

## Part O Dynamic Thermal Modelling Report

Assessment on: **Hermitage Park**

AL24, AL32, AL41, L255, L361, L467, L468, L552, L553.

Client: **Miller Homes.**

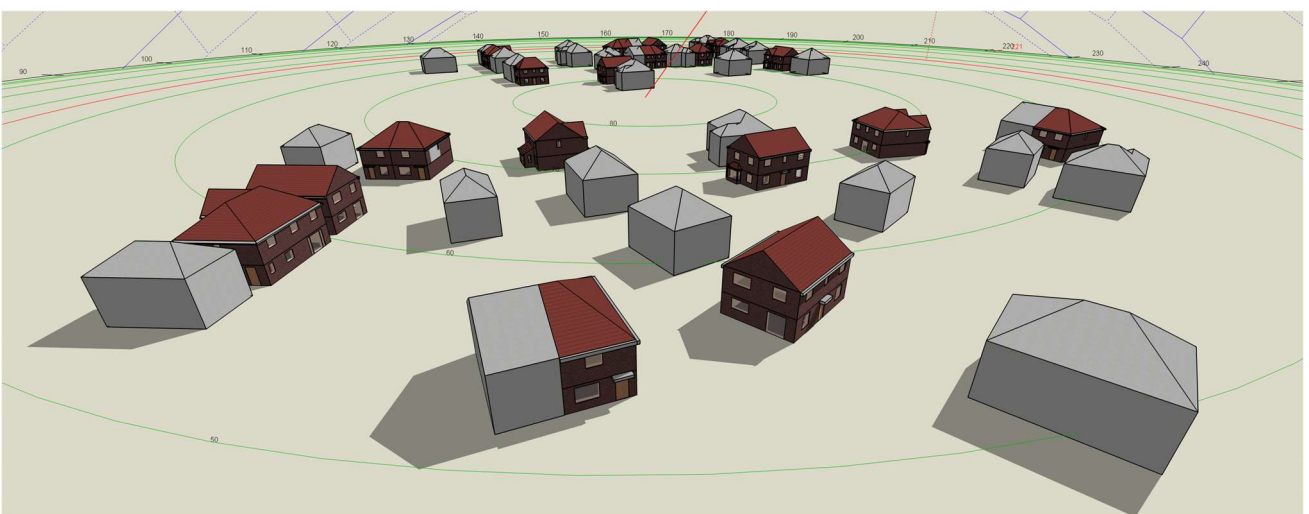
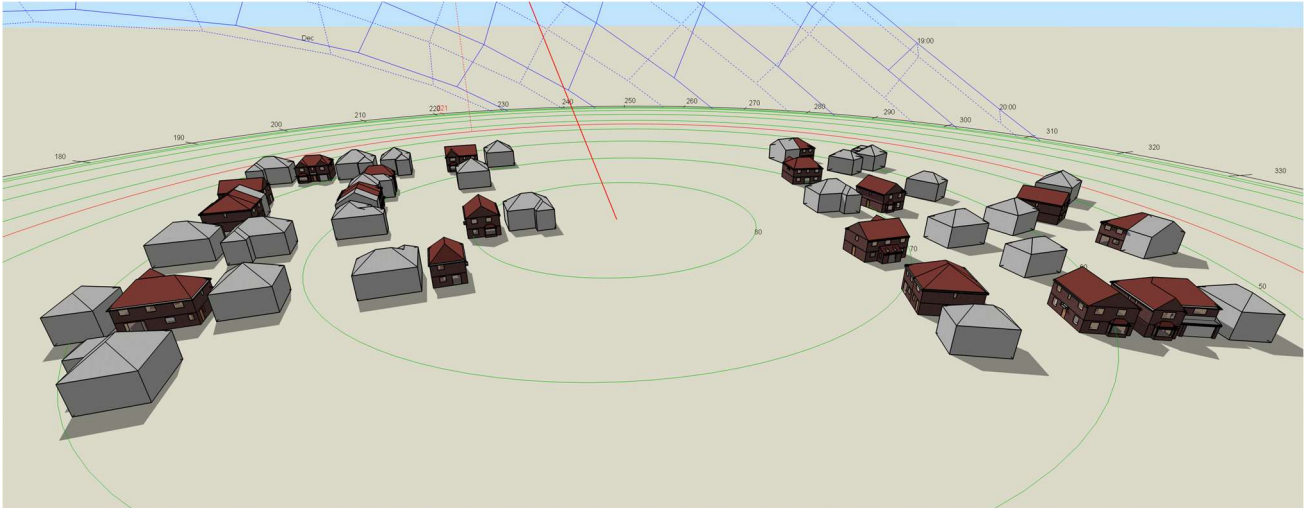


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## Revisions

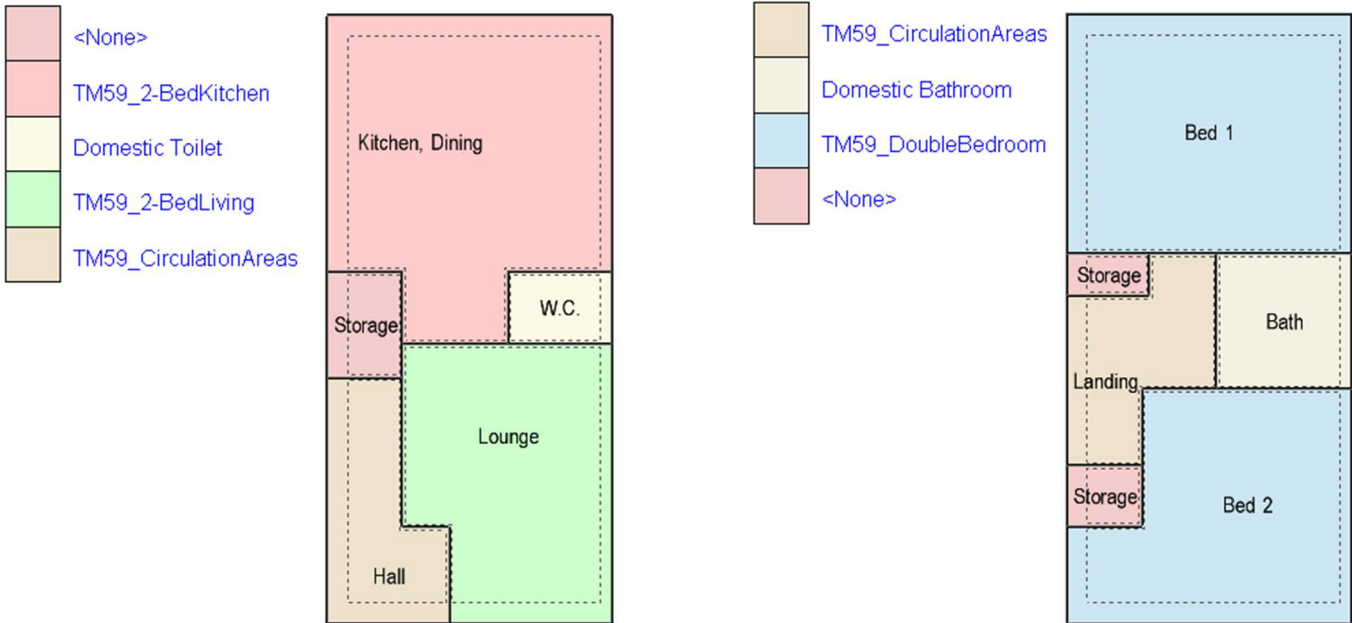
| Revision | Revision Details | Report prepared by    |  |            | Report checked by |  |            |
|----------|------------------|-----------------------|--|------------|-------------------|--|------------|
|          |                  | Name                  |  | Date       | Name              |  | Date       |
| -        | -                | William Harrison-Hurd |  | 20/06/2025 | Will Howarth      |  | 20/06/2025 |
|          |                  |                       |  |            |                   |  |            |
|          |                  |                       |  |            |                   |  |            |
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## DSM Model

