75 Regent's Park Road

Overheating Assessment

April 2025

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Issue Purpose	For Planning	
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Date of Issue	30th April 2025	

NRG CONSULTING

1 Executive Summary

NRG Consulting have been commissioned to undertake an Overheating Assessment to support a Planning Application at **Flat A, 75 Regent's Park Road, London, NW1 8UY.**

The development is for: *Roof replacements and remedial works. Installation of plant, refurbishment on courtyard surface and like-for-like replacements of all courtyard-facing doors and external windows*

The property is an existing dwelling for which an overheating assessment is required to verify the need for mechanical cooling as per Camden Local Plan Policy CC2, para. 8.41 and Camden Planning Guidance: Energy efficiency and adaptation for further information and guidance.".

This report is to support the live application (2025/0417/P) for the installation of air conditioning within the habitable rooms of the dwelling.

The following guidelines have been followed to assess the proposed development:

- CIBSE TM59: 2017 – Design methodology for the assessment of overheating risk in homes.
- GLA Guidance on preparing Energy Statements (June 2022)

This assessment has been performed based on the follow specification, details of which are contained within this report:

- U-Values of thermal elements. (Obtained from the EPC and from the Design Team)
- Window specification including U-Value, G-Value and opening details.
- The ventilation strategy, infiltration and air permeability rates.

Based on the information and statement made within this report, we have run a dynamic thermal analysis of the proposed habitable rooms for the residential development in order to assess compliance against CIBSE TM59 (Part O version) without cooling. This assessment failed for the rooms with the proposed cooling. The cooling hierarchy was then reviewed before the assessment was re-run with mechanical cooling.

