HODKINSON

Dynamic Overheating Assessment

Homes for Lambeth

Former Coral Day Nursery, Wootton Street

Final

Chiara Fratter
BArch, MSc (Hons), CEng MCIBSE

December 2020

DOCUMENT CONTROL RECORD

REPORT STATUS: FINAL

Version	Date	Reason for issue	Author	Checked by	Approved for Issue by Project Manager
v.1	27.11.2020	Draft	C Fratter	K Paxton	Z Lowther
v.2	18.12.2020	Final	C Fratter	K Paxton	Z Lowther

ABOUT HODKINSON CONSULTANCY

Our team of technical specialists offer advanced levels of expertise and experience to our clients. We have a wide experience of the construction and development industry and tailor teams to suit each individual project.

We are able to advise at all stages of projects from planning applications to handover.

Our emphasis is to provide innovative and cost-effective solutions that respond to increasing demands for quality and construction efficiency.

This report has been prepared by Hodkinson Consultancy using all reasonable skill, care and diligence and using evidence supplied by the design team, client and where relevant through desktop research.

Hodkinson Consultancy can accept no responsibility for misinformation or inaccurate information supplied by any third party as part of this assessment.

Executive Summary

This report details the methodology and findings of the dynamic overheating assessment of representative dwellings within the Former Coral Day Nursery, Wootton Street development by Homes for Lambeth, in the London Borough of Lambeth. The analysis has been undertaken in line with the current London Plan (2016) Policy 5.9 *Overheating and cooling* and the Intend to Publish London Plan (2019) Policy SI4: *Managing heat risk*.

Dwellings have been selected for the overheating assessment based on design characteristics that establish them as representative of the overall proposed scheme. This selection of dwellings includes consideration of varying floors and of different orientations.

For the purposes of this report, it is assumed that homes will utilise openable windows as the primary means of ventilation, with a background mechanical ventilation system. Passive measures have been explored as far as practicable to avoid the need for comfort cooling. The Noise Assessment by Ardent Consulting Engineers (December 2020) states that while suitable internal sound levels are achieved with windows closed, consideration has been given to the potential for adverse impact during overheating conditions, where residents may open windows to control the internal temperature. The risk levels in terms of noise during this scenario is deemed to be medium to low (Appendix C). It is therefore considered that external noise does not pose any limitation on the use of window opening to control overheating. Windows on noisier elevations are utilised when the spaces are not occupied to prevent future occupants' exposure to external noise disturbance with attention to sensitive rooms such as bedrooms.

The performance of the units has been assessed against the Charted Institute of Building Services Engineers (CIBSE) guidance CIBSE TM59: *Design Methodology for the Assessment of Overheating Risk in Homes* (2017). This dynamic overheating assessment of representative homes across the scheme demonstrates that the proposed development complies with the current guidance CIBSE TM59.

All homes tested demonstrate **an acceptable level of overheating** based on the CIBSE TM59: 2017 criteria. The results are based on some key design features that follow the London Plan Policy SI4 cooling hierarchy, as shown in the following table.

Table i: Design Features to address the cooling hierarchy (London Plan Policy SI 4)

Cooling Hierarchy	Proposed Measures	Discussion
1. Reduce the amount of heat entering the building	Highly efficient building fabric and air tightness standards	*As per Energy Statement*
	G value of 0.37 for south-east façade and 0.45 for all other facades	*A low G-value reduces the solar gains, therefore assists in the mitigation of overheating. However, it has implications on CO_2 emissions, fabric energy efficiency and internal daylight levels and has*

Table i: Design Features to address the cooling hierarchy (London Plan Policy SI 4)

