



APPROVED DOCUMENT O: OVERHEATING DYNAMIC THERMAL MODELLING APPROACH

Client	Newett Homes
Site Name/House Type	Addingham - ADD-21-V1 - Opp Barnsley Road - Plot 1
Proposed Building Type	Detached
Security/Noise/Pollution Issues	Noise Bedroom windows on the front, left and right facade are closed during sleeping hours
Assessor Organisation	Award Energy Consultants Ltd
Assessor Address	6 Raglan Street, Harrogate, HG1 1LT
Assessor Name	Viktoria Kanova
Assessment Date	29/10/2025

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1. EXECUTIVE SUMMARY

2b.1 Modelling details	
Dynamic software name and version	DesignBuilder 7.2.0.032
Weather file location used, including any additional, more extreme weather files	CIBSE Weather File - Leeds DSY1 2020s, High Emissions, 50 Percentile Scenario No additional weather files assessed.
Number of sample units modelled, including an explanation of why the size/selection has been chosen	House type modelled under South orientation to determine outcomes on the site.
2b.2 Modelled occupancy	
Details of the occupancy profiles used	CIBSE TM52 Type 2
Details of the equipment profiles used	Follow those detailed in CIBSE TM59
Details of the opening profiles used	Follow those detailed in CIBSE TM59 with Part O restrictions applied
2b.3 Modelled overheating mitigation strategy	
Free areas	Based on those shown on elevations drawings
Infiltration and mechanical flow rates	Air permeability = 5 See Section 5 of the report for mechanical ventilation rates
Window U-value Window g-value	1.3 (whole window) 0.46 - whole window (0.73 - glass only)
Shading strategy	As per building geometry. No additional shading required e.g. window louvres, shutters, etc.
Mechanical cooling	No mechanical cooling required
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?	YES - with mitigation proposed
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	- Limiting glazing areas to prevent unwanted solar gains - Ensuring windows can be fully openable by ensuring they meet the protection from falling criteria, thereby increasing the amount of ventilation - Having fully openable windows on opposite sides of the dwelling to ensure cross ventilation is possible - Utilising mechanical ventilation to remove excessive heat - Utilising high levels of insulation to ensure heat gains through the fabric are minimised.

2. INTRODUCTION

This report assesses the dwelling against the new Approved Document O using the dynamic thermal modelling approach to determine the specification requirements to ensure compliance can be achieved.

The report investigates the scenario below:

- Noise in bedrooms on the front, left and right facades is out with the limits detailed in Section 3.3 of Approved Document O and therefore affected bedroom windows are closed during sleeping hours (23:00 – 07:00).

In order for a dwelling to comply with Part O following the dynamic thermal modelling approach it must pass **both** of the following two criteria:

- a. For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree Celsius above the maximum acceptable temperature during the period May to September inclusive shall not be more than 3 percent of occupied hours. ('Criteria a')
- b. For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 11 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 23:00 and 07:00 for bedrooms is 32 hours, therefore 33 or more hours above 26 °C will be recorded as a fail). ('Criteria b')

Note the dynamic modelling approach in Part O focuses on the above rooms within a dwelling since these are the rooms which are typically occupied for long periods of time and as such overheating is more of an issue. Other rooms such as bathrooms, halls, and cupboards are not included in the assessment.

3. ASSESSMENT METHODOLOGY

The Part O dynamic thermal modelling approach, which is heavily based on CIBSE TM59 'Design methodology for the assessment of overheating risk in homes (2017)', requires the use of appropriate modelling software. For the purposes of this report, DesignBuilder 7.2.0.032 was used to conduct the assessment using the latest design information as detailed in Section 4. Information such as the building geometry, fabric performance, mechanical ventilation, and window opening profiles were included within this model. The ADD-21-V1 is a 2-storey 4-bedroom house. This report assesses this house type in a detached configuration.

