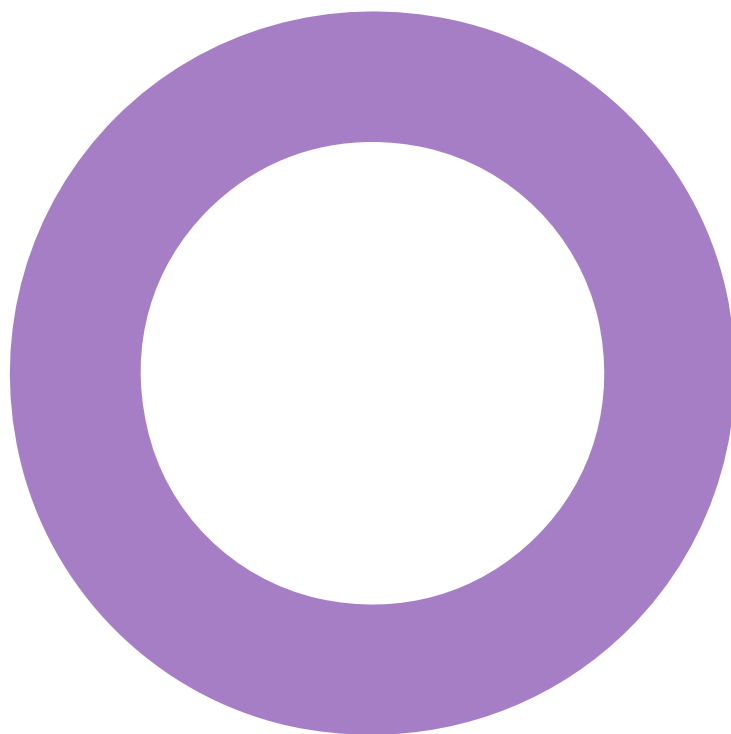


**71-73 Caversham Rd.
Reading.
S2 Estates.**

SUSTAINABILITY
OVERHEATING RISK ASSESSMENT
TM59
REVISION 00 – 11 MARCH 2022



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	11/03/2022	Initial Issue	JP	JT	KC

This document has been prepared for S2 Estates only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 23/24398E
Document reference: REP-2324398-05-JP-20220311-Overheating Risk Assessment-Rev00

Contents.

Audit sheet.	2
1. Executive summary.	4
1.1 Summary of Results	4
1.2 Conclusions	4
2. Introduction.	5
2.1 Industry Guidance	5
2.2 Assessment Criteria – Adaptive	5
2.3 Assessment Criteria – Fixed	5
2.4 Assessment Criteria – Corridors	5
3. Assessment.	5
3.1 Assessment Criteria	5
3.2 Sample Dwellings	5
3.3 Summary of Input Parameters	5
3.4 Weather Files	6
4. Results.	8
Predominantly Naturally Ventilated	8
Living Rooms	8
Bedrooms	8
5. Summary.	8
Appendix A – Sample dwellings.	9
5.1 Caversham Road Development.	9
Appendix B – Accommodation type schedule.	12

1. Executive summary.

This report summarises the initial findings of the overheating risk assessment undertaken on a sample of dwellings at the proposed Caversham Road development.

A preliminary assessment of the development has been undertaken for a total of 11 sample dwellings, which represent the diversity of dwellings in the development including those apartments which will be at higher risk of overheating (typically South / West facing apartments).

The overheating risk assessment has been carried out on the basis that dwellings will be predominantly naturally ventilated via opening windows aided by MVHR, i.e. dwelling will have ‘good opportunities’ for natural ventilation in summer months, with no local noise or air quality currently as a concern for the development and so no constraints.

The assessment has been undertaken following industry guidance, specifically CIBSE TM59 2017 – *Design methodology for the assessment of overheating risk in new homes*.

