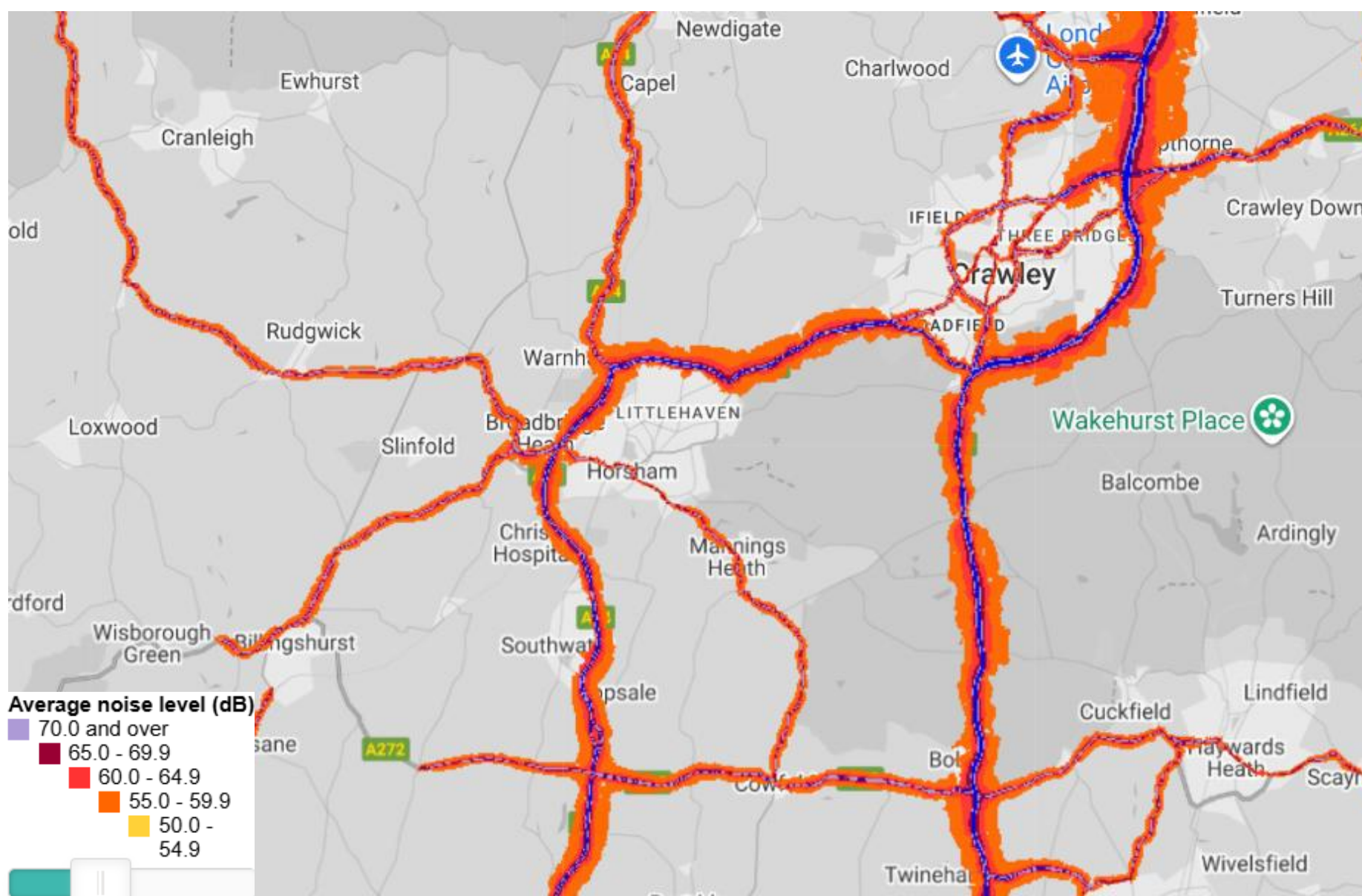


Figure 8: Noise risk map of proposed development

6.2.2 Pollution (ADO section 3.5)

Part 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.

Analysis has found the site is not subject to significant pollution sources which would affect the natural ventilation strategy.

6.2.3 Security (section 3.6 – 3.7)

Part O stipulates in section 3.6 *Security* that openings which may be vulnerable to intrusion by a casual or opportunistic burglar includes the following:

- a) Ground Floor Bedrooms
- b) Easily accessible bedrooms

With 'Easily Accessible' being defined as one of either of the following definitions:

- A window or doorway, any part of which is within 2m vertically of an accessible level surface, such as the ground or basement level, or an access boundary
- A window within 2m vertically of a flat or sloping roof (with a pitch of less than 30 degrees) that is within 3.5m of ground level.