Cooling Hierarchy	Proposed Measures	Discussion
		therefore been optimised to be kept as high as possible
	External shading: Balcony overhangs are included as per design proposal	*External shading is considered one of the most effective methods for solar control and overheating mitigation*
2. Minimise internal heat generation	Energy efficient design of building services	
3. Manage the heat	We have assumed a 250mm concrete slab between the floors	*The thermal mass of which will help reduce the risk of overheating*
4. Passive measures	**Natural Ventilation:** Windows and glazed doors assumed fully openable (90-degrees). Low noise risk facades > Bedrooms: 24/7 (allows for daytime use as study/home office or daytime sleeping) > Living/dining/kitchen: 09:00-22:00 Medium noise risk facades > Bedrooms: 22:00-07:00 > Living/dining/kitchen: 09:00-22:00 and restricted during the night-time	*Windows are simulated to be open when internal temperature exceeds 22°C and when external temperature is lower than the internal temperature:* $T_{indoor} > 22°C$, $T_{outdoor} < T_{indoor}$ *Any balcony doors open through the night are restricted to 100mm.* *Night-time ventilation effectively purges excess heat build-up during the day and cools the building fabric, especially if it is thermally massive.* *On noisier facades windows in bedrooms are open outside sleeping hours to prevent sleep disturbance due to external noise, while windows in kitchen/living rooms are open during the daytime as those are considered to be less sensitive (Confirmed with Ardent Consulting Engineers).*
5. Mechanical measures	Mechanical ventilation to meet minimum Part F requirements in all dwellings.	*Assumption made based on a mechanical ventilation that will be able to meet the proposed ventilation rates.*
6. Active cooling	There is no requirement for active cooling. All homes are using a combination of passive mechanical ventilation, in conjunction with natural purge ventilation to mitigate the overheating risk.	

CONTENTS

Executive Summary 2

1. INTRODUCTION **5**

2. REQUIRED STANDARDS **7**

3. MODELLING APPROACH **9**

4. SUMMARY OF RESULTS **14**

5. CONCLUSION **15**

APPENDICES **17**

APPENDIX A Assessed Dwellings Internal Layout **18**

APPENDIX B Extreme DSY2 and DSY3 Weather Scenarios **23**

APPENDIX C Façade Noise Risk Categories **26**

APPENDIX D Mechanical Ventilation Rates **29**

APPENDIX E GHA Overheating Checklist **30**

1. INTRODUCTION

1.1 This document has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development on behalf of Homes for Lambeth in support of a planning application for the proposed development at Former Coral Day Nursery Wootton Street in the London Borough of Lambeth.

Site Location

1.2 The proposed development site is located between Waterloo and Southwark stations and immediately to the south of Waterloo East station. The location is shown in Figure 1 below.

Figure 1: Site Location – Map data © 2020 Google

1.3 The site is currently occupied by a single storey brick building which houses the Former Coral Day Nursery which is now vacant. The site also contains some low-grade landscaping, several semi-mature trees of mixed quality and some residual parking for local residents.

1.4 The site is bounded to the north by Wootton Street, to the east by Street to the south by an estate road utilised by residents of Windmill House and Ipsden Buildings - the Peabody development to the south. To the west of the site lies Windmill House itself.

Proposed Development

1.5 The proposed development is described as follows:

> *"Demolition and clearance of existing structures and redevelopment comprising construction of a part 5/8/10 storey mixed use building comprising replacement community floorspace on ground floor, 36 no. residential units (Class C3) above with associated residents' amenities, cycle parking, car parking and public realm enhancement."*

1.6 Figure 2 below illustrates the proposed site layout.

Figure 2: Proposed Site Layout – Stockwool Architects (December 2020)

Overheating and Thermal Comfort

1.7 Maintaining comfortable thermal comfort conditions in the face of climate change and increasing temperatures is one of the largest challenges to be addressed by designers. The main objective is to achieve thermal comfort and minimise summertime overheating without the use of conventional air conditioning systems, which typically have associated greenhouse gas emissions and impact on the urban heat island effect.

1.8 Dynamic thermal simulations have been carried out for representative dwellings, to determine whether there is a risk of overheating. Appropriate mitigation measures have been recommended to mitigate the overheating risk and ensure that comfortable thermal conditions are achieved.

2. REQUIRED STANDARDS

Regional Policy: Intend to Publish London Plan (2019)

2.1 The Panel of Inspectors report into the draft London Plan was published in October 2019. The Mayor considered the Inspectors' recommendations and, in December 2019, issued to the Secretary of State the Intend to Publish London Plan. The Secretary of State responded to this in March 2020. The GLA have advised the Secretary of State that there is an intention to progress publication of the Local Plan and publication is scheduled to commence prior to the end of 2020.

2.2 The following key policy in the Intend to Publish London Plan is considered relevant to the proposed development and this Overheating Assessment:

2.3 **Policy SI4 Managing Heat Risk** states that major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the cooling hierarchy and CIBSE TM59:

A) Development proposals should minimise adverse impacts on urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B) Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

1. *Reduce the amount of heat entering a building in summer through orientation, shading, albedo, 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 (ensuring they are the lowest carbon options).*

2.4 Low-energy measures should be used to mitigate overheating risk. These include solar shading, building orientation and solar-controlled glazing. Occupant behaviour will also have an impact on overheating risk.