1.1 Summary of Results
Table 1 Results Summary for the natural ventilation scenario

	Overheating Criterion 1	Overheating Criterion 2	Result
	During Occupied Hours (Bedrooms and Living Rooms)	Night-time (Sleep thresholds) (Bedrooms only)	
Unit 00-001	✓	✓	Risk criteria met
Unit 01-101	✓	✓	Risk criteria met
Unit 01-107	✓	✓	Risk criteria met
Unit 02-202	✓	✓	Risk criteria met
Unit 02-203	✓	✓	Risk criteria met
Unit 02-205	✓	✓	Risk criteria met
Unit 02-208	✓	✓	Risk criteria met
Unit 04-401	✓	✓	Risk criteria met
Unit 05-501	✓	✓	Risk criteria met
Unit 05-502	✓	✓	Risk criteria met
Unit 05-503	✓	✓	Risk criteria met

All bedrooms within the sample assessment currently comply with the second criterion of TM59, which assesses night-time temperatures against maximum thresholds recommended for sleep comfort. Similarly, all living spaces comply with Criterion 1.

1.2 Conclusions

The results of this overheating risk assessment for a sample of dwellings at the Caversham Road development show that the current architectural design and certain operational assumptions outlined in this report are

expected to reduce the risk of overheating in most of the dwellings assessed in line with industry guidance, if windows are openable and able to be used as the predominate means of summer ventilation.

2. Introduction.

This document has been prepared to summarise the initial findings of the overheating risk assessment undertaken on a sample of dwellings at the Caversham Road development.

The assessment has been completed in line industry guidance, specifically guidance outlined in CIBSE TM59 2017 – Design methodology for the assessment of overheating risk in new homes.

2.1 Industry Guidance

CIBSE TM59 provides a standardised methodology for assessing and reporting overheating risk in new and refurbished homes. The guidance categorises dwellings into the following depending on the predominant means of ventilation:

Predominantly naturally ventilated

These are homes that have ‘good opportunities’ for natural ventilation in summer months, but may still have mechanical ventilation with heat recovery (MVHR). These dwellings should be assessed for overheating risk using the ‘adaptive comfort criteria’.

TM59 defines that for a habitable room to facilitate ‘adaptation’, the room must have operable windows with a minimum free area that satisfies purge ventilation criteria outlined in Building Regulations Part F, i.e. window opening area should be at least 1/20th of floor area of the room. Dwellings typically require opening windows for Part F purge requirements.

Predominantly mechanically ventilated

These are homes that either have no or limited opportunity for opening windows, on the basis of constraints such as noise and air quality levels.

2.2 Assessment Criteria – Adaptive

A dwelling is deemed to meet CIBSE TM59 requirements where the following conditions have been met:

- Criteria a) whereby all living rooms, kitchens and bedrooms must not exceed the maximum adaptive comfort threshold for more than 3% of total occupied hours from May to September
- Criteria b) whereby all bedrooms must not exceed the maximum operative temperature threshold of 26°C for more than 1% of annual occupied hours during the night (22:00 – 07:00).

2.3 Assessment Criteria – Fixed

A dwelling is deemed to meet the fixed temperature test where the following conditions have been met:

- All living rooms, kitchens and bedrooms must not exceed a fixed operative temperature target of 26°C for more than 3% of annual occupied hours.

2.4 Assessment Criteria – Corridors

It is understood that internal communal corridors will include low temperature hot water pipework and is therefore subject to overheating risk assessment as follows:

- Corridors should not exceed operative temperature of 28°C for 3% of total annual hours (262 hours or less).

3. Assessment.

3.1 Assessment Criteria

The overheating risk assessment has been carried out on the basis that dwellings will be predominantly naturally ventilated via opening windows aided by MVHR, i.e. dwelling will have ‘good opportunities’ for natural ventilation in summer months, with no local noise or air quality constraints.

3.2 Sample Dwellings

A total of 6 dwellings have been assessed. These are outlined in Appendix A . These units have been selected on the basis of higher risk factors such as South and West facing orientations, and top floor and corner locations.

3.3 Summary of Input Parameters

The following table provides an overview of the input parameters / modelling assumptions.