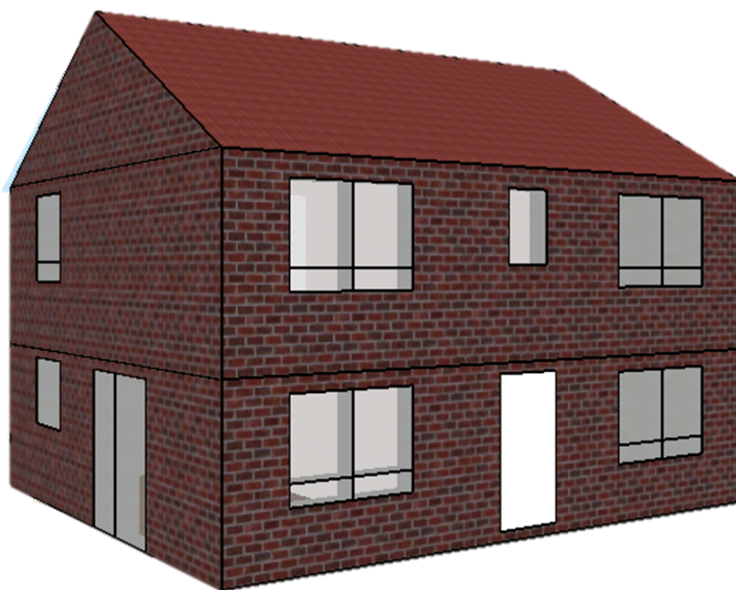


Figure 1: 3D model representation of the ADD-21-V1 house type within the Design Builder software. Simplifications are made where appropriate.

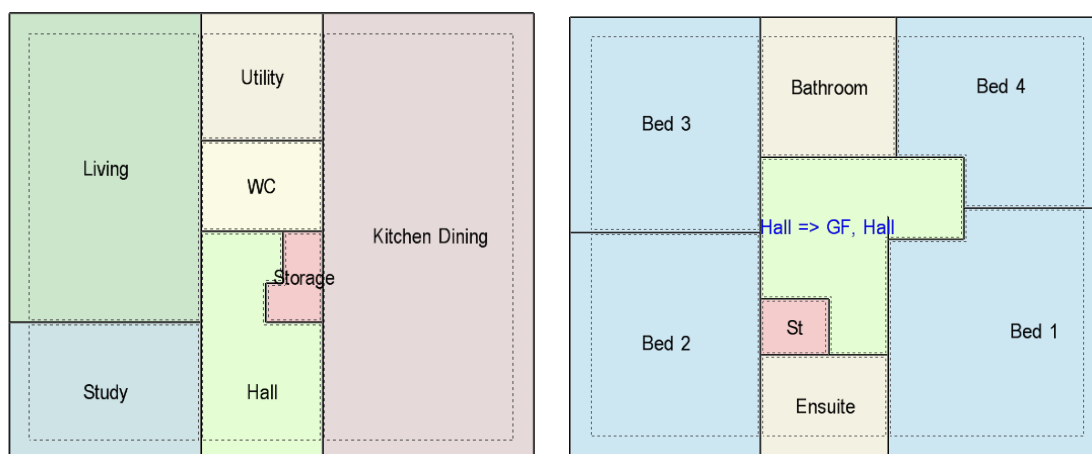


Figure 2: Site plan representation of the ADD-21-V1 house type within the Design Builder software. Simplifications are made where appropriate.

3.1 ASSESSMENT ASSUMPTIONS

All criteria and methodologies in Part O and CIBSE TM59 have been followed for this assessment. Some assessment assumptions are listed here for completeness:

- Any openable windows can be opened to a maximum depth of 650mm; this is the distance between the surface of the inside wall and the handles of the windows when they are fully opened
- Suitably sized trickle vents and door undercuts are present to allow replacement air to enter and freely move throughout the dwelling
- The influence of internal blinds and curtains have not been included in the assessment as stipulated by Part O
- All windows, rooflights, and glazed doors are outward opening, either side, central, sash, bottom or top hung as indicated by the elevation drawings
- The modelled airspeed in each space is set at 0.1 m/s
- Internal doors are assumed to be opened during the day and shut at night to allow for cross-ventilation, except those to the garage and to cupboards which are assumed to always be closed
- External doors are shut at all times with the exception of the French doors and Bifold Doors which can be opened and follow the same opening criteria as the windows. French doors can be opened to 90 degrees and bifold doors can be fully opened
- All Part O opening profiles and restrictions have been followed
- The Part O 'protection from falling' and 'easily accessible' restrictions are applied
- Standardised occupancy and heat gain profiles have been used to account for the lighting, occupants and equipment sources
- Any heat recovery element to mechanical ventilation systems operates a 'summer bypass' Mode.
- Bedroom windows on the front, left and right facades are closed during the sleeping hours (between 23:00-7:00).

4. PROJECT SPECIFICATION

The following information details the specification items which have an influence on the assessment of overheating. These were taken from the latest design information. If changes to the specification occurs this will have a bearing on the performance of the dwelling and ultimately whether compliance with Part O is achieved or not.

4.1 FABRIC SPECIFICATION

Table 1: Fabric Specification provided by Newett Homes

Variable	Description / Specification	U-value (W/m ² K)
Form of Construction	Traditional masonry construction	N/A
Air Permeability Rate	5 m ³ / (h.m ²) @ 50Pa	N/A
Ground Floor System	Screed over rigid insulation	0.09
External Walls	Traditional masonry cavity with lightweight block inner leaf	0.19
Wall to garage	Insulated lightweight blockwork wall	0.18
Spandrel Wall	As per Smartroof construction	0.18
Internal Partitions	Blockwork; timber frame (insulated and uninsulated)	Varies
Intermediate Floor	Timber separating floor; chipboard finish; plasterboard ceiling below. Assumed 100mm mineral wool within floor zone	
Exposed Floor	Mineral wool between joists	0.20
Cold Roof	Mineral wool between and over joists	0.09
Slope	Rigid PIR insulation	0.16
Windows, Glazed Doors & French Doors	Double-glazed low-e (g_{win} -value = 0.46)	1.30
Entrance Doors	Solid entrance door	1.1
Thermal Bridging Contribution	10% of the U-value of each external heat loss element	N/A

4.2 VENTILATION SPECIFICATION

Table 2: Ventilation Specification provided by Newett Homes

Variable	Description / Specification
Ventilation System	Intermittent fans
Standard Extract Rates (provided on drawings)	Kitchen = 60 l/s WC = 6 l/s Bathrooms & Ensuites = 15 l/s Utility = 30 l/s
Natural Ventilation	• Windows open day and night

- Air infiltration through other openings, vents and cracks in the building structure is simulated and included in the natural ventilation rate
- Internal doors have been modelled as open to aid with cross ventilation through the dwelling.
- The volume of air is based on the tables located in Approved Document F. Each room has a small amount of air infiltration, this has been set at 0.15 air changes per hour, in line with CIBSE Guide A for buildings with good airtightness.

4.3 WINDOW OPENING REFERENCES

The following figure illustrates which windows and glazed doors can be opened. All windows are assumed to meet the Part O 'protection from falling' criteria and all first-floor windows are not 'easily accessible' under Part O.