Any windows which can be attributed with any of the above two criteria therefore are required to be closed overnight to ensure compliance with Part O stipulations is adhered to, which has been taken into account during the modelling process, and extended to non-bedroom windows (such as bathrooms and landings which are often used as additional window openings to can aid the removal of excess heat in dwellings) which may act as access points into the dwelling for opportunistic burglars etc.

It has been assumed that measures in line with ADO stipulations to secure affected windows and doors have not been considered, which may include:

- a) Fixed or lockable louvred shutters.
- b) Fixed or lockable window grilles or railings.

Analysis has found that across the site, all ground floor windows have been modelled as closed.

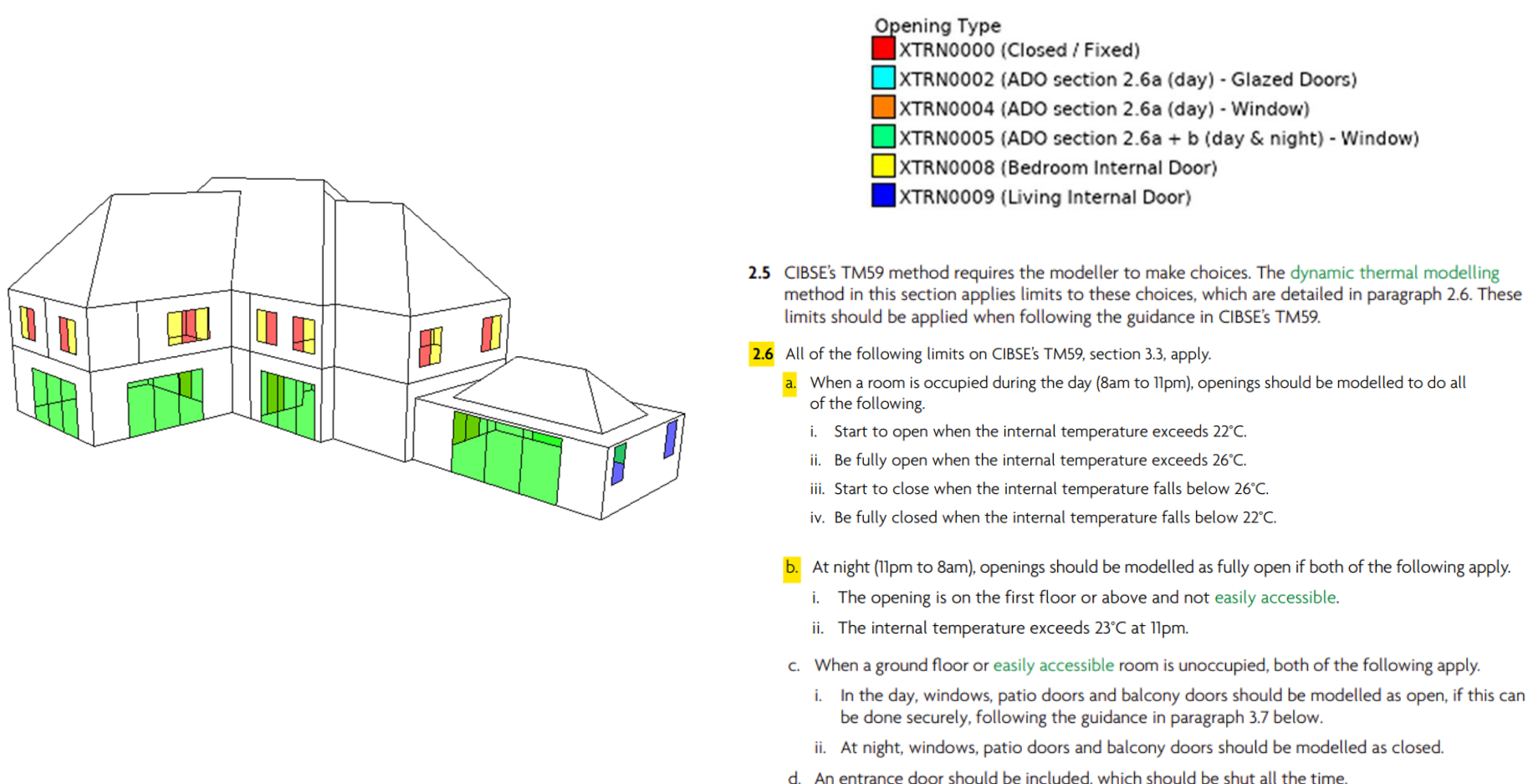
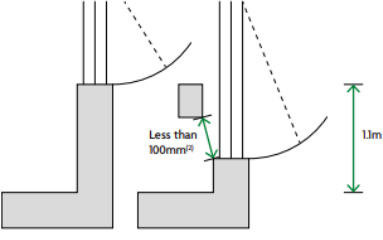


Figure 9: Vulnerable / Easily Accessible windows depiction of proposed development

6.2.4 Protection from Falling (ADO section 3.8 - 3.10)

- **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.