2.5 Passive ventilation should be prioritised, accounting for any external noise and air quality issues. The increased use of air conditioning systems is not desirable as these have significant energy requirements and, under conventional operation, expel hot air, thereby adding to the urban heat island effect. If active cooling systems, such as air conditioning systems, are unavoidable, these should be designed to reuse the waste heat they produce.

2.6 The Draft GLA Guidance on Preparing Energy Assessments (2020), identifies CIBSE TM59 guidance as the most appropriate methodology for the assessment of overheating risk of homes.

CIBSE TM59 (2017) Assessment Criteria: predominantly naturally ventilated homes

2.7 The criteria for the assessment of overheating risk have been specified by the Chartered Institute of Building Services Engineers (CIBSE) in the CIBSE TM59: Design methodology for the assessment of overheating risk in homes (2017). CIBSE TM59 is based on CIBSE TM52 and CIBSE Guide A and provides a standardised approach to predicting overheating risk for both naturally and mechanically ventilated residential buildings.

2.8 The CIBSE TM59 guidance suggests that the following two criteria must be met in order to demonstrate compliance:

> **(a)** For living rooms, kitchens, and bedrooms: The indoor operative temperature should not exceed the threshold comfort temperature by 1°C or more for more than 3% of occupied hours;

> **(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).

3. MODELLING APPROACH

Unit Selection

3.1 Dynamic thermal modelling has been undertaken using Design Builder Software (v.6). The performance of the units has been assessed under the CIBSE TM59 guidance and the adaptive thermal comfort model for a primarily natural ventilated scenario.

3.2 Representative dwelling units with different layouts, sizes, orientation and external shading have been assessed. The selection of the units for overheating risk assessment was based on the following design characteristics:

> Varying proportions of glazed areas;

> Units located in different orientations and on different floor levels;

> Dwellings with and without external shading from balcony overhangs or surrounding buildings; and

> Dwellings with and without external noise constraints.

3.3 The location and the internal layouts of the dwellings selected for assessment are presented in Appendix A.

Site External Weather Conditions

3.4 External temperatures and incident solar gains are greatest during summer months, coinciding with periods of lower wind speeds. Solar altitude is also highest during summer months, increasing the effects of façade shading from balcony overhangs and window reveals. Such considerations should be accounted for when designing for overheating risk.

3.5 The effects of external conditions are vital in an overheating assessment as they influence:

> Solar heat gains (a function of incident direct and diffuse solar radiation and solar altitude); and

> Calculated natural ventilation rates (a function of external temperature, wind directions and speeds).

3.6 CIBSE Design Summer Year weather data for London Weather Central (representative of urban areas within the Mayor's Central Activity Zone) has been used for the 2020s, high emissions, 50% percentile scenario as required by CIBSE TM59 and the London Plan.

3.7 The assessment of overheating risk has been undertaken using the Design Summer Year 1 (DSY1) weather file, in accordance with the Draft GLA Energy Assessment Guidance. The final mitigation strategy has also been tested under the more extreme DSY2 and DSY3 weather files and the results are presented in Appendix B.

Model Geometry and Local Shading

3.8 Overshadowing from the building blocks has been taken into account during the simulation, based on the model geometry and the site orientation.

3.9 Solar control forms an integral part of overheating mitigation strategies. External shading in the form of balconies is applied in most of the façades across the development as part of the design proposals. These were incorporated in the simulation model and are shown in Figure 3.