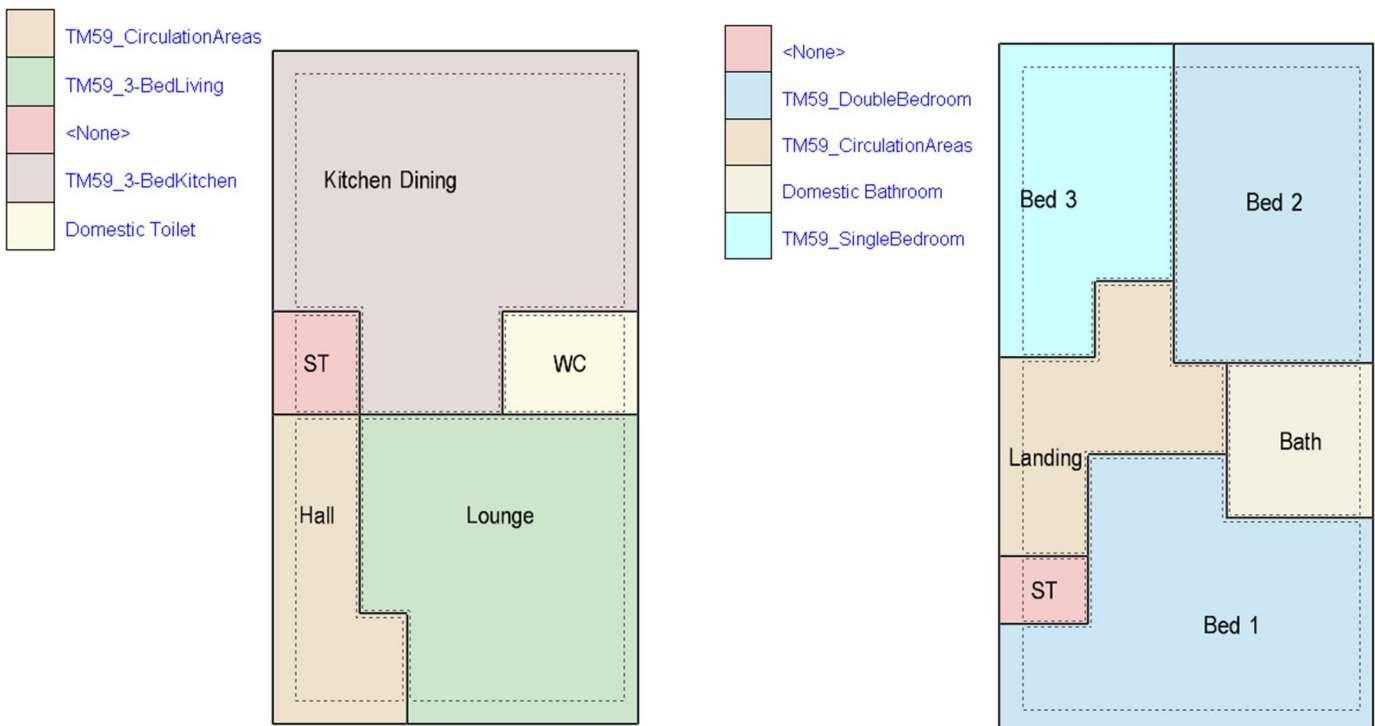


## DSM Floor Plans

### AL24



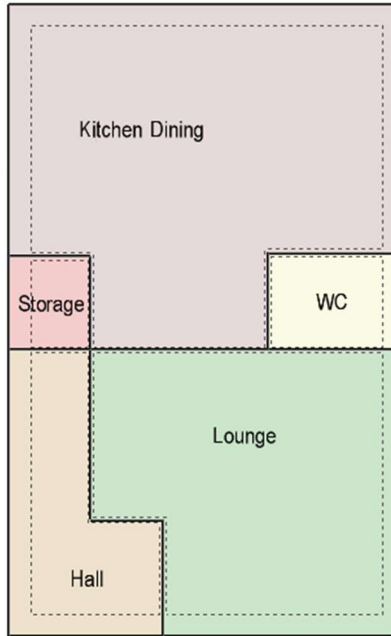
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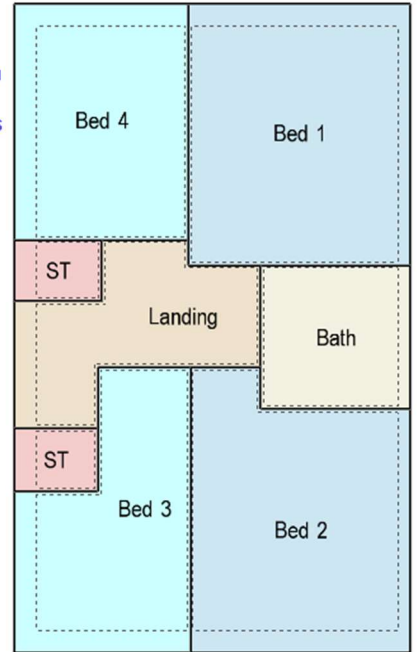


### AL41

- <None>
- TM59\_3-BedKitchen
- Domestic Toilet
- TM59\_CirculationAreas
- TM59\_3-BedLiving

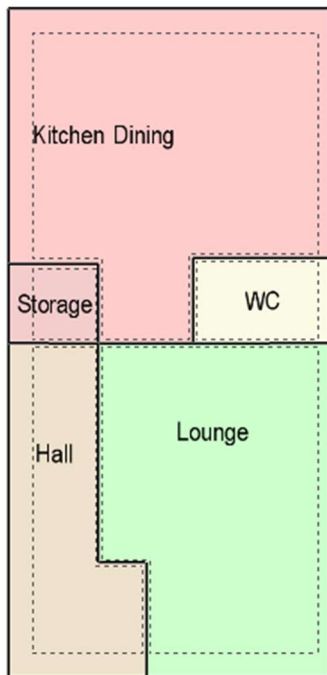


- TM59\_SingleBedroom
- TM59\_DoubleBedroom
- TM59\_CirculationAreas
- Domestic Bathroom
- <None>