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.

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

Figure 10: Guarding height diagram

Analysis has found that a select number of upper floor windows do not meet the requirements to be opened beyond 100mm restrictors across the site as the sill heights are below the minimum threshold of 1100mm above FFL

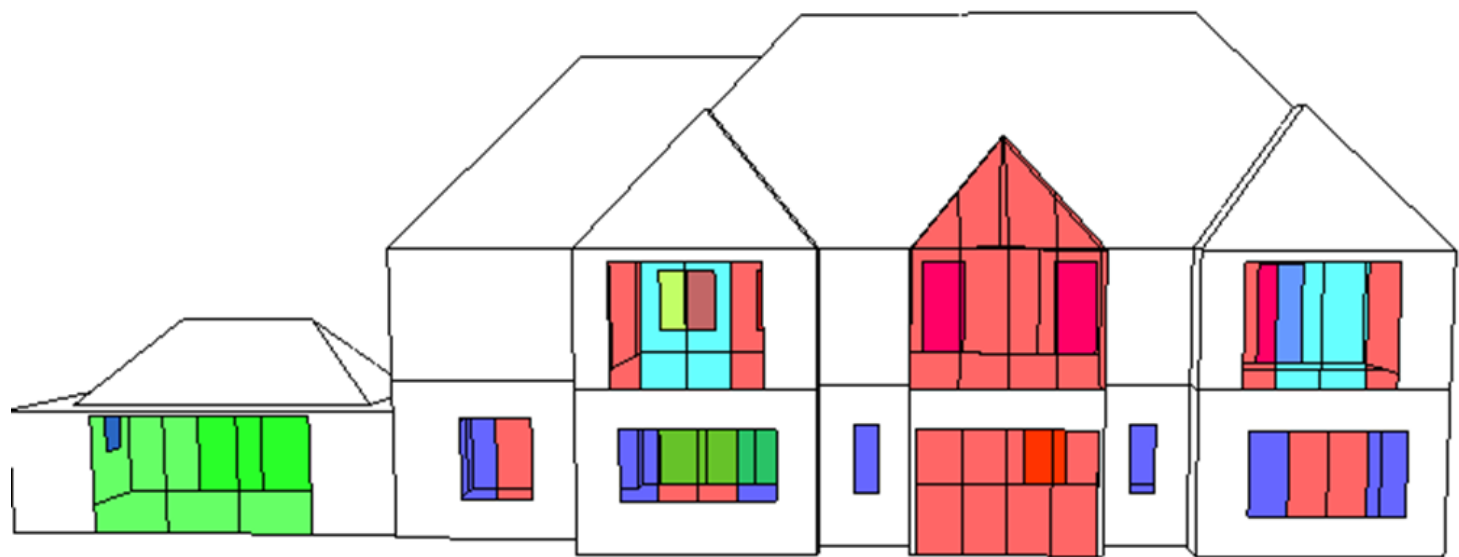


Figure 11: 100mm restricted upper floor windows depiction

6.2.5 Protection from Entrapment (ADO section 3.11)

When considering openings as part of the overheating mitigation strategy, the risk of entrapment must also be assessed. Windows and other openings should be designed and installed so that they do not present hazards where body parts, such as fingers, hands, or limbs, could become trapped during operation.

In particular, where large or frequent openings are required for natural ventilation, care must be taken to ensure that:

- a) Opening mechanisms are designed to minimise the risk of trapping fingers or limbs.
- b) Restrictors or safety devices are fitted where appropriate to control the movement of the window sash.
- c) Any safety features incorporated into the opening design remain functional and do not restrict compliance with the overheating mitigation strategy.

By addressing the potential for entrapment alongside overheating mitigation, the design ensures both safe use of openings and compliance with the requirements of Approved Document O: Overheating.