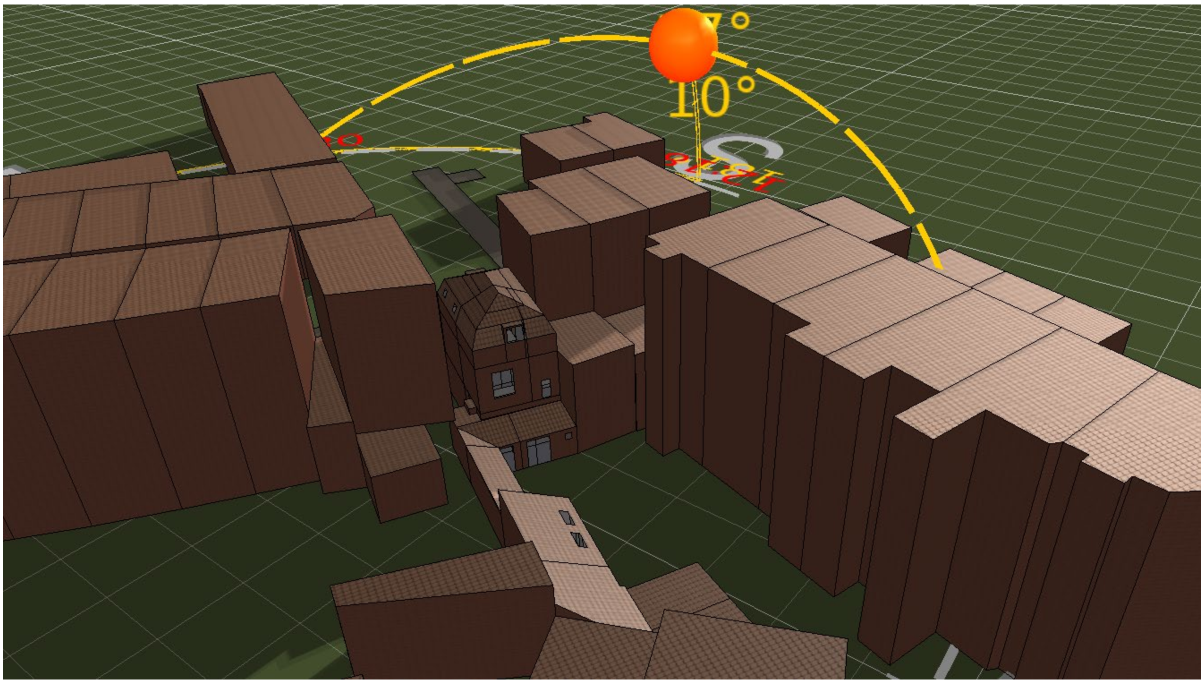

Figure 1: 3D model of the proposed building

2 Overheating Guidance for Homes

2.1 CIBSE TM59 (2017) and Approved Document O: Overheating

The Chartered Institute of Building Services Engineers guidance "*Design Methodology for the Assessment of Overheating Risk in Homes*" (CIBSE TM59) was published in 2017 and presents a standardised approach to predicting overheating risk for residential building using dynamic thermal analysis.

Approved Document O (Part O) of the Building Regulations (2021) was introduced in June 2022. The aim and reason for the introduction of Part O1: Overheating mitigation is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures. This is met by designing and constructing the building to achieve both of the following:

(a) limit unwanted solar gains in summer.
(b) provide an adequate means to remove heat from the indoor environment.

Part O applies to:

1. Residential (dwellings) Dwellings, which includes both dwellinghouses and flats.
2. Residential (institutional) Home, school, or other similar establishment, where people sleep on the premises.
3. The building may be living accommodation for the care or maintenance of any of the following:
    a. Older and disabled people, due to illness or other physical or mental condition.
    b. People under the age of 5 years.
4. Residential (other) Residential college, hall of residence and other student accommodation, and living. Accommodation for children aged 5 years and older.

2.2 CIBSE TM59: 2017 – Assessment Criterion

TM59:2017 provides a baseline in which to simulate overheating risk against which includes specific weather files, defined internal gains and a set of profiles that represent reasonable usage patterns for a home suitable for evaluating overheating risk.

It then has two criterion which deem whether it believes a habitable room within a dwelling is at risk of having issues with overheating. These are:

Test	Assessment Criterion	Acceptable Criterion	Investigated Period	Weather File
Criterion *a*	The frequency of the time when the operative temperature is higher than the maximum acceptable temperature	3% of occupied hours	May-September	Design Summer Year 1 DSY1, 2020s, High Emission, 50% percentile scenario
Criterion *b* (Bedrooms only)	Number of hours where temperature is above required	32 hours between 22:00 and 7:00	May-September	

Table 1: CIBSE TM59 – Assessment criteria for naturally ventilated buildings

2.3 Approved Document Part O – Amendments to the CIBSE TM59 Methodology

With the introduction of Part O, some clarifications were made within the guidance of the design parameters to input when running the dynamic thermal simulations for compliance that supersede or clarify the CIBSE TM59 manual. These are highlighted in Sections 2.4 and 2.5 below.

To demonstrate compliance using the dynamic thermal modelling method, all the following guidance should be followed:

- CIBSE's TM59 methodology for predicting overheating risk.
- The limits on the use of CIBSE's TM59 methodology set out in paragraphs 2.5 and 2.6. of ADO.
- The acceptable strategies for reducing overheating risk in paragraphs 2.7 to 2.11 of ADO.

Amendments to CIBSE TM59 methodology within Part O

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.
   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.

2.4 GLA Guidance on Energy Statements

The GLA Guidance (June 2022) contains a section on overheating in-line with the requirements of Policy SI 4 of the London Plan (2021). This introduces the cooling hierarchy and the text states:

It is important to identify potential overheating risk, particularly in residential accommodation, early in the design process, and then incorporate suitable passive measures within the building envelope and services design to mitigate overheating and reduce cooling demand, in line with London Plan Policy SI 4. 8.2. 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:
3. Manage the heat within the building through exposed internal thermal mass and high ceilings:
4. Provide passive ventilation
5. Provide mechanical ventilation
6. Provide active cooling systems

3 Methodology Applied & Model Inputs

This section includes the model inputs used to assess the risk of overheating within the proposed development.

All the habitable rooms of the proposed dwelling that are proposed to be supplied with Air Conditioning have been included within the overheating analysis.