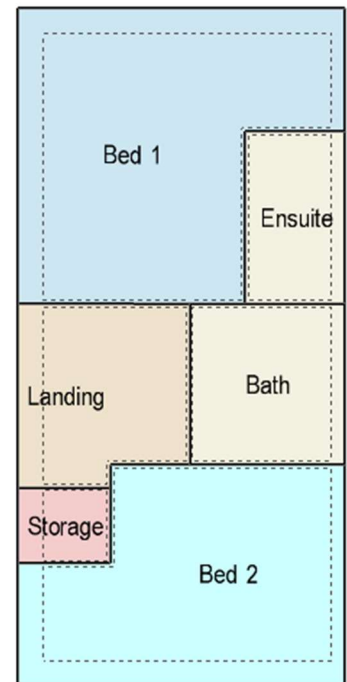


### L255

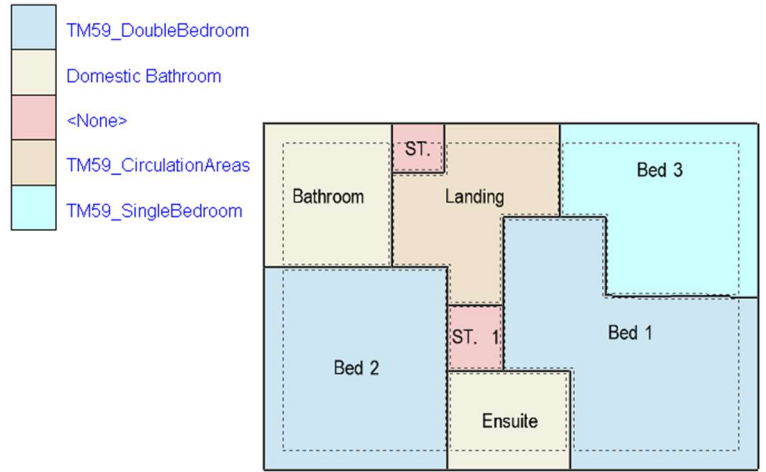
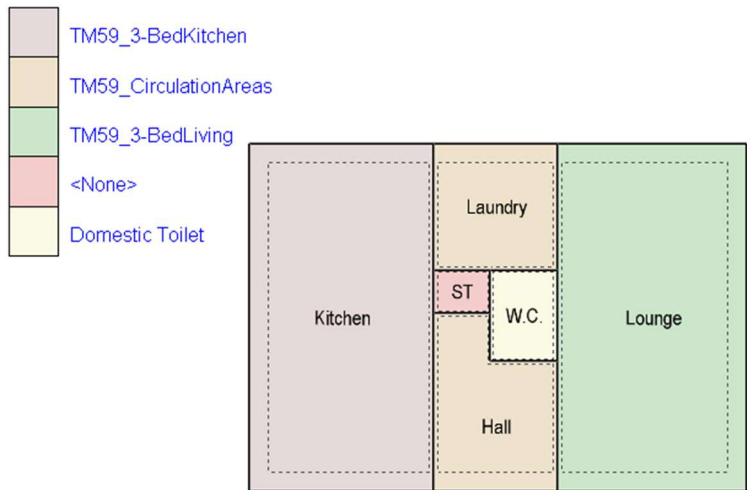
- TM59\_2-BedLiving
- Domestic Toilet
- <None>
- TM59\_2-BedKitchen
- TM59\_CirculationAreas



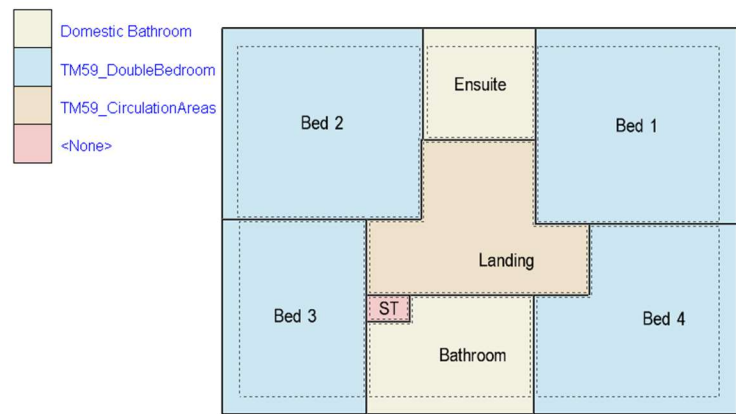
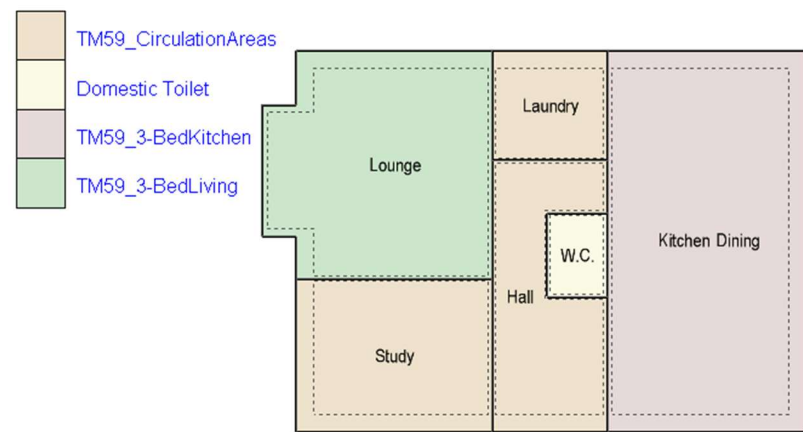
- TM59\_DoubleBedroom
- Domestic Bathroom
- TM59\_CirculationAreas
- TM59\_SingleBedroom
- <None>



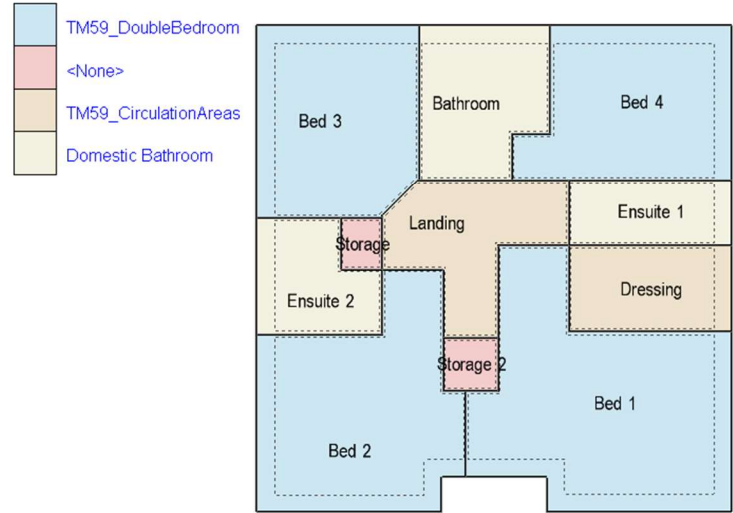
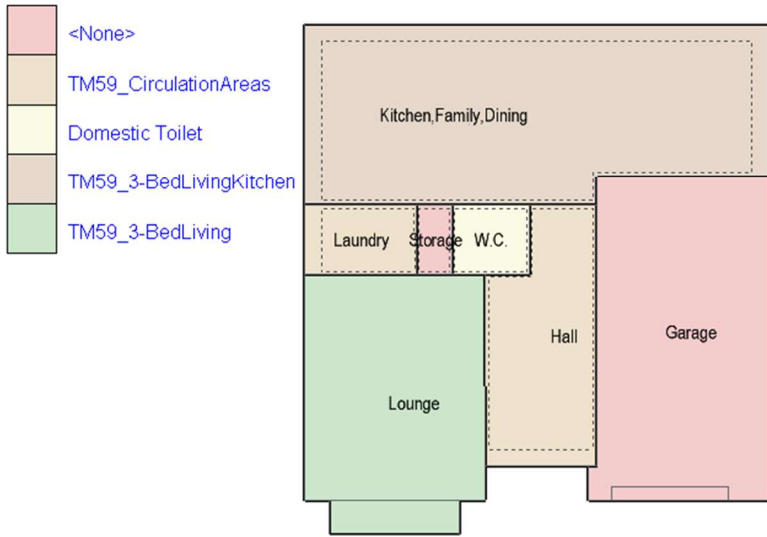
L361