6.2.6 Summary of restrictions to window openings

Measure	ADO Section Reference	Impact to proposed development
Noise	3.2 – 3.4	All bedroom windows required to close overnight for noise
Pollution	3.5	None
Security	3.6 – 3.7	All ground floor openings to close overnight
Protection from falling	3.8 – 3.10	Select number of upper floor windows placed on 100mm restrictors
Protection from entrapment	3.11	None

6.3 WINDOW OPENING SCHEDULE

2.5 CIBSE's TM59 method requires the modeller to make choices. The **dynamic thermal modelling** method in this section applies limits to these choices, which are detailed in paragraph 2.6. These limits should be applied when following the guidance in CIBSE's TM59.

2.6 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 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.

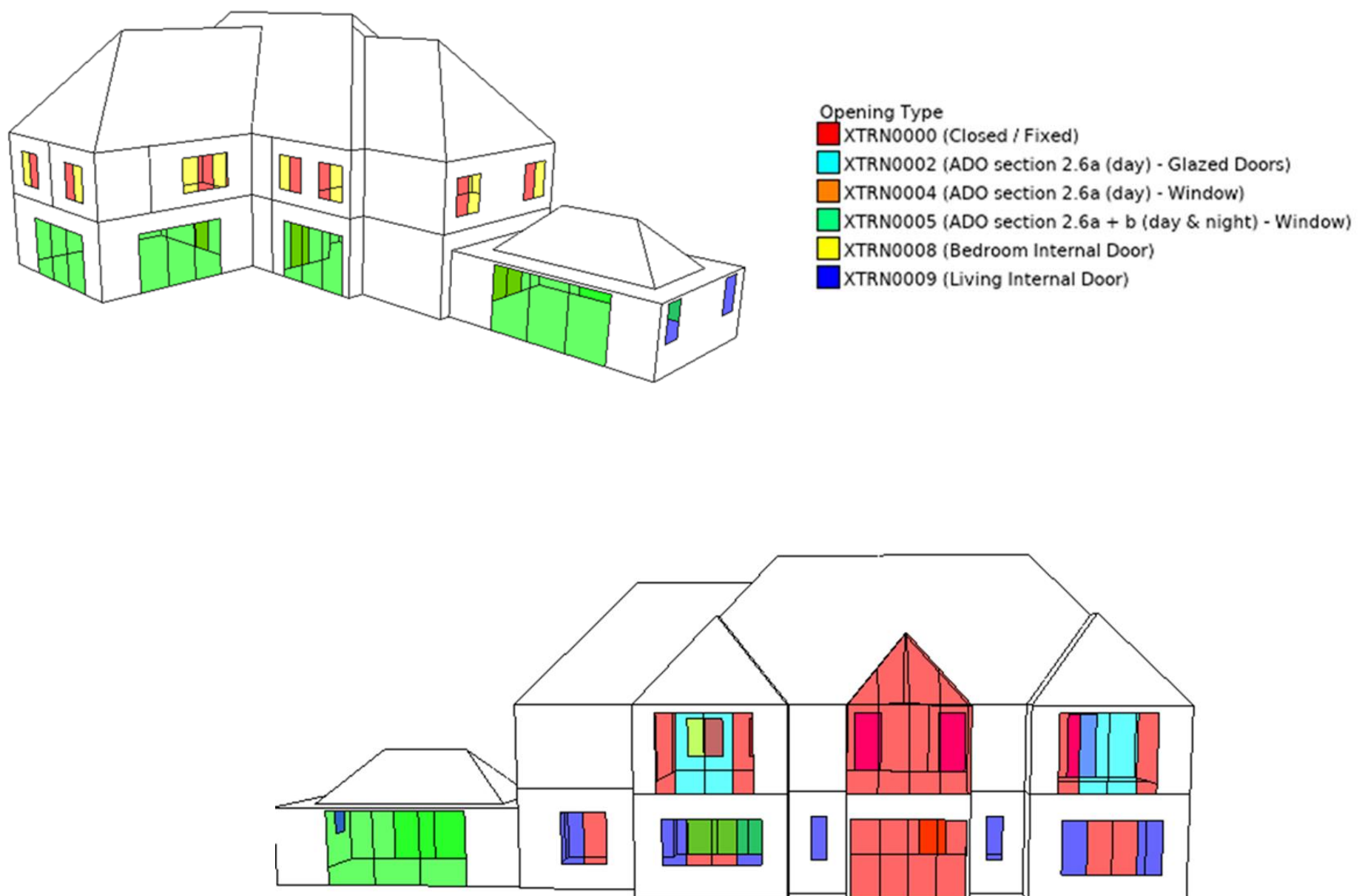


Figure 12: Window opening schedule key of the development

6.4 SHADING

Shading devices such as from roof structures and balustrades have been modelled as this would provide shading to the dwelling, limiting any unwanted solar gains. Additionally, local buildings may provide useful shading, however no local buildings were found in the site vicinity.

