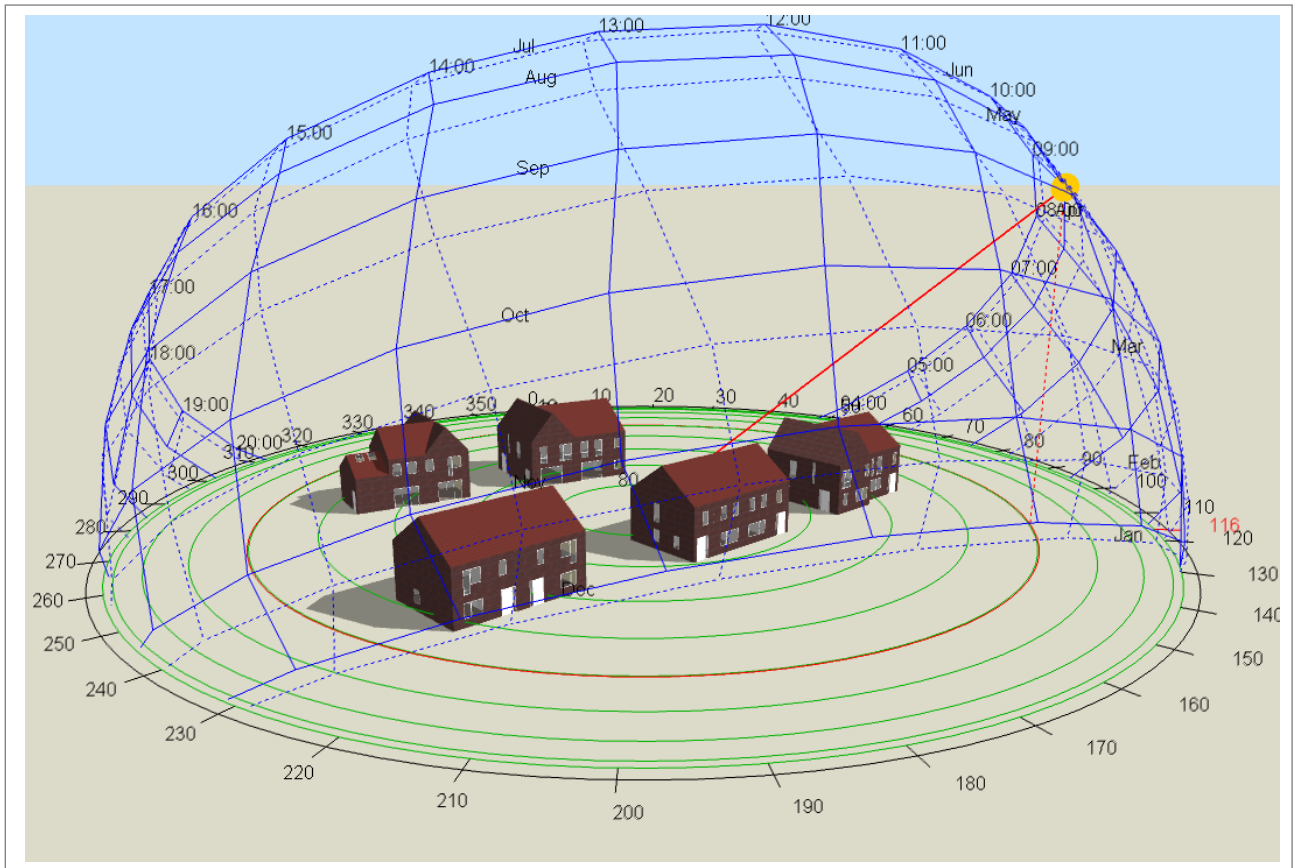




Domestic Overheating Assessment

Dynamic Thermal Modelling – Part O

Ginnell Farm,
Rochdale

1st September 2025

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Document Status

Client: Fairway Building and Remedial Contractors Ltd

Site: Ginnell Farm, Rochdale

Proposals: The construction of 9 new dwellings

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Appendix A: Dynamic Thermal Modelling (TM59) Results

Document Control Record:

Prepared by	Checked by	Date	Job	Revision
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1 Scope

This report has been prepared to assess the likelihood of overheating for the proposed residential development at Ginnell Farm on Broad Lane in Rochdale which consists of the construction of 9 new build houses.