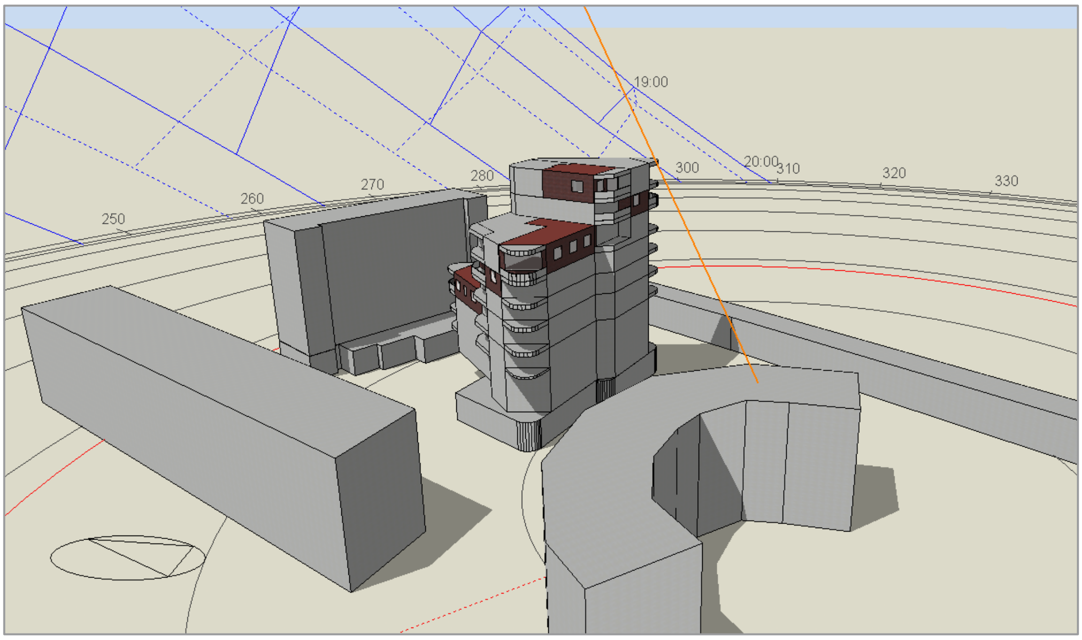


Figure 3: Design builder simulation model, sun path shown for 21st June 12:00 noon BST

3.10 Horizontal shading devices such as balconies and overhangs are more efficient when applied in south oriented façades and during midday when the solar angle is high. Their role in reducing solar gains in the summer period is considered to be paramount.

Design Modelling Inputs for Dwellings

3.11 The following modelling inputs (Table 1) have been set up in the baseline dynamic thermal simulation, in line with the Energy Statement and SAP calculation inputs. CIBSE TM59 guidance has been used for all occupancy rates and internal heat gain assumptions which will contribute to the risk of overheating.

Table 1: Dynamic thermal modelling design assumptions

Data Input			**Discussion**
Weather data	**Location**	CIBSE London Weather Centre Design Summer Years (DSYs) for 2020s, high emissions, 50% percentile scenario	*Geographically closest and most representative industry-standard CIBSE weather data file*
		Additional DSY2, DSY3 were tested to demonstrate performance under extreme weather conditions (Appendix B)	
Building Fabric Construction details	**External walls**	0.18 W/m^2.K	*As per the Energy Statement*
	Flat roof	0.10 W/m^2.K	*As per the Energy Statement*
	Ground floor	0.10 W/m^2.K	*As per the Energy Statement* *Thermally massive construction assumed*
	Ceilings/floors	Assumed to be adiabatic between adjacent floors	*These are thermally massive and will add to the thermal capacity of the building* *Since there are units above and below all simulated units heat loss through ceilings and floors is assumed to be zero (adiabatic)*
	Party walls between units	Assumed to be adiabatic between adjacent units Fully filled and sealed	*Walls adjacent to other units are assumed to be lightweight partitions* *Adjacent units have been included in the dynamic simulation calculations*
	Partitions within units	Steel-stud partitions	*Assumed thicknesses as per Stockwool drawings*
	Internal doors	0.90 m width	As per Stockwool drawings
Windows	**Windows and Glazed Doors**	U value 1.3 W/m^2.K	*As per Energy Statement*
		G value of 0.37 for south-east façade and 0.45 for all other facades	*Specified to reduce solar gains and mitigate against overheating while limiting negative effect on CO$_2$ emissions and internal daylight levels*