In the thermal modelling assessment, the proposed external shutters to the windows on the front elevation have been modelled as shown below. Internal blinds are prohibited from Part O overheating assessments, however external shutters are encouraged to be used as it helps to limit solar gains from entering through the windows, whilst having limited impact on airflow through the openings.



Figure 13: Shading proposed across the development

6.5 MECHANICAL VENTILATION – dMEV (SYSTEM 1)

Mechanical ventilation in the form of centralised and/or decentralised mechanical extract ventilation (cMEV / dMEV, respectively) is proposed for the dwelling, known as system 1 ventilation system.

The minimum extract ventilation rates (high rate and continuous rates) can be seen in table 1.1 – this have been taken from Approved Document F.

For more information, please refer to Approved Document F, Volume 1: Dwellings.

Table 1.1 Minimum extract ventilation rates for intermittent extract systems	
Room	Intermittent extract rate (l/s)
Kitchen (cooker hood extracting to the outside) ⁽¹⁾	30
Kitchen (no cooker hood or cooker hood does not extract to the outside) ⁽²⁾	60
Utility room	30
Bathroom	15
Sanitary accommodation ⁽³⁾	6
NOTES:	
1. See Diagram 1.1.	
2. See Diagram 1.2.	
3. As an alternative for sanitary accommodation, the purge ventilation guidance may be used.	

Figure 14: Approved Document F minimum ventilation rates of proposed mechanical ventilation strategy

It is not anticipated that the development will not rely on the proposed mechanical ventilation strategy as it will not have any significant impact on internal temperatures and is therefore considered a passive approach.

7 COOLING HIERARCHY – MECHANICAL VENTILATION

Note the below was only considered in Appendix B simulation as part of the cooling hierarchy demonstration and has not been considered in the final design.

Ventilation in the form of MVHR is a proposed solution to mitigating the overheating risk posed to the site.

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 (bathrooms and utility) 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 air out of habitable spaces and evacuated from the apartments, 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, which the unit has been based on. A depiction of MVHR installation on the dwelling is shown below to illustrate how the proposed dwelling is likely to be served by the unit.

During the summer months, the unit has been assumed to operate in a true summer bypass mode, allowing for incoming air to be delivered at external air conditions.

7.1.1 Boosted Overheating Flow Rates

The following boosted overheating flow rates to the bedrooms were found to be required from the MVHR system to ensure Part O Compliance could be met.

#	Bedroom Impacted	Room Location	See Appendix	Required Overheating Flow Rate (l/s)	Notes
1	Bedroom	First Floor	B	20l/s	MVHR unit (if proposed) flow rates to bedrooms analysed
2	Bedroom 2	First Floor	B	20l/s	
3	Bedroom 3	First Floor	B	20l/s	
4	Bedroom 4	First Floor	B	20l/s	