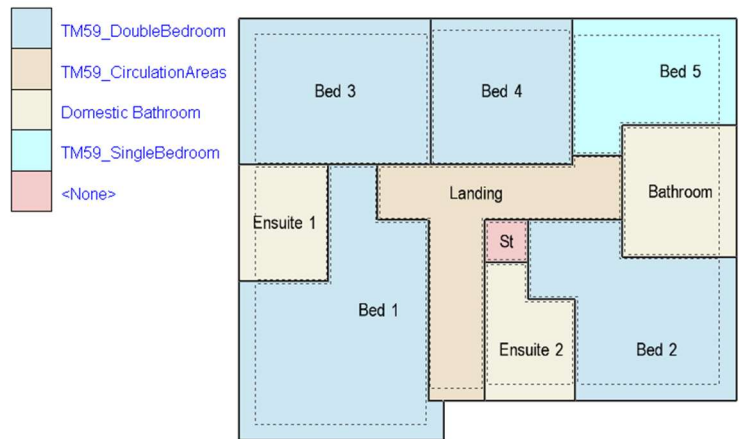
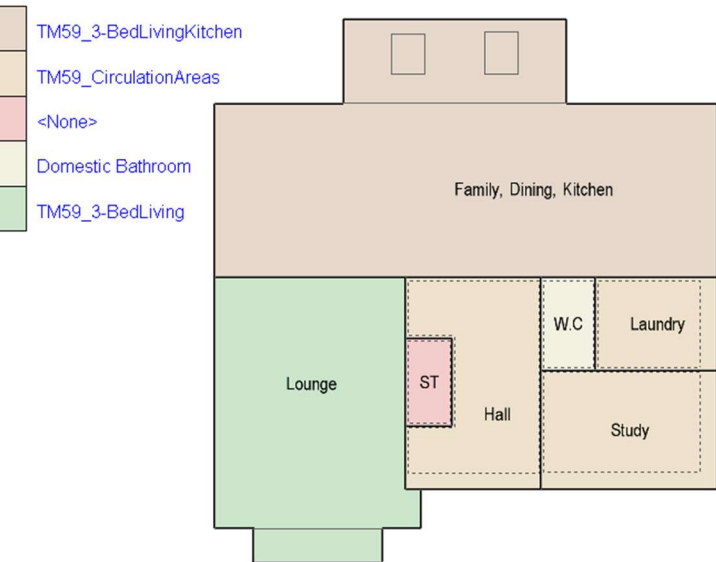
L467



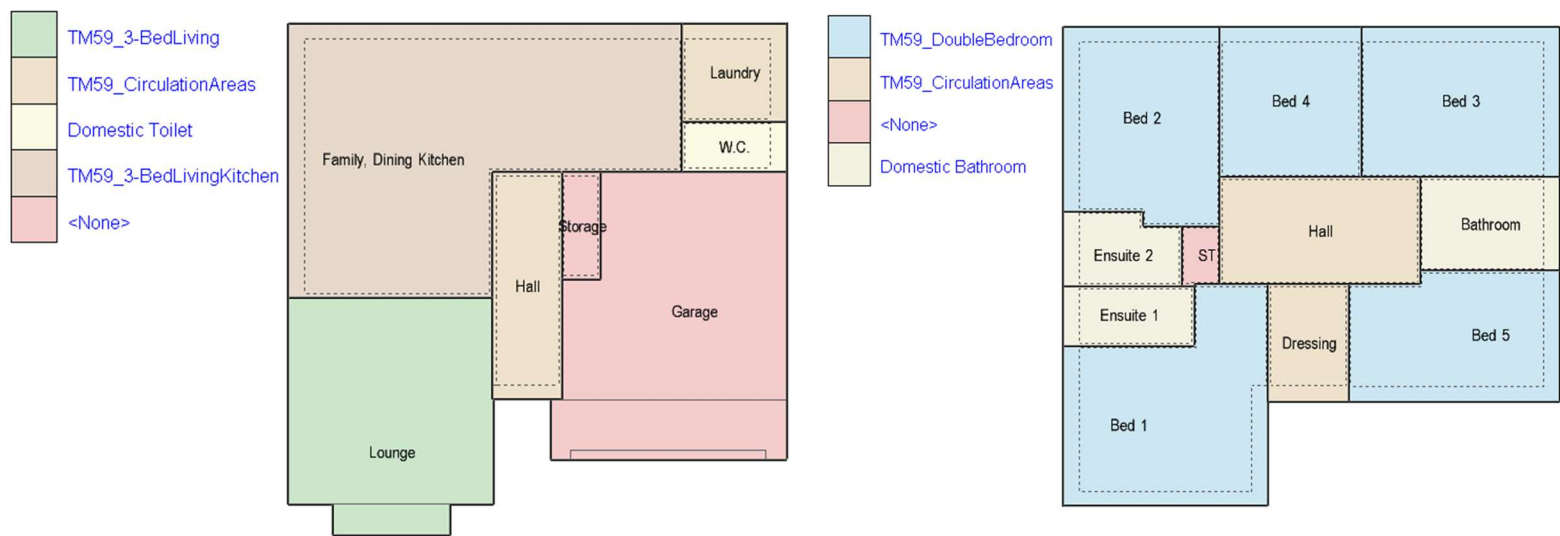
L468



L552



L553



## Introduction

### Software

The building has been modelled using DesignBuilder Dynamic Simulation Modelling Software Version 7.2.0.032, using the EnergyPlus Simulation Engine.

The DSM model can be used to provide:

- Overheating analysis (this report)
- Future weather energy-consumption predictions
- Heating and Cooling Load calculations
- Climate Based Daylight Modelling
- Thermal Fluid Dynamics Assessments
- Building Compliance Assessments (Building Regulations Part-L and EPC)
- Bespoke detailed HVAC analysis
- Digital Twin and Calibrated Modelling
- Uncertainty and Sensitivity Analysis
- Optimisation

### In accordance with Approved Document O

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

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

### Compliance Criteria for CIBSE TM59

TM59 is the design methodology for the assessment of overheating risk in homes. It is an extension of the BS EN 15251 standard described above. It contains standardised internal gains and occupancy profiles that must be included in all TM59 modelling and stipulates which weather files should be used. In order to pass the standard, both of the following criteria must pass the annual simulation test:

- Criterion A - For Living Rooms, Kitchens and Bedrooms - CIBSE TM52 Criterion 1: Hours of exceedance. < 3% indicates a fail.
- Criterion B - For Bedrooms Only – from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. This equals 32hrs - so 33hrs indicates a fail.