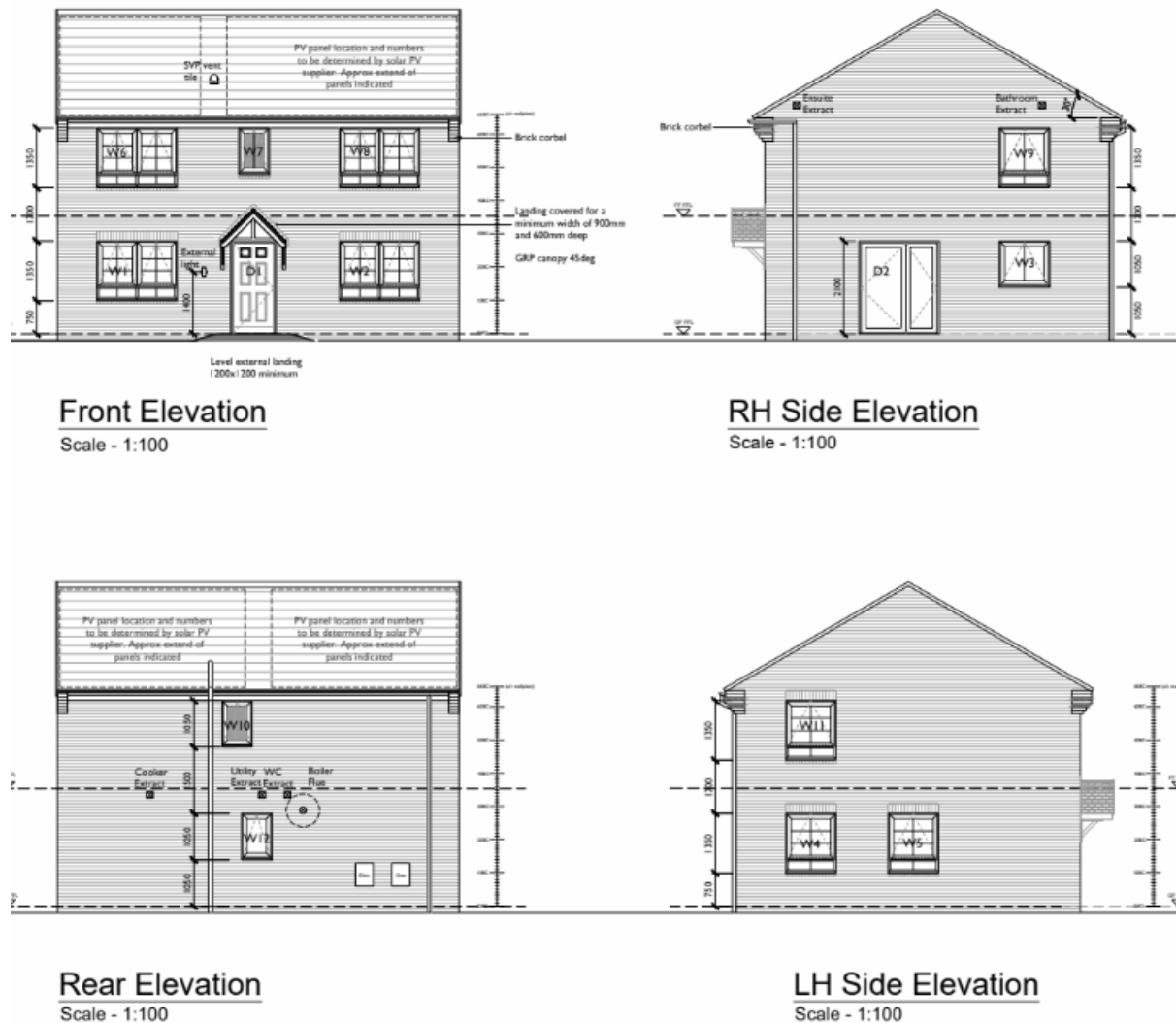


Figure 2: Elevations (Mirrored) provided by Newett Homes showing the window/door openings and which casements are fixed and which are open, and how eg side hung/top hung

5. RESULTS

The tables on the following pages detail the results of the Part O assessments for each scenario. Results which pass are given in **green**, results which fail are given in **red**. Note the 'Dwelling Orientation' indicates the direction the front door of each dwelling faces. Additional mechanical ventilation, extra openings or reduced glazing may be required if the house type fails to meet either criteria.