Software	IES 2019.300.2	Window opening type (where applicable)	Refer to section below.
Weather Data	Design Summer Year (DSY1) Norwich 2020 High Emissions Scenario 50 th Percentile	Occupancy	Bedrooms: 24/7 Living room/Kitchen: 9am-10pm
Assessment Criteria	CIBSE TM59	Max. Occupancy Density	1 Bed – 2 People 2 Bed – 4 People
Assessment Season		Occupancy Heat Gains	75W / person (Sensible) 55W / person (Latent)
Wall U-Value	0.15 W/m².K	Communal Corridor Internal Gains	8 W/m² (Initial estimation based upon improved pipework insulation)
Existing Wall U-Value	0.20 W/m².K	Lighting Gains	2 W/m² (All areas)
Spandrel panel U-Value	1.1 W/m².K	Max. Equipment Gains – Kitchen & Living	450 W (as per CIBSE TM59)
Window Averaged U-value	1.4 W/m².K	Max. Equipment Gains – Bedroom	80 W (as per CIBSE TM59)
Window g-Value	0.5	Heat Interface Unit	78W – continuous output
Rooflight U-value	1.6 W/m².K		
Rooflight g-Value	0.5		
Roof U-Value	0.12 W/m².K		
Floor U-value	0.12 W/m².K	Window Covering (SF = Shading Factor)	None
Apartment Floor above retail U-value	0.12 W/m².K	Mechanical Ventilation	Living Rooms – 16l/s Bedrooms – 13l/s
Infiltration	0.15 ACH		

Table 2: Modelling Inputs.

3.3.1 Window Opening Details

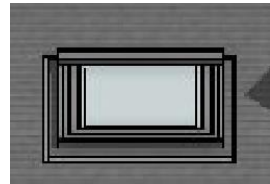
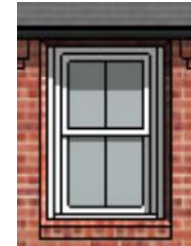
Windows areas have been modelled as per elevations produced by JTP Studios (architects) received on 22/02/2022. The various types of openings have been outlined within Table 3.

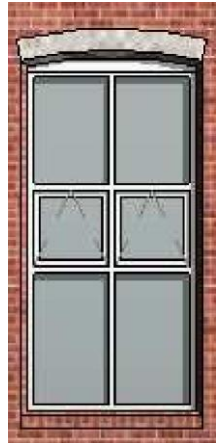
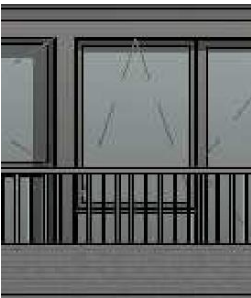
For this initial overheating assessment, assumptions have been made regarding the opening detail of windows i.e. top hung, side hung, etc, and the degree of opening for each window. It is currently assumed that all windows will have a 300mm opening, and balcony doors open to 45°.

The shading effect of internal blinds has not been included.

The window opening profile is as per CIBSE TM59 guidance, i.e. the window is open when the internal operative temperature exceeds 22°C.

Table 3: Window opening types: Apartments

Window/Door type	Height (m)	Width (m)	Opening (mm)	Openable Area	Fixing
1 	1.15	0.90	300mm	48.20%	Side Hung
2 	1.30	1.30	300mm	34.20%	Top Hung
3 	1.15	0.70	No restriction	50.00%	Sash
4 	0.59	0.62	300mm	77.10%	Top Hung

Window/Door type	Height (m)	Width (m)	Opening (mm)	Openable Area	Fixing
					
5 	1.00	0.90	300mm	46.70%	Considered Top Hung
6 	1.30	0.90	300mm	46.60%	Side Hung
7 	1.50	1.00	300mm	42.30%	Top Hung
Glazed door	2.25	0.80	45°	103.20%	Side Hung

Window/Door type	Height (m)	Width (m)	Opening (mm)	Openable Area	Fixing
					
Winter Garden 	1.30	0.43	considered that 2 panels will be able to be moved full out of the way	100%	Slide

CIBSE TM59 requires that developments achieve the overheating criteria using DSY1 for the year 2020, high emissions scenario 50th percentile, which represents the period 2010-2040, anticipating current “high” global CO₂ emissions levels, using the medium certainty percentile. This represents a reasonable baseline position for assessment of new buildings. The impact of future (2050 & 2080) weather (through additional analysis of the dynamic model under projected future weather files) has not been undertaken during this initial assessment.