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

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

All results are based on the output from computer modelling software and should be taken as an indication of the likely final situation, but these conditions cannot be guaranteed.

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



Figure 01 - *DesignBuilder 3D Rendering*

2 Executive Summary

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

The overheating mitigation strategy includes the use of hybrid MVHR ventilation and glazing with a g-value of 0.50 to minimise solar gains.

The proposed overheating mitigation measures are summarised in the table below:

Overheating Strategy	TM59 / Part O Compliance	Notes
- Glazing with a g-value of 0.50 - Hybrid MVHR Ventilation (w/ cooling coil for peak lopping)	☒	Overheating strategy compliant

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

Based on the current architectural drawings, the openable windows above ground floor do not meet the guarding height requirements of Part O (1100mm from FFL). Therefore, these windows can only be opened 100mm wide as part of the overheating mitigation strategy in accordance with Approved Document Part O.

An alternative strategy is presented where the windows have been modelled as fully openable. This shows that the dwellings are capable of passing Part O based on a natural ventilation strategy if changes are made to the design to ensure the Part O guarding requirement is met.

3 Part O: Dynamic Thermal Modelling Method

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

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

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

Limits on CIBSE's TM59 modelling

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

- a) When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following:
 - i. Start to open when the internal temperature exceeds 22°C
 - ii. Be fully open when the internal temperature exceeds 26°C
 - iii. Start to close when internal temperature falls below 26°C
 - iv. Be fully closed when the internal temperature falls below 22°C
- b) At night (11pm to 8am), openings should be modelled as fully open if both of the following apply:
 - i. The opening is on the first floor or above and not easily accessible
 - ii. The internal temperature exceeds 23°C at 11pm.
- c) When a ground floor of easily accessible room is unoccupied, both of the following apply:

Ensuring the Overheating Strategy is Usable

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

1.1 Noise

- **3.2)** In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).
- **3.3)** Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits: A) 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am). & b) 55dB LAFmax, more than 10 times a night (between 11pm and 7am).

1.2 Pollution

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

1.3 Security

- **3.6)** When determining the free area available for ventilation during sleeping hours, only the proportion of openings that can be opened securely should be considered to provide useful

ventilation. This particularly applies in the following locations, where openings may be vulnerable to intrusion by a casual or opportunistic burglar.

- a) Ground floor bedrooms
- b) Easily accessible bedrooms

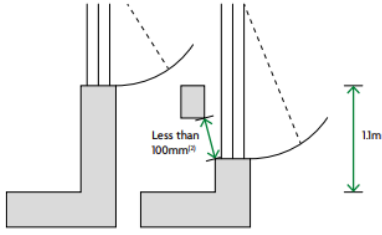
1.4 Protection from Falling

- **3.8)** Openings which are intended to be open for long periods to reduce overheating risk might pose a higher risk of falls from height. Only the proportion of openings which can be opened with a very low risk of occupants falling from height should be considered to form part of the overheating mitigation strategy.

- **3.9)** Openings that can be opened wider than 100mm may form part of the overheating mitigation strategy where they meet all of the following conditions:

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

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*.

Windows Restrictions

Based on the current drawings, the first-floor windows have a sill height of approximately 800mm and do not meet the Part O Guarding requirement of 1100mm. Therefore, these windows are restricted to open to 100mm wide as part of the overheating mitigation strategy in accordance with Part O Protection from falling (see above).