3.1 Basis for Model

Project Information	
Building Category	Category II – New Builds
Software	IES Virtual Environment - 2024
Weather File - Location	London Weather Centre
Weather File - Details	DSY1, 2020s, High Emission, 50% percentile scenario
Summer Days	May 1st to September 30th – 153 days
Drawing Issue Date	April 2025

Table 2: Project information

3.2 Occupancy Patterns and Behaviour – CIBSE TM59 Data

In line with CIBSE guidance, realistic algorithms for occupant behaviour, the use of windows and other adaptive behaviour were used in the dynamic thermal model, as well as a realistic occupancy schedule.

Internal heat gains are based on '*Table 2 Occupancy and equipment gain description*' content in CIBSE TM59 (Appendix 1). These are replicated in the table below.

Room	Occupancy Heat Gain (W/person)		Light Heat Gain (W/m^2)	(Other Small Power W/m^2)
	Sensible	Latent		
Kitchen/Living Room	75	55	2	450
Bedroom	75	55	2	80

Table 3: Heat gain figures – Modelling & data inputs

3.3 Fabric Element and Ventilation Details

<table>
<tr><th>Thermal Elements</th><th>Proposed U-Value (W/m²K)</th></tr>
<tr><td>External Wall (Uninsulated Cavity) to (Uninsulated Solid Wall)</td><td>1.6 – 2.09</td></tr>
<tr><td>Ground Floor</td><td>0.18</td></tr>
<tr><td>Roof</td><td>0.15</td></tr>
<tr><th>Ventilation Type</th><td>System 1 – Natural Ventilation</td></tr>
<tr><th colspan="2">Air Permeability</th></tr>
<tr><td colspan="2">15 m³/(hm²) @50Pa</td></tr>
<tr><td colspan="2">Table 4: Fabric elements and ventilation details</td></tr>
</table>

For the fabric elements, GLA and Part L notional U-Values have been used to reflect the condition of the existing building along with information obtained from the EPC for the dwelling. This is with the exception of the U-Value and G-Value of the Windows (as highlighted below) which have come direct from the manufacturer as new windows are being installed as part of the proposals.

3.4 Windows and Internal Doors – Opening and Operation Details

<table>
<tr><th>Opening Type</th><th>Proposed U-Value (W/m²K)</th><th>Proposed G-Value (%)</th><th>Opening Hours</th></tr>
<tr><td>Windows</td><td>1.4</td><td>0.55</td><td rowspan="5">As per Part O where windows have been modelled as openable.</td></tr>
<tr><td>Rooflight</td><td>1.3</td><td>0.55</td></tr>
<tr><th>Window Type</th><th>Openable Area</th><th>Maximum Openable Angle</th></tr>
<tr><td>Fixed</td><td>-</td><td>-</td></tr>
<tr><td>Side Hung – 2F (Blue)</td><td>100%</td><td>40°</td></tr>
<tr><td>Side Hung – GF (Red)</td><td>100%</td><td>20°</td><td rowspan="2">Open from 10:00 - 17:00</td></tr>
<tr><td>Rooflight (Green)</td><td>100%</td><td>20°</td></tr>
<tr><th>Window Reveal Depth</th><td colspan="3">N/A</td></tr>
<tr><th>External Window Shading</th><td colspan="3">No</td></tr>
<tr><th>Internal Window Shading</th><td colspan="3">Internal blinds for the windows</td></tr>
<tr><th>Door Type</th><th colspan="3">Opening Hours</th></tr>
<tr><td>Internal Doors</td><td colspan="3">Assumed open in the daytime and closed when the occupants are sleeping.</td></tr>
<tr><td colspan="4">As this scheme sits outside of Part O, the impact of Internal Blinds or Curtains has been modelled in this assessment.</td></tr>
<tr><td colspan="4">Table 5: Window and doors opening details</td></tr>
</table>

Impact of Ceiling Fans

Ceiling fans have been considered within the context of this report. However, they are generally ineffective in addressing high indoor temperatures. While ceiling heights are likely sufficient and structurally the installation is possible, this would be costly and involve potentially major works in an existing dwelling.

As per CIBSE Guide A, ceiling fans primarily move air around rather than lowering air temperature, which can provide a perceived cooling effect through increased air movement but does not directly reduce the room's temperature. While this may have an impact when the temperature is lower, in higher temperature scenarios and in modern buildings, fans can recirculate warm air. CIBSE further indicates that fans are ineffective once indoor temperatures exceed 25°C to 27°C, as the body's natural ability to cool through evaporation diminishes at higher temperatures.