The weather files used in this assessment are as follows:

- Swindon_Brize_Norton_DSY1_2020High50

3.4 Window opening profiles

Due to an update to part O, new guidance on considerations around window openings have been considered.

- 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 22C
 - ii. Be fully open when the internal temperature exceeds 26oC
 - iii. Start to close when the internal temperature falls below 26oC
 - iv. Be fully closed when the internal temperature falls below 22oC
- b. At night (11pm-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 23oC 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

3.5 Design validation.

The mechanical flow rates defined here will need to be developed as the design progresses. If acoustic requirements suggest that window opening should be curtailed, increased mechanical ventilation or active cooling will need to evaluated.

3.6 Weather Files

The CIBSE TM59 guidance stipulates that modelling is undertaken with the weather file most appropriate to the location for the project, for the 2020s, high emissions scenario 50th percentile. Design Summer Years (DSY) are used for evaluating overheating risk within buildings. Three DSY files are available for each of the 14 weather file locations in the UK. The most appropriate weather file for the location of Caversham Road development is Norwich.

4. Results.

Predominantly Naturally Ventilated

The results for the dwellings are summarised in Table 4 and 5 for a predominantly naturally ventilated scenario. Additional Mechanical ventilation has been included in line with Table 2. All of the rooms pass the TM59 using the adaptive comfort criteria as shown in Table 4. All bedrooms currently comply with the second criteria.

Living Rooms

Table 4; Results for Overheating Risk – Naturally Ventilated Living Rooms.

Room	TM59 Criterion 1 (<3% required for compliance)	Result
L00-001-Living	1.01%	L00-001-Living
L01-101-Living	1.01%	L01-101-Living
L01-107-Living	0.45%	L01-107-Living
L02-202-Living	1.11%	L02-202-Living
L02-203-Living	1.41%	L02-203-Living
L02-205-Living	0.60%	L02-205-Living
L02-208-Living	0.96%	L02-208-Living
L04-401-Living	0.96%	L04-401-Living
L05-501-Living	0.80%	L05-501-Living
L05-502-Living	0.80%	L05-502-Living
L05-503-Living	0.96%	L05-503-Living

Key
0.0% - 2.0%
2.0% - 3.0%
3.0% - 4.0%
>4.0%

Bedrooms

Table 5: Results for Overheating Risk - Naturally Ventilated Bedrooms.

Room	% Hours >26C (Night-time) (<1% required for compliance)
L00-001-Bedroom 2	0.15%
L01-101-Single Bedroom 1	0.43%
L01-107-Bedroom	0.37%
L01-101-Bedroom 1	0.27%
L01-101-Bedroom 2	0.24%
L02-202-Bedroom 1	0.37%
L02-202-Single Bedroom	0.15%
L02-203-Bedroom1	0.33%
L02-205-Bedroom 1	0.37%
L02-208-Bedroom 1	0.15%
L04-401-Bedroom 1	0.24%
L04-401-Bedroom 2	0.21%
L05-501-Bedroom1	0.12%
L05-502-Bedroom1	0.37%
L05-503-Bedroom1	0.46%
L05-503-Bedroom2	0.06%
L00-001-Bedroom 1	0.85%

Key
0.0% - 0.5%
0.5% - 1.0%
1.0% - 2.0%
>2.0%

5. Summary.

The results of this overheating risk assessment for a sample of dwellings at the Caversham Road development indicate that the current architectural design and certain operational assumptions (as outlined in this report) are able to reduce the risk of overheating (in the sample dwellings assessed) in line with industry guidance. This is on the basis that windows are openable and able to be used as the predominate means of summer ventilation, with a reasonable degree of unrestricted opening (300mm assumed in the model).

Appendix A – Sample dwellings.