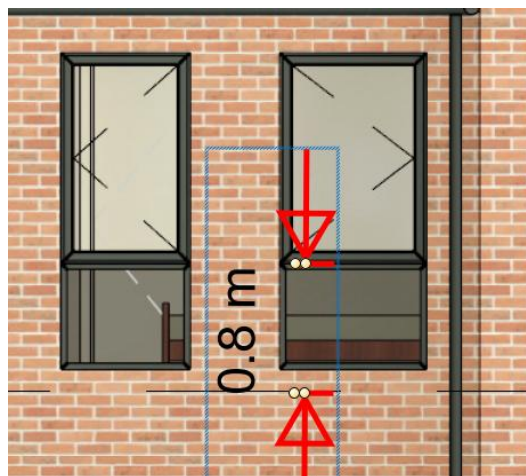


Figure 02 – Architectural elevation drawing first floor windows

4 CIBSE TM59 Assessment Criteria

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

Compliance is based on passing both of the following criteria:

- a) For living rooms, kitchens and bedrooms: the number of hours during which DT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 percent of occupied hours. (CIBSE TM52 Criterion 1: Hours of exceedance).**
- b) For bedrooms only: to guarantee comfort during the sleeping hours the operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. (Note: 1% of the annual hours between 22:00 and 07:00 for bedrooms is 32 hours, so 33 or more hours above 26 °C will be recorded as a fail).**

5 The Model

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

Geometry

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

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

-  Project ground floor
-  Project internal floor
-  Project partition
-  Project internal door
-  Project wall
-  Project external door
-  Project semi-exposed ceiling
-  Project unoccupied pitched roof
-  Project semi-exposed wall
-  Project pitched roof
-  Project external glazing

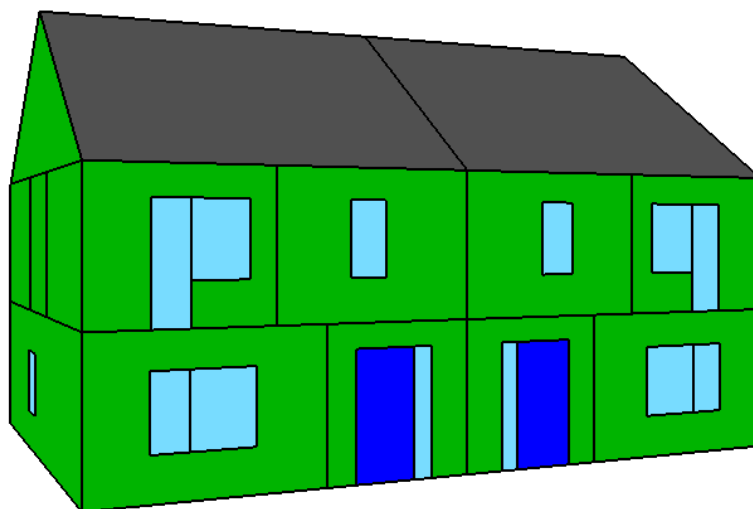


Figure 02 - Thermal Model image (Plot 8-9 example)

Site Location and Climate Data

The CIBSE DSY weather file for Manchester (DSY1_2020_High50) has been selected as this is the closest weather file for the site's location.