Table 1: Dynamic thermal modelling design assumptions

Data Input			Discussion
	Shading	External shading from balconies and solid balustrade where present	*These elements will provide some solar shading as the sun tracks around the building*
	Reveal depth	External reveal: 150 mm	*As per Stockwool drawings*
Ventilation and infiltration	**Air Tightness**	3.5 $m^3/hr\text{-}m^2$ @50 pascals	*As per the Energy Statement*
	Natural Ventilation	Internal doors are only open during the day (07:00-22:00)	*Night-time ventilation is important for bedrooms as it effectively purges excess heat build-up during the day and cools the building fabric.* *Any balcony doors open through the night are restricted to 100mm* *Windows are simulated to be open when internal temperature exceeds 22°C and when external temperature is lower than the internal temperature:* $T_{indoor} > 22^{\circ}C$, $T_{outdoor} < T_{indoor}$
		Windows and glazed doors assumed fully openable (90-degrees). Low noise risk facades > Bedrooms 24/7 (allows for daytime use as study/home office or daytime sleeping) > Living/dining/kitchen 09:00-22:00 Medium noise risk facades > Bedrooms: 22:00-07:00 > Living/dining/kitchen: 24/7 (fully open 09:00-22:00 and restricted during the night)	
	Mechanical ventilation	Mechanical ventilation to meet minimum Part F requirements in all dwellings.	*Refer to Appendix D for calculated minimum part F ventilation rates.* *The Air Quality Report (by Mayer Brown, December 2020) also suggests that mechanical ventilation system is recommended to provide the future residents with suitable indoor air quality and ventilation.*

3.12 External noise levels have been measured by Ardent Consulting Engineers, and an assessment of noise risk levels undertaken against the ANC's *Acoustics, Ventilation and Overheating (AVO) Guide*

(2020). The development has been found to fall within the low and medium risk categories, therefore window opening is used as the primary means of overheating mitigation with attention to the hours when the rooms are occupied. Noise risk category levels for the development site are shown in Appendix C.

3.13 The following occupancy schedules and internal gains assumptions (Table 2) have been used, in accordance with CIBSE TM59 guidance.

Table 2: Occupancy and equipment gains (CIBSE TM59)

Unit/room type	Occupancy	Equipment Load
1-bedroom apartment: 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 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
2-bedroom apartment: 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 200 W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
3-bedroom apartment: 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 200W from 8 pm to 10 pm 110 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 85 W for the rest of the day
Double bedroom	2 people at 70% gains from 11 pm to 8 am, 2 people at full gains from 8 am to 9 am and from 10 pm to 11 pm, 1 person at full gain in the bedroom from 9 am to 10 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during the sleeping hours
Single bedroom	1 person at 70% gains from 11 pm to 8 am, 1 person at full gains from 8 am to 11 pm	Peak load of 80 W from 8 am to 11 pm Base load of 10 W during sleeping hours
Utility cupboard	N/A	Assumed Zero as induvial heating system is proposed

4. SUMMARY OF RESULTS

4.1 This chapter summarises the results given by running dynamic thermal simulations for the buildings under the current design summer year (1989) for the 2020s high emission, 50% percentile scenario, as required by CIBSE TM59 and the London Plan planning policies.

Dwellings

4.2 Results presented in Table 3 indicate that, based on the assumptions outlined within Table 1 and Table 2, all assessed rooms meet the CIBSE TM59 criteria and therefore demonstrate an acceptable level of overheating risk.

Table 3: TM59 Overheating Results for DSY1 2020s

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3%)	TM59 Criterion B: Bedroom temperature hours >26°C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
B.04.06	Bedroom 1	0.00	19.67	Pass
	Bedroom 2	0.00	23.50	Pass
	Bedroom 3	0.00	21.50	Pass
	Living / Dining / Kitchen	0.00	N/A	Pass
B.06.04	Bedroom	0.00	7.00	Pass
	Living / Dining / Kitchen	0.00	N/A	Pass
B.07.03	Bedroom 1	0.00	27.00	Pass
	Bedroom 2	0.00	28.67	Pass
	Living / Dining / Kitchen	0.00	N/A	Pass
B.08.01	Bedroom 1	0.00	19.33	Pass
	Bedroom 2	0.00	22.50	Pass
	Living / Dining / Kitchen	0.00	N/A	Pass
B.09.02	Bedroom	0.00	29.17	Pass
	Living / Dining / Kitchen	0.00	N/A	Pass

4.3 A copy of the Good Homes Alliance domestic overheating checklist, as required by the GLA, is provided in Appendix E.

5. CONCLUSION

5.1 This report details the methodology and findings of the dynamic overheating assessment of representative dwellings within the Former Coral Day Nursery, Wootton Street development by Homes for Lambeth, in the London Borough of Lambeth. The analysis has been undertaken in line with the current London Plan (2016) Policy 5.9 *Overheating and cooling* and the Intend to Publish London Plan (2019) Policy SI4: *Managing heat risk*.