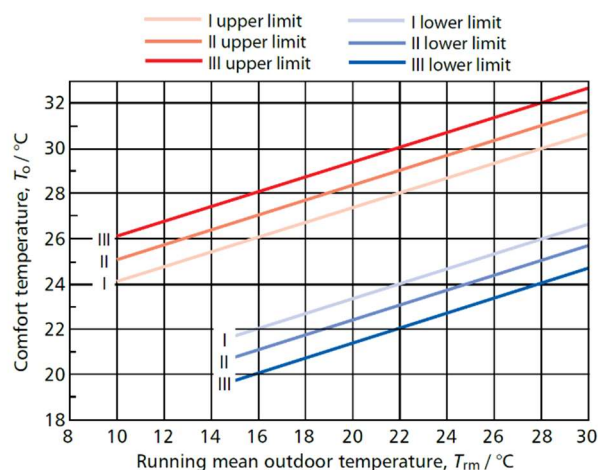
## Corridors – Assessment Criteria

N.B. Whilst TM59 does not include a mandatory target for corridors, they suggest that  $\approx 3\%$  of total annual hours at 28°C operative should be the target. See S4.5 from TM59 below. Research has shown that overheating corridors lead to overheating flats.

### “4.5 Corridors: assessment criteria

The overheating test for corridors should be based on the number of annual hours for which an operative temperature of 28 °C is exceeded. Whilst there is no mandatory target, if an operative temperature of 28 °C is exceeded for more than 3% of total annual hours, this should be flagged as a significant risk within the report. “

## Adaptive Comfort Category



## Adaptive Comfort Category Description

**Table 2** Suggested applicability of the categories and their associated acceptable temperature range for free-running buildings and of PMV for mechanically ventilated buildings (from BSI, 2007). The CIBSE suggestion is that designers should aim to remain within the Category II limits.

| Category | Explanation   | Suggested acceptable range (K) | Suggested acceptable limits PMV |
|----------|---|--------------------------------|---------------------------------|
| I        | High level of expectation only used for spaces occupied by very sensitive and fragile persons | $\pm 2$                        | $\pm 0.2$                       |
| II       | Normal expectation (for new buildings and renovations)  | $\pm 3$                        | $\pm 0.5$                       |
| III      | A moderate expectation (used for existing buildings)  | $\pm 4$                        | $\pm 0.7$                       |
| IV       | Values outside the criteria for the above categories (only acceptable for a limited periods)  | $>4$                           | $> 0.7$                         |

*This building has been tested under Category II limits, as per the table above.*

### Limits on CIBSE's TM59 modelling (Part O)

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.

### Acceptable mitigation strategies in accordance with Part O

- a) Fixed shading devices; Shutters, external blinds, overhangs, awnings.
- b) Glazing design involving; size, orientation, g-value, depth of window reveal.
- c) Building design
- d) Shading by permanent buildings

Blinds, curtains, and foliage such as tree cover should not be taken into account when considering whether the requirements of Part O have been met.

## Location and Orientation

This site was simulated using Leeds DSY1 2020's HIGH 50% CIBSE weather location file, Leeds is the closest of the 16 approved weather stations - Approximately 19.9 miles from the site (HD8). The plots have been orientated as per the provided site layout - Please see Appendix 1.

## Specification for the Model

The following information has been used to produce the building model.

### Drawing Pack

The Client provided:

- AutoCad Plans
- AutoCad Elevations
- AutoCad Sections
- Site Layout - Rev J

## Construction Specification

As per Energy Specification (L1 2021) 21/09/23 – Please see Appendix 2

Thermal Mass – Thermal characteristics of all elements are integral to the Dynamic Model.

### HVAC

Heating – Boiler (SEDBUK - 89%), Radiator heating.

Ventilation – DMEV, Vent Axia Lo-Carbon NBR DMEV C (ADF table 1.22)

### Ventilation Strategy

Natural (purge) ventilation is provided by opening windows. The windows are simulated to start to open as per opened when a room is occupied and the operative temperature in the room is above 22°C, as stated in Part O, section 2.6, (i). Any accessible windows are modelled to close at 11pm until 8am (in line with ADO).

Miller Homes have confirmed that no plots are constrained by pollution, noise or otherwise.

Air infiltration through other openings, vents and cracks in the building structure is simulated and included in the Crack Template.

EnergyPlus Crack Template of Good = 5.0 m<sup>3</sup>/(h.m<sup>2</sup>) @ 50 Pa

### Internal Conditions

Defined by dynamic simulation model as per TM59:2017, Section 6, Table 2:

## Detailed Inputs

| Input                            | Figure                                     | Source                       |
|----------------------------------|--|------------------------------|
| Metabolic Rates                  | 130 w<br>(sensible = 65W,<br>latent = 65w) | TM59                         |
| Lighting                         | 2 W/m <sup>2</sup>                         | TM59 Default                 |
| Main zonal temperature setpoints | Various                                    | TM59 Default                 |
| Equipment IHG & Schedules        | Various                                    | TM59 Defaults – see Appendix |
| Internal Air Speed               | 0.1m/s                                     | TM59 Default                 |

## Window & Door Schedule

Approved Document O opening protocols have been used to set opening schedules. (See below)

| Opening  | Schedule                                       |
|--|--|
| <b>All Openings (Apart from entrance Door)</b>     | Included in ventilation strategy               |
| <b>Entrance Door</b>                               | Always Closed                                  |
| <b>Easily Accessible Openings (Defined by ADO)</b> | Closed 11pm until 8am, Opening remaining hours |
| <b>Internal Doors</b>                              | Closed 11pm until 8am. Opening remaining hours |
| <b>All Remaining Openings</b>                      | Open 24/7                                      |

The discharge coefficient for each opening has been calculated using the Future Homes Hub Part O Simplified Method Spreadsheet tool (This takes into consideration ADO's 650mm restriction for outward opening windows).

**Easily Accessible** - Defined as one of the following:

- 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.

Windows above porches/canopies, where they have no independent structural contact with the ground, have not been considered accessible; following the removal of NHBC's technical bulletin 6.7/22. If the technical bulletin returned, it would be more than likely that a Certificate, proving the porch/canopy cannot be used to gain accessibility, would be required.

## Protection From Falling

As all windows form part of the ventilation strategy, all openings must comply with Approved Document O – Protection from Falling – Section 3.8 – 3.10 (please see appendix 4). Meaning that any openings currently not complying with this; will require guarding meeting the criteria laid out within sections 3.8 – 3.10.

## Sample Selection

As a minimum we will always model each type, and each built form of that type. We do this as the characteristics of each individual design behave differently in regard to overheating.

The sample of plots to represent these types is then selected based on the following characteristics; predominantly west-facing glazing, none/little shading from nearby properties. This ensures we produce our mitigation strategy for each type from the plots which are most at risk of overheating.