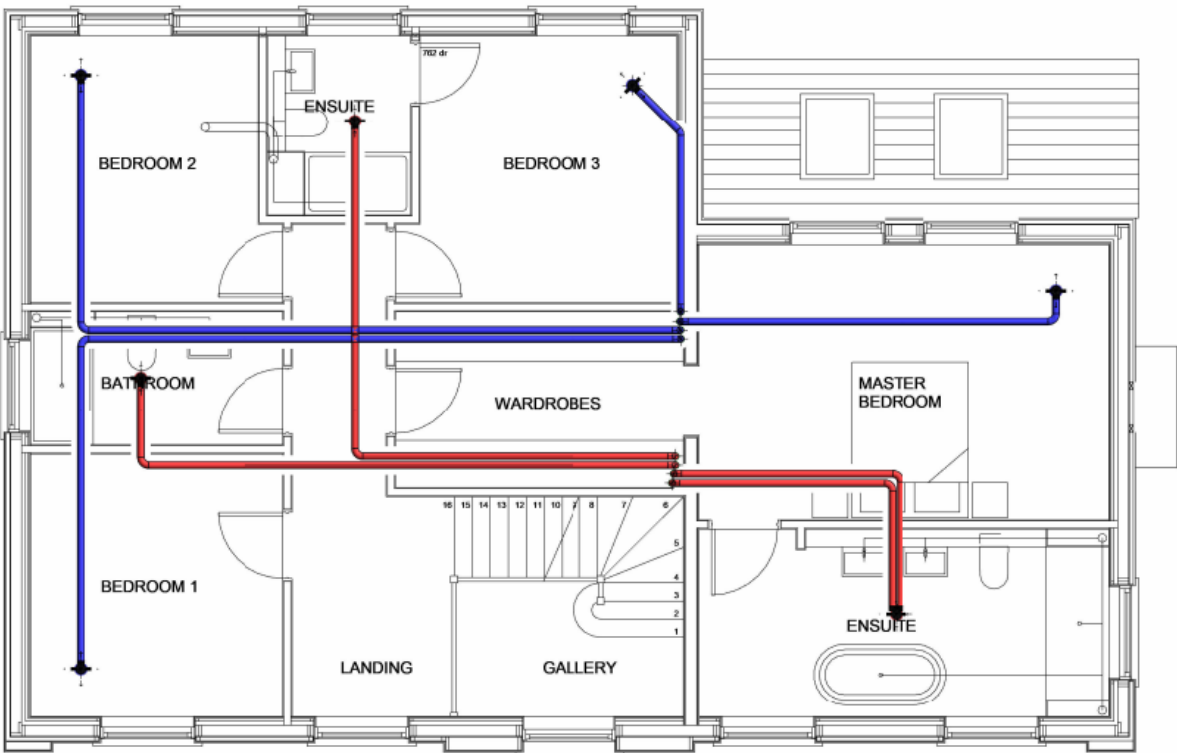


Figure 14: MVHR ducting depiction of proposed dwelling (note, this is for illustration only and not based on the proposed site)

8 COOLING HIERARCHY – ACTIVE COOLING

An **Underfloor Cooling (UFC)** unit works by circulating cooled water through a network of pipes embedded within the floors of a new-build home. This system operates on the same principles as underfloor heating but in reverse — instead of warming the space, it absorbs excess heat and lowers indoor temperatures for improved comfort during warmer months.

- **Cooled Water Circulation:** The UFC system is connected to a central cooling source — typically a heat pump or a chiller — which lowers the temperature of the water. This cooled water is then pumped through the underfloor pipework.
- **Thermal Exchange:** As the cooled water flows through the pipes, it absorbs heat from the room above. This is a gentle, radiant process, meaning the system cools the room evenly and silently, without drafts or the noise of fans.
- **Return and Re-cooling:** Once the water has absorbed heat, it returns to the cooling unit, where it is cooled again before being recirculated through the floor.
- **Control System:** Smart thermostats and zone controls allow homeowners to manage temperatures in different areas of the home, ensuring comfort and efficiency.
- **Dehumidification:** Because cooling the floor surfaces can lead to condensation if not properly managed, the system may be paired with ventilation or dehumidification units to maintain indoor air quality and prevent moisture build-up.