The cause of overheating is primarily Criterion B and thus nighttime temperatures are more of concern. Ceiling fans are considered to the louder than modern air conditioning units and this, more likely to disturb the residents then AC as well as being considered ineffective for cooling purposes.

Figure 2: Window opening details – Front and rear elevation

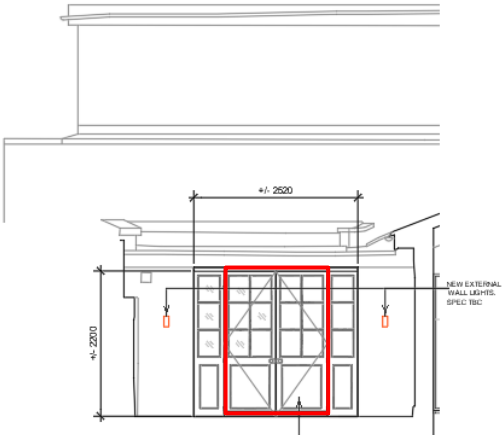

Figure 3: Window opening details – Dining elevation

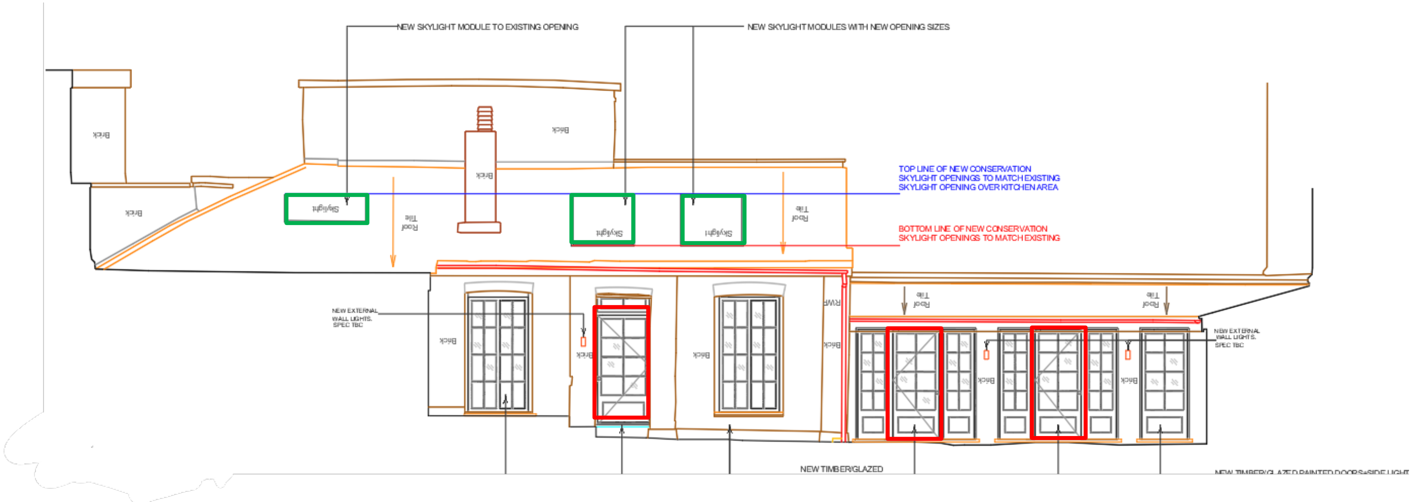

Figure 3: Window opening details – Living room and Gallery elevation

Figure 3: Street View

4 Results

4.1 Without Cooling

The table below shows the results of the dynamic simulation based on the current design proposals against the CIBSE TM59 criteria for dwellings that are predominantly naturally ventilated. The results based on the current situation demonstrates that the living room as existing exceed the threshold outlined by CIBSE TM59 and therefore overheats during the summer.

Compliance for kitchens and living rooms is based on passing Criterion A. Bedrooms must pass both criteria.