## Part O Calculation Results

### Criteria

- Criterion A - > 3% indicates a fail (Living rooms, Kitchens and Bedrooms).
- Criterion B - > 32hrs indicates a fail (Bedrooms only).

### Base Specification Results

Results produced from Base specification listed above.

| Base Results  |       |                |                 |                  |           |
|---|-------|----------------|-----------------|------------------|-----------|
| Criteria for predominantly naturally ventilated homes |       |                |                 |                  |           |
| Plot  | Floor | Zone           | Criterion A (%) | Criterion B (hr) | Pass/Fail |
| AL24 - Semi-detached                                  |       |                |                 |                  |           |
| 38  | FF    | BED1           | 0               | 4.83             | Pass      |
|   | FF    | BED2           | 0               | 1.67             | Pass      |
|   | GF    | KITCHENXDINING | 0               | N/A              | Pass      |
|   | GF    | LOUNGE         | 0               | N/A              | Pass      |
| 58  | FF    | BED1           | 0               | 4.33             | Pass      |
|   | FF    | BED2           | 0               | 4.5              | Pass      |
|   | GF    | KITCHENXDINING | 0               | N/A              | Pass      |
|   | GF    | LOUNGE         | 0               | N/A              | Pass      |
| AL24 - Mid-terrace                                    |       |                |                 |                  |           |
| 59  | FF    | BED1           | 0               | 3.83             | Pass      |
|   | FF    | BED2           | 0               | 4                | Pass      |
|   | GF    | KITCHENXDINING | 0               | N/A              | Pass      |
|   | GF    | LOUNGE         | 0               | N/A              | Pass      |
| AL32 - Semi-detached                                  |       |                |                 |                  |           |
| 31  | FF    | BED1           | 0               | 6.17             | Pass      |
|   | FF    | BED2           | 0               | 6                | Pass      |
|   | FF    | BED3           | 0               | 5.83             | Pass      |
|   | GF    | KITCHENDINING  | 0               | N/A              | Pass      |
|   | GF    | LOUNGE         | 0               | N/A              | Pass      |
| 39  | FF    | BED1           | 0               | 5.5              | Pass      |
|   | FF    | BED2           | 0               | 6.83             | Pass      |
|   | FF    | BED3           | 0               | 6.67             | Pass      |
|   | GF    | KITCHENDINING  | 0.03            | N/A              | Pass      |

|                      |    |               |      |       |      |
|----------------------|----|---------------|------|-------|------|
|                      | GF | LOUNGE        | 0    | N/A   | Pass |
| AL41 - Semi-detached |    |               |      |       |      |
| 7                    | FF | BED1          | 0    | 9.33  | Pass |
|                      | FF | BED2          | 0    | 4.5   | Pass |
|                      | FF | BED3          | 0    | 4.67  | Pass |
|                      | FF | BED4          | 0.07 | 9.33  | Pass |
|                      | GF | KITCHENDINING | 0.25 | N/A   | Pass |
|                      | GF | LOUNGE        | 0    | N/A   | Pass |
| L255 - Semi-detached |    |               |      |       |      |
| 64                   | FF | BED1          | 0    | 4.33  | Pass |
|                      | FF | BED2          | 0    | 2.67  | Pass |
|                      | GF | KITCHENDINING | 0    | N/A   | Pass |
|                      | GF | LOUNGE        | 0    | N/A   | Pass |
| L255 - Mid-terrace   |    |               |      |       |      |
| 65                   | FF | BED1          | 0    | 3     | Pass |
|                      | FF | BED2          | 0    | 4.17  | Pass |
|                      | GF | KITCHENDINING | 0    | N/A   | Pass |
|                      | GF | LOUNGE        | 0    | N/A   | Pass |
| L361 - Detached      |    |               |      |       |      |
| 62                   | FF | BED1          | 0.07 | 8.83  | Pass |
|                      | FF | BED2          | 0.05 | 17.17 | Pass |
|                      | FF | BED3          | 0.01 | 9.83  | Pass |
|                      | GF | KITCHEN       | 0.45 | N/A   | Pass |
|                      | GF | LOUNGE        | 0.46 | N/A   | Pass |
| 78                   | FF | BED1          | 0.07 | 9.5   | Pass |
|                      | FF | BED2          | 0    | 10.67 | Pass |
|                      | FF | BED3          | 0.12 | 17.33 | Pass |
|                      | GF | KITCHEN       | 0.04 | N/A   | Pass |
|                      | GF | LOUNGE        | 1.02 | N/A   | Pass |
| L467 - Detached      |    |               |      |       |      |
| 10                   | FF | BED1          | 0.13 | 12.67 | Pass |
|                      | FF | BED2          | 0    | 8.5   | Pass |
|                      | FF | BED3          | 0    | 10.5  | Pass |
|                      | FF | BED4          | 0.15 | 10.17 | Pass |
|                      | GF | KITCHENDINING | 0.52 | N/A   | Pass |
|                      | GF | LOUNGE        | 0    | N/A   | Pass |
| 23                   | FF | BED1          | 0.12 | 13.33 | Pass |
|                      | FF | BED2          | 0    | 7.67  | Pass |
|                      | FF | BED3          | 0.04 | 5.5   | Pass |
|                      | FF | BED4          | 0.15 | 8.17  | Pass |
|                      | GF | KITCHENDINING | 0.51 | N/A   | Pass |
|                      | GF | LOUNGE        | 0.44 | N/A   | Pass |

|                 |    |                |      |       |      |
|-----------------|----|----------------|------|-------|------|
| 32              | FF | BED1           | 0    | 8.83  | Pass |
|                 | FF | BED2           | 0.03 | 18.67 | Pass |
|                 | FF | BED3           | 0.3  | 17.33 | Pass |
|                 | FF | BED4           | 0    | 10.33 | Pass |
|                 | GF | KITCHENDINING  | 0    | N/A   | Pass |
|                 | GF | LOUNGE         | 1.58 | N/A   | Pass |
| 42              | FF | BED1           | 0.13 | 16.33 | Pass |
|                 | FF | BED2           | 0    | 13    | Pass |
|                 | FF | BED3           | 0.02 | 7.33  | Pass |
|                 | FF | BED4           | 0.2  | 6.5   | Pass |
|                 | GF | KITCHENDINING  | 0.55 | N/A   | Pass |
|                 | GF | LOUNGE         | 0.27 | N/A   | Pass |
| 61              | FF | BED1           | 0    | 7.67  | Pass |
|                 | FF | BED2           | 0    | 10.5  | Pass |
|                 | FF | BED3           | 0.33 | 5.33  | Pass |
|                 | FF | BED4           | 0.13 | 11.5  | Pass |
|                 | GF | KITCHENDINING  | 0.07 | N/A   | Pass |
|                 | GF | LOUNGE         | 0.57 | N/A   | Pass |
| L468 - Detached |    |                |      |       |      |
| 9               | FF | BED1           | 0.03 | 12.33 | Pass |
|                 | FF | BED2           | 0    | 11.83 | Pass |
|                 | FF | BED3           | 0    | 5.83  | Pass |
|                 | FF | BED4           | 0    | 7.83  | Pass |
|                 | GF | KTCHNXFMLYXDNG | 0.3  | N/A   | Pass |
|                 | GF | LOUNGE         | 0.66 | N/A   | Pass |
| 55              | FF | BED1           | 0    | 4.33  | Pass |
|                 | FF | BED2           | 0    | 7.33  | Pass |
|                 | FF | BED3           | 0.09 | 19    | Pass |
|                 | FF | BED4           | 0.07 | 12.33 | Pass |
|                 | GF | KTCHNXFMLYXDNG | 1.95 | N/A   | Pass |
|                 | GF | LOUNGE         | 0    | N/A   | Pass |
| L552 - Detached |    |                |      |       |      |
| 40              | FF | BED1           | 0.06 | 11    | Pass |
|                 | FF | BED2           | 0.07 | 14.5  | Pass |
|                 | FF | BED3           | 0    | 10.33 | Pass |
|                 | FF | BED4           | 0    | 11.67 | Pass |
|                 | FF | BED5           | 0    | 8     | Pass |
|                 | GF | FMLYXDNGXKTCHN | 0    | N/A   | Pass |
|                 | GF | LOUNGE         | 0.76 | N/A   | Pass |
| 52              | FF | BED1           | 0    | 7.17  | Pass |
|                 | FF | BED2           | 0    | 7.5   | Pass |
|                 | FF | BED3           | 0.14 | 17.33 | Pass |