5.1 Caversham Road Development.

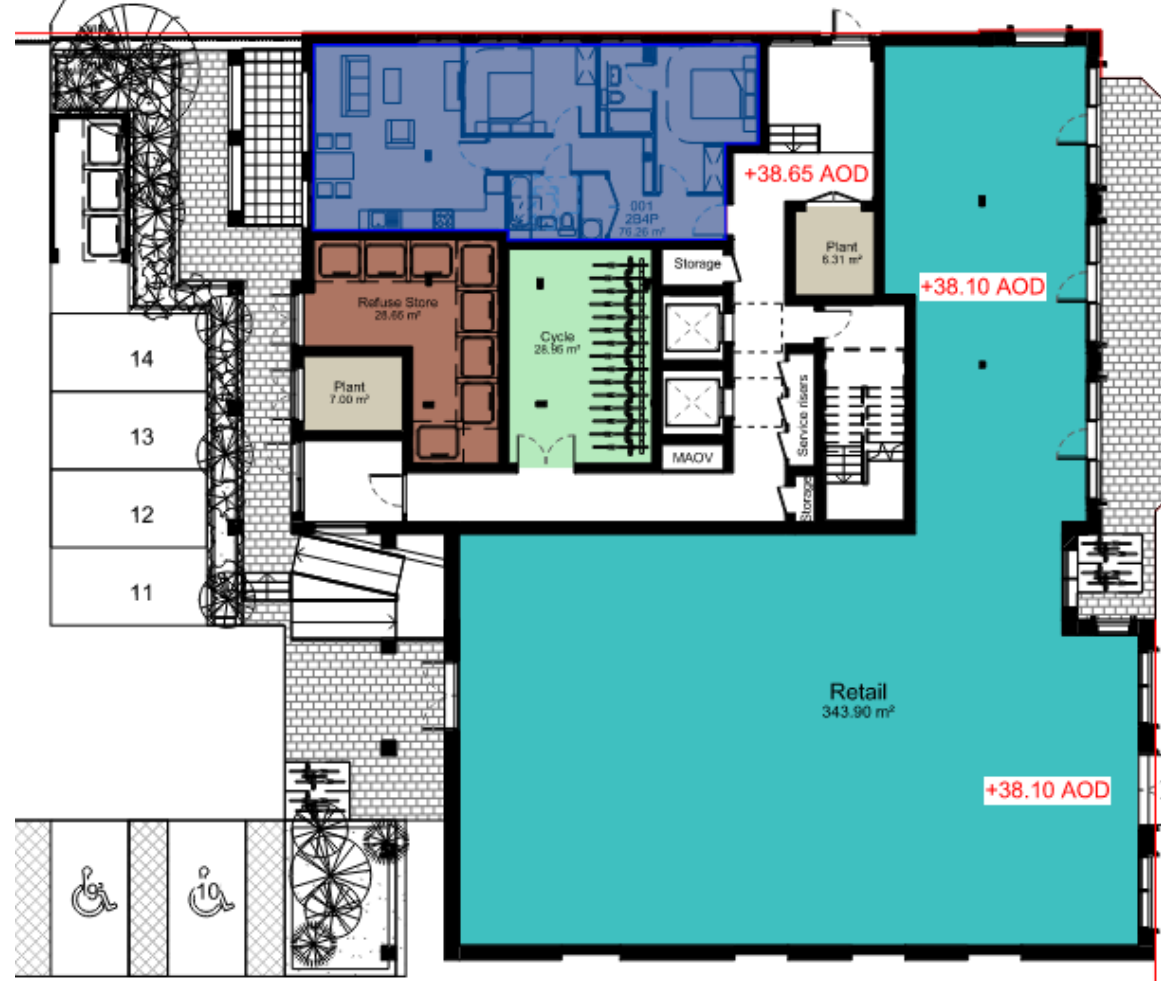


Figure 1: Caversham Road - Ground Floor

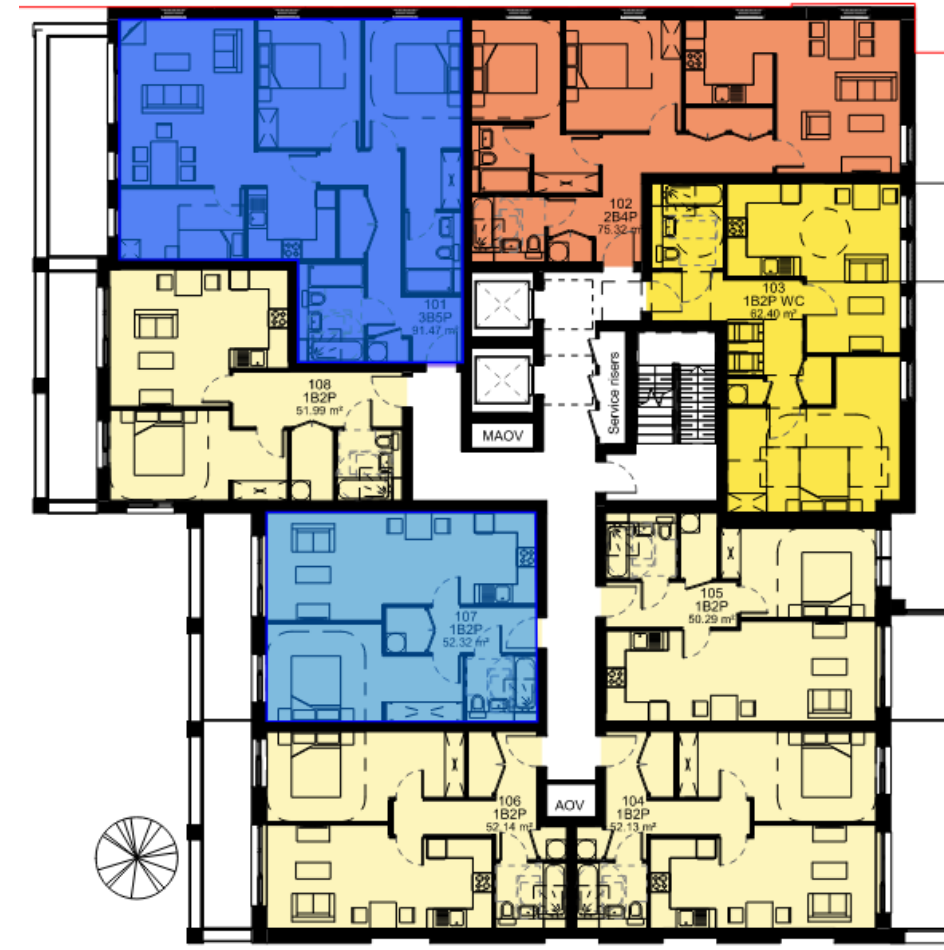


Figure 2: Caversham Road - First Floor

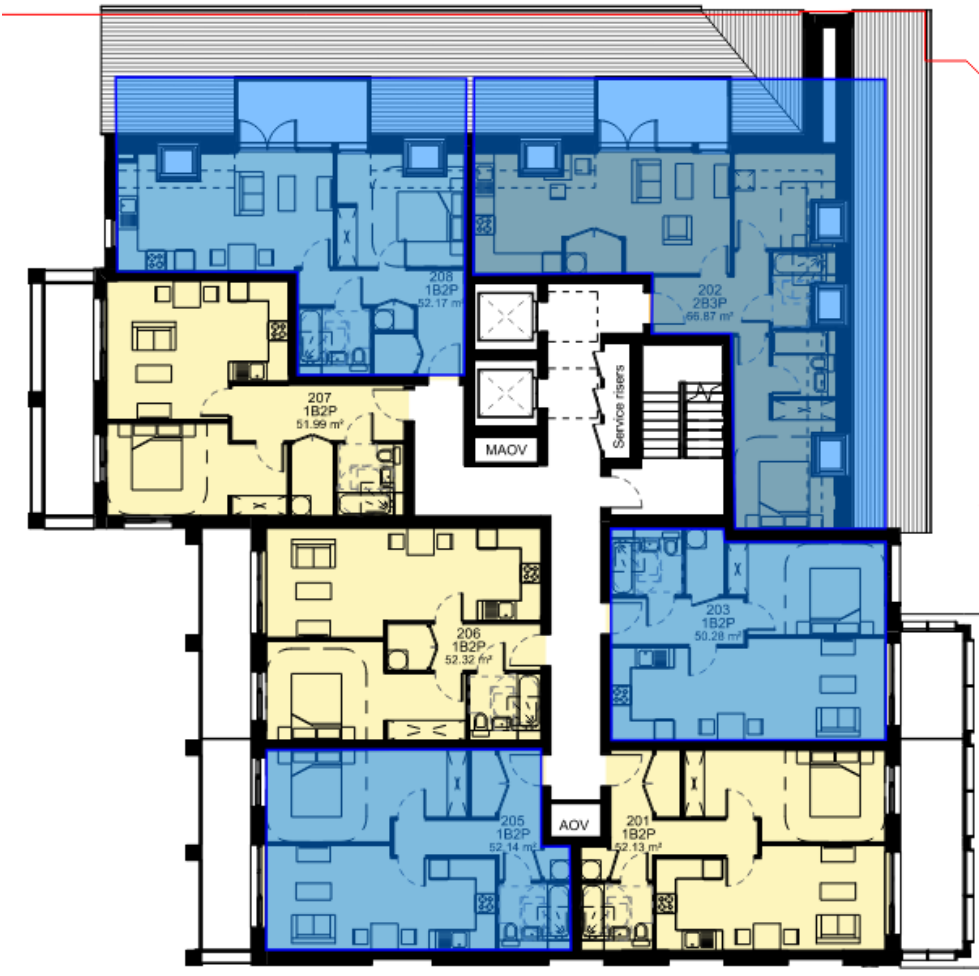


Figure 3: Caversham Road - Second Floor



Figure 4: Caversham Road - Third Floor



Figure 5: Caversham Road – Fourth Floor



Figure 6: Caversham Road – Fifth Floor

Appendix B – Accommodation type schedule.

Block	Dwelling Type	Flat/ House	No. of Bedrooms	No. of Inhabitants	Area (m²)	Quantity	TM59?