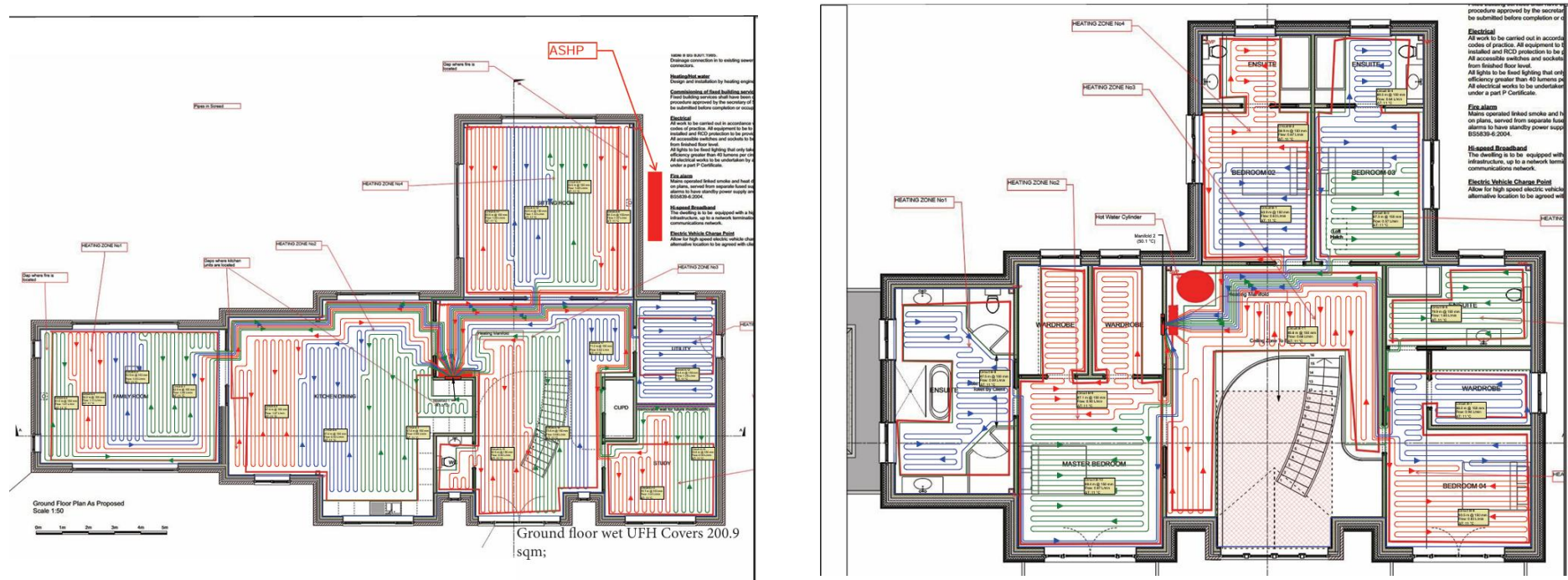


Figure 15: UFC system installation depiction

9 COOLING HIERARCHY – SUMMARY OF MEASURES

The Cooling Hierarchy as stated in the London Plan has been followed, as summarised in the table below;

#	Cooling Hierarchy measure	Implementation of measure	Measure effect	Measure Adopted in
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 and modelling of garden/patio privacy screens satisfy the above.	Reduction in solar gains entering the dwellings	Run 1 (Appendix A)
2	Minimise internal heat generation through energy efficient design	This can be achieved by measures such as fully insulated pipework.	N/A	Run 1 (Appendix 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	Run 1 (Appendix A)
4	Provide passive ventilation	Passive ventilation via as described opening of external windows and doors (as permitted by ADO / ADK opening restrictions)	Limited impact on internal temperatures	Run 1 (Appendix A)
5	Provide mechanical ventilation	Mechanical ventilation via MVHR in combination with natural ventilation via opening windows	Limited impact on internal temperatures	Run 2 (Appendix B)
6	Provide active cooling systems	Cooling via MVHR hybrid cooling units or traditional Air Conditioning Units	Found to adequately control internal temperatures and Part O compliance is achieved	Run 3 (Appendix C)

10 ASSESMENT SUMMARY

The assessment has shown that the assessed residential dwelling presents a medium to high chance of overheating – with the detailed dynamic thermal modelling has shown where the risk is likely to occur.

Following the cooling hierarchy (as adopted in the GLA London Plan), the modelling has found that the use of passive measures, alongside the considered underfloor cooling system to be the best solution to ensuring the proposed dwelling maintains a comfortable internal environment for occupants during the summer months, and to minimise the risk of overheating, using measures such as solar shading devices, reduced glazing g values and opening of windows/doors (in line with AD O/K limitations) were found to be a sufficient solution to the units.

Natural ventilation via openable windows forms the primary overheating mitigation strategy for the site, however as detailed within the report it has been demonstrated that there are limits to the use of opening windows for overheating purposes from security (ground floor openings), 100mm restrictors on a select number of upper floor windows as a falling from height safeguarding measure in addition to the predicted external noise levels that require closure of bedroom windows during sleeping hours, in line with AD O/K regulations.

A solar controlled window glazing g value has been specified in the glazing schedule to all windows & doors, targeting of low g values has been considered to prevent excessive solar gains during summer months.

A summary of the overheating mitigation strategy is listed below:

- Natural ventilation via window openings as per the architectural drawings
- Window openings subject to opening restrictions as outlined in this assessment
- Keeping the external patio doors fully open throughout the day (where applicable) to stimulate air movement throughout the entire dwelling
- Internal doors to be left open when possible to promote air movement in and out of rooms within the dwelling
- Glazing solar performance (g value) of 0.50 to glass (BS EN 410)
- Underfloor cooling system as outlined in report

With the above measures implemented, the modelling found all spaces in the assessed dwelling(s) to pass the overheating criteria and comply with Part O building regulations.

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.

Mitigating overheating will rely on the end user operation and understanding of overheating. Heat comes into the house in two ways: solar radiation from the sun, and hot air. We need to limit both to prevent overheating, which may require closing both the windows and curtains on the warmest days.

If it's cooler inside than outside, it is advised that occupants should keep their windows closed, to prevent bringing warm air in. If it reaches a point where the temperature inside the house is equal to that outside, then you should open the windows, keeping the curtains closed.

11 MODELLING DISCLAIMER

The calculations have been carried out with the information provided by others to determine whether the thermal model of the proposed building can achieve compliance, at design stage, with the stated criteria within this report.