|                 |    |                      |      |       |      |
|-----------------|----|----------------------|------|-------|------|
|                 | FF | BED4                 | 0.4  | 18.17 | Pass |
|                 | FF | BED5                 | 0.22 | 11.83 | Pass |
|                 | GF | FMLYXDNINGXKTCHN     | 0.92 | N/A   | Pass |
|                 | GF | LOUNGE               | 0.02 | N/A   | Pass |
| L553 - Detached |    |                      |      |       |      |
| 24              | FF | BED1                 | 0    | 5.5   | Pass |
|                 | FF | BED2                 | 0.04 | 20.83 | Pass |
|                 | FF | BED3                 | 0.05 | 22.17 | Pass |
|                 | FF | BED4                 | 0.18 | 35.67 | Fail |
|                 | FF | BED5                 | 0    | 101.5 | Fail |
|                 | GF | FAMILYXDININGKITCHEN | 0.65 | N/A   | Pass |
|                 | GF | LOUNGE               | 0.21 | N/A   | Pass |
| 74              | FF | BED1                 | 0    | 11    | Pass |
|                 | FF | BED2                 | 0    | 8.83  | Pass |
|                 | FF | BED3                 | 0    | 9.33  | Pass |
|                 | FF | BED4                 | 0    | 14.33 | Pass |
|                 | FF | BED5                 | 0.3  | 103.5 | Fail |
|                 | GF | FAMILYXDININGKITCHEN | 0    | N/A   | Pass |
|                 | GF | LOUNGE               | 0.65 | N/A   | Pass |

From the Base results we can identify the following:

- **AL24 – Semi-detached** - Passes all Criteriaions.
- **AL24 – Mid-terrace** - Passes all Criteriaions.
- **AL32 – Semi-detached** - Passes all Criteriaions.
- **AL41 – Semi-detached** - Passes all Criteriaions.
- **L255 – Semi-detached** - Passes all Criteriaions.
- **L255 – Mid-terrace** - Passes all Criteriaions.
- **L361 – Detached** - Passes all Criteriaions.
- **L467 – Detached** - Passes all Criteriaions.
- **L468 – Detached** - Passes all Criteriaions.
- **L552 – Detached** - Passes all Criteriaions.
- **L553 – Detached** - **Fails Criterion B.**

### Mitigation Strategy implemented in accordance with Part O

| Type            | Method*  |
|-----------------|--|
| L553 - Detached | Mechanical Ventilation achieving 30l/s in Bedroom 5. |

\*We recommend seeking further advice on the sufficiency of background ventilation due to the remedial mechanical ventilation listed above.

\*\* Operation for all Part O extract fans, when required by occupant. For bedrooms; it is suggested fans should be used when 26 degrees is exceeded. Any fan can be used, as long as the flow rates required are achieved, and noise levels are deemed acceptable (ADF Noise levels).

## Mitigation Strategy Results

| Mitigation Results                                    |       |                      |                 |                  |           |
|---|-------|----------------------|-----------------|------------------|-----------|
| Criteria for predominantly naturally ventilated homes |       |                      |                 |                  |           |
| Plot  | Floor | Zone                 | Criterion A (%) | Criterion B (hr) | Pass/Fail |
| L553 - Detached                                       |       |                      |                 |                  |           |
| 24  | FF    | BED1                 | 0               | 5.83             | Pass      |
|   | FF    | BED2                 | 0.03            | 20.67            | Pass      |
|   | FF    | BED3                 | 0.04            | 21.33            | Pass      |
|   | FF    | BED4                 | 0.16            | 25.83            | Pass      |
|   | FF    | BED5                 | 0               | 17.67            | Pass      |
|   | GF    | FAMILYXDININGKITCHEN | 0.65            | N/A              | Pass      |
|   | GF    | LOUNGE               | 0.21            | N/A              | Pass      |
| 74  | FF    | BED1                 | 0               | 10.5             | Pass      |
|   | FF    | BED2                 | 0               | 8.67             | Pass      |
|   | FF    | BED3                 | 0               | 8.67             | Pass      |
|   | FF    | BED4                 | 0               | 13               | Pass      |
|   | FF    | BED5                 | 0.21            | 27               | Pass      |
|   | GF    | FAMILYXDININGKITCHEN | 0               | N/A              | Pass      |
|   | GF    | LOUNGE               | 0.66            | N/A              | Pass      |

## Conclusion

From the base specification, the following Types failed under criterion B; L553. To mitigate the failures; mechanical ventilation was implemented into failing rooms - please see the table under Mitigation Strategy for exact flowrates.

From the base specification, all remaining House Types achieved compliance under both criterions; therefore, they require no mitigation.


The following Types, which are not covered by this report, have achieved compliance via the simplified method; L358, L458, L463, L469, L554.

\*The term Semi-detached has been used throughout this report represent dwellings of End-terrace builtform. \*

## Disclaimer

The data used in this report has been provided by the developer, it has been used in good faith and is assumed to be correct at the time of writing. Different weather conditions and altered usage of the building will produce different results. Alterations to the assumptions listed in this report could result in a different set of results, therefore, the conclusion that the building will not overheat may no longer hold true. Part O Compliance Check list