Windows Closed (Actual Scenario)

Plot - Room	CIBSE TM59 – Predominantly Naturally Ventilated Homes		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	Compliance
Study	4		NO
Snug	4		NO
Master Bedroom	1.6	35	NO
Guest Bedroom 1	0.8	44	NO
Guest Bedroom 2	1.1	46	NO
Living Room	11.3		NO
Kitchen	6		NO
Dining	7.6		NO

Table 6: Overheating Results – All closed

While there are other scenarios presented within this report, the above is the correct DSY 1 result as per current overheating guidance. The scheme is based on a busy mixed-use road and noise levels, especially on the Regent's Park Road façade, are considered to have the potential to reach unacceptable levels both day and night.

Further to this, the location of the scheme and accessibility from the main road (as shown in Figure 3) highlights that windows are not recommended at all to be opened at night-time due to security reasons.

Due to noise and/or security issues based on the location, all windows are assumed to remain closed. According to the results, all modelled habitat rooms failed in the simulation.

4.2 Without Cooling – Secondary Simulations

Windows (Openable as per Table 5)

Plot - Room	CIBSE TM59 – Predominantly Naturally Ventilated Homes		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	Compliance
Study	3.2		NO
Snug	2.6		YES
Master Bedroom	1.5	35	NO
Guest Bedroom 1	0.7	40	NO
Guest Bedroom 2	0.9	21	YES
Living Room	5.7		NO
Kitchen	2.6		YES
Dining	4.1		NO

Table 7: Overheating Results – Windows normally opened

In this scenario, the window opening inputs will follow Section 3.5, but without internal blinds. The windows on the elevation facing Regent's Park Road are assumed to be closed due to noise concerns. As a result, 5 out of the 8 modelled habitable rooms fail the CIBSE TM59 assessment.

Windows (Openable as per Table 5) with Internal Blinds (DSY 1)

Plot - Room	CIBSE TM59 – Predominantly Naturally Ventilated Homes		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	Compliance
Study	2.6		YES
Snug	2.3		YES
Master Bedroom	1.2	30	YES
Guest Bedroom 1	0.6	36	NO
Guest Bedroom 2	0.8	21	YES
Living Room	4.6		NO
Kitchen	2.2		YES
Dining	3.5		NO

Table 8: Overheating Results – Windows normally opened with internal blinds (DSY 1)

From the above it can be seen that 3 out of the 8 modelled habitable rooms fail the CIBSE TM59 assessment with internal blinds and openable windows.

The bedrooms are particularly an issue with all bedrooms modelled predicted to overheat at nighttime. It should also be raised that 26 degrees is on the higher-end of acceptable temperatures with previous WHO studies suggesting 24 degrees is when people can begin to feel "uncomfortably warm at night". CIBSE themselves in *CIBSE Guide A (2015)* advise that sleep quality may be compromised when the indoor operative temperature rises above 24°C and recommends that peak bedroom temperatures should not exceed 26°C

4.3 Future Weather Scenario

Further to this, to maximise the chances of a positive result, DSY 2 and DSY 3 were run with:

- Internal Blinds
- Openable Windows

To maximise the potential for compliant results

Windows (Openable as per Table 5) with Internal Blinds (DSY 2)

Plot - Room	CIBSE TM59 – Predominantly Naturally Ventilated Homes		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	Compliance
Study	7.5		NO
Snug	7.7		NO
Master Bedroom	5.1	126	NO
Guest Bedroom 1	3.6	136	NO
Guest Bedroom 2	3.5	99	NO
Living Room	9.8		NO
Kitchen	7.6		NO
Dining	8.9		NO

Table 9: Overheating Results – Windows normally opened with internal blinds (DSY 2)

Windows (Openable as per Table 5) with Internal Blinds (DSY 3)

Plot - Room	CIBSE TM59 – Predominantly Naturally Ventilated Homes		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	Compliance
Study	6.5		NO
Snug	6.4		NO
Master Bedroom	4.1	79	NO
Guest Bedroom 1	2.4	93	NO
Guest Bedroom 2	2.6	52	NO
Living Room	8.8		NO
Kitchen	6.3		NO
Dining	8.1		NO

Table 10: Overheating Results – Windows normally opened with internal blinds (DSY 3)

Results

All rooms fail under DSY 2 and DSY 3 highlighting a large issue with potential future weather scenarios.