1	Unit 00-001	F	2	4	76.26	1	Y
1	Unit 01-101	F	3	5	91.47	1	Y
1	Unit 01-102	F	2	4	75.32	1	
1	Unit 01-103	F	1	2	62.40	1	
1	Unit 01-104	F	1	2	52.13	1	
1	Unit 01-105	F	1	2	50.29	1	
1	Unit 01-106	F	1	2	52.14	1	
1	Unit 01-107	F	1	2	52.32	1	Y
1	Unit 01-108	F	1	2	51.99	1	
1	Unit 02-201	F	1	2	52.13	1	
1	Unit 02-202	F	2	3	66.87	1	Y
1	Unit 02-203	F	1	2	50.28	1	Y
1	Unit 02-205	F	1	2	52.14	1	Y
1	Unit 02-206	F	1	2	52.32	1	
1	Unit 02-207	F	1	2	51.99	1	
1	Unit 02-208	F	1	2	52.17	1	Y
1	Unit 03-301	F	2	4	74.70	1	
1	Unit 03-302	F	1	2	50.40	1	
1	Unit 03-303	F	1	2	52.13	1	
1	Unit 03-304	F	1	2	52.14	1	
1	Unit 03-305	F	1	2	52.32	1	
1	Unit 04-401	F	2	4	74.70	1	Y
1	Unit 04-402	F	1	2	50.43	1	
1	Unit 04-403	F	1	2	52.13	1	
1	Unit 04-404	F	1	2	52.14	1	
1	Unit 04-405	F	1	2	52.32	1	
1	Unit 05-501	F	1	2	50.71	1	Y
1	Unit 05-502	F	1	2	52.74	1	Y
1	Unit 05-503	F	2	4	80.34	1	Y



JAMES PINCOTT

GRADUATE SUSTAINABILITY CONSULTANT

+44 1223 556 862

jamespincott@hoarelea.com

HOARELEA.COM

Ground Floor
Botanic House
100 Hills Road
Cambridge
CB2 1PH
England