## Part O Compliance Check list

| 2b.1 Modelling details   |   |
|--|---|
| Dynamic software name and version  | DesignBuilder – Version 7.2.0.032   |
| Weather file location used, including any additional, more extreme weather files   | Leeds_DSY1_2020High50_  |
| Number of sample units modelled, including an explanation of why the size/selection has been chosen                                    | 21 units modelled – Sample chosen to represent the types which have not achieved compliance via the simplified method.  |
| 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) | Yes   |
| Details of the occupancy profiles used   | TM59. See Appendix 3 for more details   |
| Details of the equipment profiles used   | TM59. See Appendix 3 for more details   |
| Details of the opening profiles used   | ADO opening protocols   |
| 2b.3 Modelled overheating mitigation strategy  |   |
| Free areas   | Calculated using the Future Homes Hub Part O Simplified Method Spreadsheet tool   |
| Infiltration and mechanical flow rates   | Infiltration rate - 5.0 m <sup>3</sup> /(h.m <sup>2</sup> ) @ 50 Pa<br>DMEV – Vent Axia Lo-Carbon NBR DMEV C<br>MV - Please see Mitigation Strategy table above |
| Window g-value   | 0.41  |
| Shading strategy   | Shading from nearby dwellings   |
| 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?    | Yes   |
| What is the overall overheating strategy (i.e. what design features are key to the project passing)?                                   | Open windows in warm weather.<br>Mechanical ventilation to rooms failing Criterion B.   |
| 2b.5 Designer's declaration  |   |
| Has the building construction proposal been modelled accurately?   | Yes   |
| Designer's name  | William Harrison-Hurd   |
| Designer's organisation  | Energy & Design Ltd   |
| Designer's signature   |    |
| Registration number (if applicable)  | Elmhurst Energy Approved Overheating Competency Scheme Member<br>Y777-0001  |
| Date of design   | 20/06/2025  |



**Energy Specification (L1a 2021)**

Miller L12021 only not Scotland

- Ground floor – 125mm 0.022 PIR insulation
- Semi exposed Upper floor – 0.11 U value 200mm loft roll 40 between joists (or similar 0.040w/mk) with 93mm thermaline PIR (or similar) and another layer of 12.5mm gyproc Fireline
- Exposed Concrete Floor – 0.22 U value 100mm Total Kooltherm K7(0.020 w/mk) between timber battens
- External cavity walls - 0.21 u value = 125mm fully filled cavity with Knauf supafill 34 (or similar 0.034 w/mk) with 100mm aircrete block (0.15 w/mk)
- Garage solid wall – 0.28 u value = 100mm aircrete block (0.15 w/mk) with 63mm thermaline PIR
- Garage solid brick wall – 0.30 u value = 215mm brick with 63mm thermaline PIR
- Garage cavity wall - 0.18 U Value = 100mm aircrete block (0.15 w/mk) 125mm fully filled cavity with Knauf supafill 34 (or similar 0.034 w/mk) with 100mm aircrete block (0.15 w/mk)
- Party Walls – 0.0 U Value = fully filled with sealed edges
- Studded Knee Wall – 0.15 U Value – 90mm Knauf Frame therm 32 (or similar 0.032 w/mk) between Joists, underlined with 93mm Thermaline PIR
- Dormer wall and cheeks – 0.19 U value - 90mm Knauf Frame therm 32 (or similar 0.032 w/mk) between timber underlined with 63mm thermaline PIR
- Roof Main - 0.07 U value = Knauf loft roll 44 (or similar 0.044 w/mk) 600mm total - 100mm between joists and 500mm cross laid over
- Roof (Dormers, Bays & RITR eaves area) - 0.16 U value = Knauf loft roll 44 (or similar 0.044 w/mk) 270mm total - 100mm between joists and 170mm cross laid over
- Sloping Roof – 0.13 U Value – 140mm Knauf Frame Therm 32 (or similar 0.032 w/mk) between rafters, underlined with 93mm Thermaline PIR
- Windows / French Doors–1.3 U value, 0.41 G Factor from BFRC Certificate
- Roof Light – 1.3 U value 0.72G, 0.7 frame factor
- Entrance Doors – 1.5 U value
- Rear Doors – 1.5 U value
- Garage Doors – 1.4 U value
- Boilers & heating controls – **as per heating design**
- Bulbs - 9W & 806 Lumens
- Shower - Flow rate 8 from combi
- Design air permeability 4.5 (all plots tested)
- no secondary fire or flue
- DMEV – 500340 Vent axia Flexible duct/500776 in SAP 10
- Thermal Linear bridging details – As Per PSI Details Schedule
- Technologies - PV or WWHRS & FGHRs

Figure 2: Energy Specification

## Appendix 3

**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<br>2 people at 100% gains from 8 am to 11 pm  | Peak load of 450 W from 6 pm to 8 pm*.<br>200 W from 8 pm to 10 pm<br>110 W from 9 am to 6 pm and 10 pm to 12 pm<br>Base load of 85 W for the rest of the day    |
| 1-bedroom apartment:<br>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<br>200 W from 8 pm to 10 pm<br>110 W from 9 am to 6 pm and from 10 pm to 12 pm<br>Base load of 85 W for the rest of the day |
| 1-bedroom apartment:<br>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<br>60 W from 9 am to 6 pm and from 10 pm to 12 pm<br>Base load of 35 W for the rest of the day                             |
| 1-bedroom apartment:<br>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<br>Base load of 50 W for the rest of the day  |
| 2-bedroom apartment:<br>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<br>200 W from 8 pm to 10 pm<br>110 W from 9 am to 6 pm and from 10 pm to 12 pm<br>Base load of 85 W for the rest of the day |
| 2-bedroom apartment:<br>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<br>60 W from 9 am to 6 pm and from 10 pm to 12 pm<br>Base load of 35 W for the rest of the day                             |
| 2-bedroom apartment:<br>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<br>Base load of 50 W for the rest of the day  |
| 3-bedroom apartment:<br>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<br>200W from 8 pm to 10 pm<br>110 W from 9 am to 6 pm and from 10 pm to 12 pm<br>Base load of 85 W for the rest of the day  |
| 3-bedroom apartment:<br>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<br>60 W from 9 am to 6 pm and from 10 pm to 12 pm<br>Base load of 35 W for the rest of the day                             |
| 3-bedroom apartment:<br>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<br>base load of 50 W for the rest of the day  |
| Double bedroom                                       | 2 people at 70% gains from 11 pm to 8 am<br>2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm<br>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<br>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<br>1 person at full gains from 8 am to 11 pm  | Peak load of 80 W from 8 am to 11 pm<br>Base load of 10 W during sleeping hours  |
| Communal corridors                                   | Assumed to be zero   | Pipework heat loss only; see section 3.1 above   |

Figure 3: TM59 Occupancy and equipment gain descriptions





Figure 9: TM59 Living Room/Kitchen Occupancy

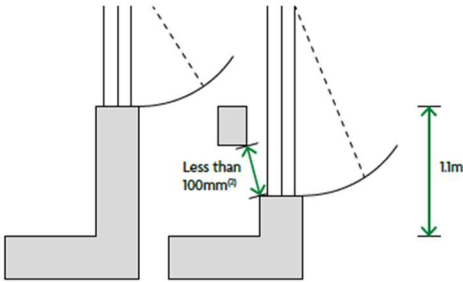
## Protection from falling

- 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.
- 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.

**NOTE:** To ensure safe operation it may be necessary to reduce the size of the outward opening windows and provide more windows to meet the required free area.

**Table 3.1 Guarding heights**

| Change in floor level between inside and outside | Guarding height <sup>(1)</sup> |
|--|--------------------------------|
| Less than 600mm                                  | See Approved Document K        |
| More than 600mm                                  | 1.1m                           |



**NOTES:**

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

- 3.10 Guarding for large openings could include, but is not limited to, either of the following.
- Shutters with a child-proof lock.
  - Fixed guarding.