Therefore, based on this, and the DSY 1 non-compliance, It is proposed to install cooling in all habitable rooms modelled. Before these results are modelled, the cooling hierarchy shall be reviewed to ensure all possible feasible measures have been covered within this assessment.

4.4 Review of Scheme Against Cooling Hierarchy

The cooling hierarchy has been reviewed for the scheme as follows:

Cooling Hierarchy	Measures Undertaken
Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.	High albedo materials are not possible.
	Insulation is proposed as part of the upgrades.
Minimise internal heat generation through energy efficient design:	Individual heating so no internal pipework heat losses.
	New LED lighting will be installed to reduce internal heat gains.
Manage the heat within the building through exposed internal thermal mass and high ceilings:	High thermal mass throughout based on construction.
	The Floor to Ceiling Height exceeds National Space Standards.
Provide Passive Ventilation	Openable Windows allow for nighttime purge ventilation (if required.)
	The dwelling benefits from the provision of cross-ventilation
Provide Mechanical Ventilation	No mechanical ventilation and infeasible to retrofit.

Some further clarification on certain elements of the hierarchy and why these are deemed in feasible are explored below:

High Albedo Materials

Green roofs, and painting the roof white were reviewed. Due to the building's historic character and conservation area status, painting the roof white is considered visually inappropriate for this context, and could harm the historic appearance of the property. A green roof would significantly change the original roof structure and incur potential structural loading liability.

PV

Due to the dormer roof, not enough PV could be fitted to make an installation viable in payback terms. This is notwithstanding potential loading issues structurally or impact on the streetscene / conservation area.

External Shading

External shading solutions such as brise soleil and canopy awnings have been considered. These features would alter the historic façade, detracting from the building's character and appearance; contrary to conservation principles. Given the narrow and deep proportions of the external courtyard, they would also impact the outdoor space, severely restricting direct sunlight.

Mechanical Ventilation

The ceiling heights within the spaces vary significantly. with several rooms having very restricted ceiling heights. Mechanical extract ventilation is being provided but in non-habitable rooms (utility and boot room and bathrooms) where we have high ceilings. Elsewhere the ceilings are either too low or do not have any void within the build-up.

4.5 Results With Cooling

As the above, all the feasible stages of the hierarchy were followed but due to the limited possibility to open the window due to external noise, active cooling is required in order to mitigate the risks of overheating. All the rooms modelled are proposed to have cooling installed.

Plot - Room	CIBSE TM59 – Predominantly Naturally Ventilated Homes		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	Compliance
Study	0		**YES**
Snug	0		**YES**
Master Bedroom	0	0	**YES**
Guest Bedroom 1	0	0	**YES**
Guest Bedroom 2	0	0	**YES**
Living Room	0		**YES**
Kitchen	0		**YES**
Dining	0		**YES**

Table 11: Overheating results – With Cooling

4.6 Proposed Air Conditioning - System Details

Datasheet for system performance can be found here: [RXYSQ8TY1 | Daikin]

The units are for cooling only. Heating is to be provided by a wet underfloor heating system.

Table of details below:

System Details	
Provides	Cooling Only
Make and Model (External Condenser)	Daikin RXYSQ-8TY1
Cooling efficiency - (SEER)	6.3
Heating Controls	Local time and temperature (Individual Room)

Table 12: Proposed VRF Specification

The above shows that industry leading efficiencies are proposed.

Figure 4: Proposed VRF Layout

5 Conclusion

A dynamic overheating assessment was undertaken for the proposed dwelling and it shows that based on CIBSE TM59 (Part O version) that the dwelling is at risk of overheating. The cooling hierarchy has been reviewed in the context of the existing property and with limited scope for the implementation of certain measures.

In order to mitigate the risk of overheating, a modern and stylish split system is proposed with industry leading cooling efficiency.

Based on this assessment, it is the authors opinion that the existing property cannot be actively cooled through passive measures and thus permission should be granted in terms of overheating and energy for the application.