It should be noted that the data generated by this work is obtained using computer simulations. These simulations are the best means of predicting the performance of the building at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

The actual operative temperatures within the building once occupied may vary from the calculated values within this report. These differences will occur due to a number of variable parameters between the modelled building and the actual building. Such differences will include the hours, levels of occupancy, equipment, how the windows are used etc.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, no responsibility for differences between the computer simulations and the actual performance of the completed development due to the inherent complexity and variability of the physics in a building and its environment.

On the Approved Document O detailed report appendices, although listed in the Approved Document O detailed report appendices under designer details, including organisation and address, we hold no responsibility for the design of the building, houses, or dwellings referenced. The term "designer" in this context refers solely to our role as a consultant interpreting drawings and details provided by the architect, client, or contractor. Our responsibility is limited to constructing and simulating the Part O overheating model within the IES software based on this information.

12 DETAILED OCCUPANCY SCHEDULES – CIBSE TM 59 HEAT GAIN PROFILE

Table 2 Occupancy and equipment gain descriptions

Unit/ room type	Occupancy	Equipment load
Studio	2 people at 70% gains from 11 pm to 8 am 2 people at 100% gains from 8 am to 11 pm	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 pm 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 to 12 pm 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 12 pm 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 to 12 pm 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 12 pm 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 to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: living room	3 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 12 pm 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 gains 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 above

Number of People	Description /Occupancy	Period																							
		00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
		Hour ending																							
		1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00
1	Single Bedroom	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
2	Double Bedroom	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.7
2	Studio	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.7
1	1-bedroom /living/Kitchen	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
1	1 - bedroom /living	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
1	1 - bedroom Kitchen	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
2	2-bedroom /living/Kitchen	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
2	2 - bedroom /living	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
2	2 - bedroom Kitchen	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0
3	3 - bedroom/living/Kitchen	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
3	3 - bedroom /living	0	0	0	0	0	0	0	0	0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0	0
3	3 - bedroom Kitchen	0	0	0	0	0	0	0	0	0	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0	0

13 COMPLIANCE CHECKLIST (APPROVED DOCUMENT O – APPENDIX B – PART 1)

1.1 Building and site details	
Residential building name/number	Sleepy Warren
Street	East of Mead Farm, Stane Street
Town	Slinfold
County	-
Postcode	RH13 0RE
Proposed building use/type of building	Residential
Are there any security, noise or pollution	- Security - All ground floor openings to close overnight - Falling from height – select number of upper floor windows to be placed on 100mm restrictors as safeguarding measure - Noise - All bedroom openings to close overnight

14 COMPLIANCE CHECKLIST (APPROVED DOCUMENT O – APPENDIX B – PART 2B)

2b.1 Modelling details		
Dynamic software name and version	IES Virtual Environment 2024 (Version 2024.1.0.0)	
Weather file location used, including any additional, more extreme weather files	London_GTW_DSY1_2020High50.epw	
Number of sample units modelled, including an explanation of why the size/selection has been chosen	Dwelling(s) assessed in correct orientation	
2b.2 Modelled occupancy		
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6? ^[1]	<u>Yes</u>	No
Details of the occupancy profiles used	As per imported ADO/TM59 dataset profiles	
Details of the equipment profiles used	As per imported ADO/TM59 dataset profiles	
Details of the opening profiles used	As per imported ADO/TM59 dataset profiles	
2b.3 Modelled overheating mitigation strategy		
Free areas	Fully openable but handles within 650mm limit of inside wall face as per section 3.9 of ADO unless specified to be placed on 100mm restrictors	
Infiltration and mechanical flow rates	Based on Table 4.24 of CIBSE Guide A for an air permeability target of 4m ² /(h.m ²).	
Window g-value	Windows & Doors (0.50)– BS EN 410	
Shading strategy	See report	
Mechanical cooling	N/A	
2b.4 Modelling results		
Has the project passed the assessment described in CIBSE's TM59, taking into account the limits detailed in paragraphs 2.5 and 2.6? ^[1]	<u>Yes</u>	No
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	- Openable windows (in line with opening restrictions outlined in this report) - g values of 0.50 to windows/doors (BS EN 410) - System 1 – Intermittent Extract Fans (to kitchens and wet rooms) - Underfloor cooling system as detailed in assessment	
2b.5 Designer's declaration		
Has the building construction proposal been modelled accurately?	<u>Yes</u>	No
Designer's name	-	
Designer's organisation	-	
Designer's signature	-	
Registration number (if applicable)	N/A	
Date of design	25.09.25	