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

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

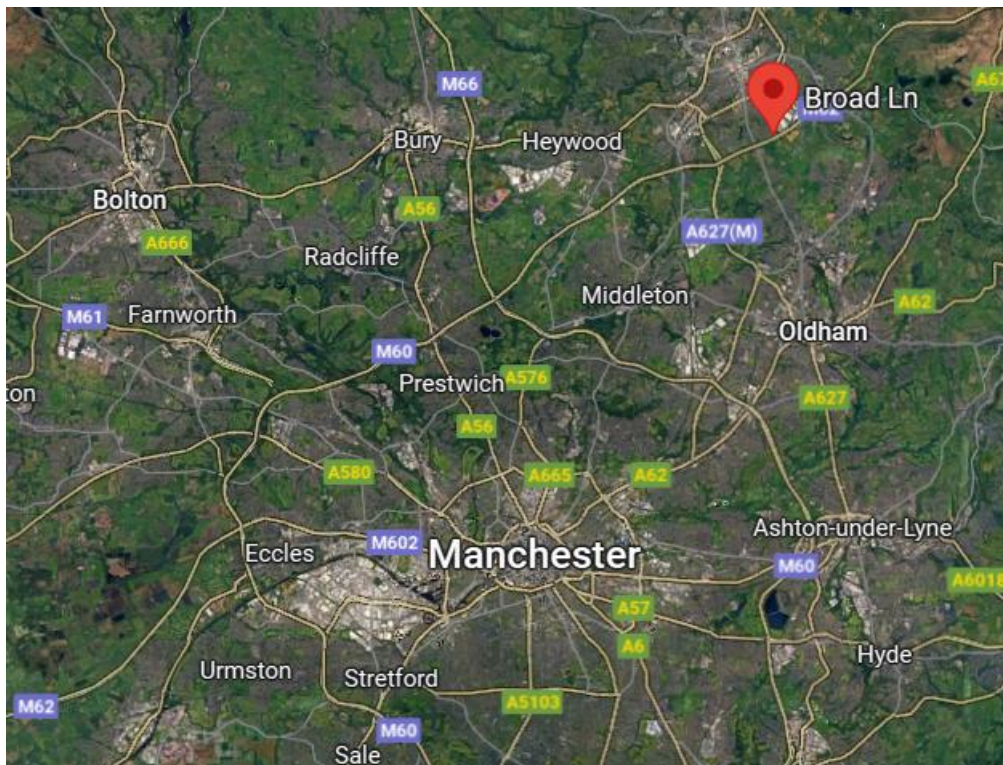


Figure 03 - Site Location

The site is located on Broad Lane in Rochdale.

Building Construction and U-Values

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

Table 1 shows the construction U-values and air infiltration used in the thermal model. These values have been taken from the SAP (Part L) Calculations.

Table 01: *U Values applied to the Dynamic Simulation Model*

Element	Modelled U Value (W/m²K)
External Wall	0.15
Pitched Roof (insulated ceiling)	0.10
Flat Roof	0.10
Ground Floor	0.10
Glazing	1.00
Doors	1.00
Air Leakage (m ³ (h.m ²) @ 50Pa	3.0
Glazing g Value (whole window value)	50%

Internal Gains

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

Mechanical Ventilation

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

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

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

The minimum whole house ventilation rates can be seen in table 1.3 – these have been taken from *Approved Document F*.

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

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

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

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

NOTES:

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

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

6 Results

A full set of TM59 results can be seen in Appendix A of this report.

The proposed overheating mitigation strategy is shown below:

Overheating Strategy	TM59 / Part O Compliance	Notes
- Glazing with a g-value of 0.50 - Hybrid MVHR Ventilation (w/ cooling coil for peak lopping)	☒	Overheating strategy compliant

7 Summary

The assessment has shown that the proposed new-build residential dwellings at Ginnell Farm on Broad Lane in Rochdale present a low risk of overheating providing the overheating strategy listed within this report are implemented.

A baseline scenario has been simulated based on the current design utilising Hybrid MVHR Ventilation (with cooling coil for peak lopping) and a glazing g-value of 0.50 to limit solar gains. This shows that all plots are complying with TM59/Part O Dynamic Modelling method.

An alternative scenario where the windows are fully openable has also been modelled which shows the plots can comply with Part O, if the guarding height requirement for the first-floor windows is met.

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.

Appendix A: TM59 Results

Current design, Hybrid MVHR (W/ Cooling)