Table 3: Criteria a results

Room Name	Criteria A (%Hrs Top-Tmax>=1K)	Results/Actions
	Dwelling Orientation	
	South	
Kitchen Dining	3.18	Extra ventilation required
Lounge	1.44	None Required
Bedroom 1	1.35	None Required
Bedroom 2	2	None Required
Bedroom 3	1.37	None Required
Bedroom 4	1.92	None Required

Table 4: Criteria b results

Room Name	Criteria B (No.Hrs Top-Tmax>=33.0)	Results/Actions
	Dwelling Orientation	
	South	
Kitchen Dining	N/A	N/A
Lounge	N/A	N/A
Bedroom 1	166	Extra ventilation required
Bedroom 2	208.33	Extra ventilation required
Bedroom 3	206.17	Extra ventilation required
Bedroom 4	201.33	Extra ventilation required

6. MITIGATION

The results indicate that when the house type has windows closed on the front, left and right facades during the sleeping hours, Criteria A & B is exceeded, necessitating mitigation.

The following mitigation measures are required to meet Part O overheating requirements when following the Part O acoustic window opening schedule:

- supplying the additional mechanical ventilation requirements detailed in the column on the right of Tables 5 & 6. These are given as the minimum supply rate of external air which must enter the bedrooms to ensure they comply with the Criteria B temperature during sleeping hours. This may be met with appropriately designed extract ventilation which ensures the replacement air entering the bedroom achieves the equivalent supply rate of external air. Ventilation rates are given in litres per second. These ventilation rates are continuous and do not account for 'boost' modes in accordance with Part O.

Table 5: Criterion a results

Room Name	Criterion A (%Hrs Top-Tmax>=1K)	Minimum Additional Mechanical Ventilation Rate (External Air)
	Dwelling Orientation	
	South	
Kitchen Dining	2.83	None Required
Lounge	1.12	None Required
Bedroom 1	0.67	51 l/s
Bedroom 2	0.82	47 l/s
Bedroom 3	0.42	45 l/s
Bedroom 4	0.98	40 l/s

Table 6: Criterion b results

Room Name	Criterion B (No.Hrs Top-Tmax>32.0)	Minimum Additional Mechanical Ventilation Rate (External Air)
	Dwelling Orientation	
	South	
Kitchen Dining	n/a	None Required
Lounge	n/a	None Required
Bedroom 1	31.67	47 l/s
Bedroom 2	31	46 l/s
Bedroom 3	31.83	40 l/s
Bedroom 4	31.67	40 l/s

7. CONCLUSION

As part of this report the ADD-21-V1 house type, Plot 1, was assessed under South orientation. The Leeds DSY1 2020s High Emissions 50 Percentile CIBSE weather file was used for all assessments as required as a minimum under Part O.

Results of this assessment show that when windows are closed during sleeping hours on the front, left and right facades, additional mechanical ventilation is required to ensure bedrooms comply with the assessment criteria under Part O. Additional minimum supply rates to bedrooms (in addition to the standard ventilation rates) are detailed in Table 6 in this report.

Any proposed mechanical ventilation system used to meet compliance with Part O should be verified as suitable by a ventilation designer or other suitably qualified professional. These systems must ensure the required ventilation rates are met and should not result in excessive noise during operation.

8. DISCLAIMER

This document has been prepared for the titled project, or named part thereof, and should not be relied upon or used for any other project or part as the case may be, without an independent check being made on it. Award Energy Consultants Ltd shall not be liable for the consequences of using this document other than for the purpose for which it was commissioned, and any user and any other person using or relying on this document for such other purpose, agrees and will be such use or reliance be taken to confirm this agreement to indemnify Award Energy Consultants Ltd for all loss of damage resulting therefrom.

The assessment detailed in this report has been carried out by Award Energy Consultants Ltd in accordance with the requirements of Approved Document O (2021 Edition) based on the design information provided by the project team. Some assumptions are made as part of this process which may not occur in practice, the details of which are included in the report. Whilst Award Energy Consultants Ltd take great care in carrying out these assessments, certain variables are difficult to predict, and compliance with Part O does not guarantee overheating will not occur during in-use performance. As such, the data contained within this report is purely advisory and for the purposes of satisfying Part O requirements. Higher or lower temperatures than those calculated may occur. It therefore remains the responsibility of others to design and construct the building appropriately to ensure a comfortable internal environment for occupants is guaranteed throughout the year. Award Energy Consultants Ltd accept no liability should problems occur during in use performance.