Unit	Room	Criterion a (%)	Criterion b (Hr)	Pass/Fail
Plot 1	Kitchen Living Dining	1.07	N/A	Pass
Plot 1	Bedroom 1	0.00	15.5	Pass
Plot 1	Bedroom 2	0.00	20.0	Pass
Plot 1	Bedroom 3	0.00	29.5	Pass
Plot 1	Bedroom 4	0.00	12.5	Pass
Plot 2	Kitchen Living Dining	0.29	N/A	Pass
Plot 2	Bedroom 1	0.00	28.5	Pass
Plot 2	Bedroom 2	0.00	24.0	Pass
Plot 2	Bedroom 3	0.00	15.0	Pass
Plot 3	Kitchen Dining	0.29	N/A	Pass
Plot 3	Living	0.47	28.5	Pass
Plot 3	Bedroom 1	0.00	24.0	Pass
Plot 3	Bedroom 2	0.00	15.0	Pass
Plot 3	Bedroom 3	0.00	4.0	Pass
Plot 4	Kitchen Dining	0.00	N/A	Pass
Plot 4	Living	0.24	N/A	Pass
Plot 4	Bedroom 1	0.00	31.5	Pass
Plot 4	Bedroom 2	0.03	25.0	Pass
Plot 4	Bedroom 3	0.00	15.5	Pass
Plot 5	Kitchen Dining	0.03	N/A	Pass
Plot 5	Living	0.00	N/A	Pass
Plot 5	Bedroom 1	0.00	31.5	Pass
Plot 5	Bedroom 2	0.00	25.0	Pass
Plot 5	Bedroom 3	0.00	15.5	Pass
Plot 6	Kitchen Dining	0.00	N/A	Pass
Plot 6	Lounge	0.00	N/A	Pass
Plot 6	Bedroom 1	0.00	27.0	Pass
Plot 6	Bedroom 2	0.00	18.0	Pass
Plot 6	Bedroom 3	0.07	15.0	Pass
Plot 7	Kitchen Living Dining	0.00	N/A	Pass
Plot 7	Bedroom 1	0.00	27.0	Pass
Plot 7	Bedroom 2	0.00	18.0	Pass
Plot 7	Bedroom 3	0.00	15.0	Pass
Plot 8-9	Kitchen Living Dining	0.00	N/A	Pass
Plot 8-9	Bedroom 1	0.00	31.5	Pass
Plot 8-9	Bedroom 2	0.00	25.0	Pass
Plot 8-9	Bedroom 3	0.00	20.5	Pass

Alternative scenario (Natural ventilation): Fully openable windows based on Part O Guidance – ensuring guarding requirement is achieved

Unit	Room	Criterion a (%)	Criterion b (Hr)	Pass/Fail
Plot 1	Kitchen Living Dining	1.15	N/A	Pass
Plot 1	Bedroom 1	0.00	11.5	Pass
Plot 1	Bedroom 2	0.00	20.5	Pass
Plot 1	Bedroom 3	0.00	23.0	Pass
Plot 1	Bedroom 4	0.00	7.5	Pass
Plot 2	Kitchen Living Dining	0.03	N/A	Pass
Plot 2	Bedroom 1	0.00	15.0	Pass
Plot 2	Bedroom 2	0.00	10.0	Pass
Plot 2	Bedroom 3	0.00	7.0	Pass
Plot 3	Kitchen Dining	0.03	N/A	Pass
Plot 3	Living	0.00	N/A	Pass
Plot 3	Bedroom 1	0.00	8.0	Pass
Plot 3	Bedroom 2	0.00	7.5	Pass
Plot 3	Bedroom 3	0.00	4.0	Pass
Plot 4	Kitchen Dining	0.03	N/A	Pass
Plot 4	Living	0.00	N/A	Pass
Plot 4	Bedroom 1	0.00	8.0	Pass
Plot 4	Bedroom 2	0.00	7.5	Pass
Plot 4	Bedroom 3	0.00	4.0	Pass
Plot 5	Kitchen Dining	0.03	N/A	Pass
Plot 5	Living	0.00	N/A	Pass
Plot 5	Bedroom 1	0.00	8.0	Pass
Plot 5	Bedroom 2	0.00	7.5	Pass
Plot 5	Bedroom 3	0.00	4.0	Pass
Plot 6	Kitchen Dining	0.00	N/A	Pass
Plot 6	Lounge	0.00	N/A	Pass
Plot 6	Bedroom 1	0.00	9.0	Pass
Plot 6	Bedroom 2	0.00	5.5	Pass
Plot 6	Bedroom 3	0.07	3.0	Pass
Plot 7	Kitchen Living Dining	0.00	N/A	Pass
Plot 7	Bedroom 1	0.00	10.5	Pass
Plot 7	Bedroom 2	0.00	4.0	Pass
Plot 7	Bedroom 3	0.00	3.5	Pass
Plot 8-9	Kitchen Living Dining	0.00	N/A	Pass
Plot 8-9	Bedroom 1	0.00	14.5	Pass
Plot 8-9	Bedroom 2	0.00	9.0	Pass
Plot 8-9	Bedroom 3	0.00	8.0	Pass