5.2 Dwellings have been selected for the overheating assessment based on design characteristics that establish them as representative of the overall proposed scheme. This selection of dwellings includes consideration of varying floors and of different orientations.

5.3 For the purposes of this report, it is assumed that homes will utilise openable windows as the primary means of ventilation, with a background mechanical ventilation system. Passive measures have been explored as far as practicable to avoid the need for comfort cooling. The Noise Assessment by Ardent Consulting Engineers (December 2020) states that while suitable internal sound levels are achieved with windows closed, consideration has been given to the potential for adverse impact during overheating conditions, where residents may open windows to control the internal temperature. The risk levels in terms of noise during this scenario is deemed to be medium to low (Appendix C). It is therefore considered that external noise does not pose any limitation on the use of window opening to control overheating. Windows on noisier elevations are utilised when the spaces are not occupied to prevent future occupants' exposure to external noise disturbance with attention to sensitive rooms such as bedrooms.

5.4 The performance of the units has been assessed against the Charted Institute of Building Services Engineers (CIBSE) guidance CIBSE TM59: *Design Methodology for the Assessment of Overheating Risk in Homes* (2017). This dynamic overheating assessment of representative homes across the scheme demonstrates that the proposed development complies with the current guidance CIBSE TM59.

5.5 All homes tested demonstrate **an acceptable level of overheating** based on the CIBSE TM59: 2017 criteria. The results are based on some key design features that follow the London Plan Policy SI4 cooling hierarchy, as shown in the Table 4.

Table 4: Design Features to address the cooling hierarchy (London Plan Policy SI 4)

Cooling Hierarchy	Proposed Measures	Discussion
1. Reduce the amount of heat entering the building	Highly efficient building fabric and air tightness standards	*As per Energy Statement*
	G value of 0.37 for south-east façade and 0.45 for all other facades	*A low G-value reduces the solar gains, therefore assists in the mitigation of overheating. However, it has implications*

Table 4: Design Features to address the cooling hierarchy (London Plan Policy SI 4)

Cooling Hierarchy	Proposed Measures	Discussion
		on CO_2 emissions, fabric energy efficiency and internal daylight levels and has therefore been optimised to be kept as high as possible
	External shading: Balcony overhangs are included as per design proposal	*External shading is considered one of the most effective methods for solar control and overheating mitigation*
2. Minimise internal heat generation	Energy efficient design of building services	
3. Manage the heat	We have assumed a 250mm concrete slab between the floors	*The thermal mass of which will help reduce the risk of overheating*
4. Passive measures	**Natural Ventilation:** Windows and glazed doors assumed fully openable (90-degrees). Low noise risk facades > Bedrooms: 24/7 (allows for daytime use as study/home office or daytime sleeping) > Living/dining/kitchen: 09:00-22:00 Medium noise risk facades > Bedrooms: 22:00-07:00 > Living/dining/kitchen: 09:00-22:00 and restricted during the night-time	*Windows are simulated to be open when internal temperature exceeds 22°C and when external temperature is lower than the internal temperature:* $T_{indoor} > 22°C$, $T_{outdoor} < T_{indoor}$ *Any balcony doors open through the night are restricted to 100mm.* *Night-time ventilation effectively purges excess heat build-up during the day and cools the building fabric, especially if it is thermally massive.* *On noisier facades windows in bedrooms are open outside sleeping hours to prevent sleep disturbance due to external noise, while windows in kitchen/living rooms are open during the daytime as those are considered to be less sensitive (Confirmed with Ardent Consulting Engineers).*
5. Mechanical measures	Mechanical ventilation to meet minimum Part F requirements in all dwellings.	*Assumption made based on a mechanical ventilation that will be able to meet the proposed ventilation rates.*
6. Active cooling	There is no requirement for active cooling. All homes are using a combination of passive mechanical ventilation, in conjunction with natural purge ventilation to mitigate the overheating risk.	

APPENDICES

Appendix A
Assessed Dwellings Layout

Appendix B
Extreme DSY2 and DSY3 Weather Scenarios

Appendix C
Façade Noise Risk Categories

Appendix D
Mechanical Ventilation Rates

Appendix E
GHA Overheating Checklist

APPENDIX A

Assessed Dwellings Internal Layout

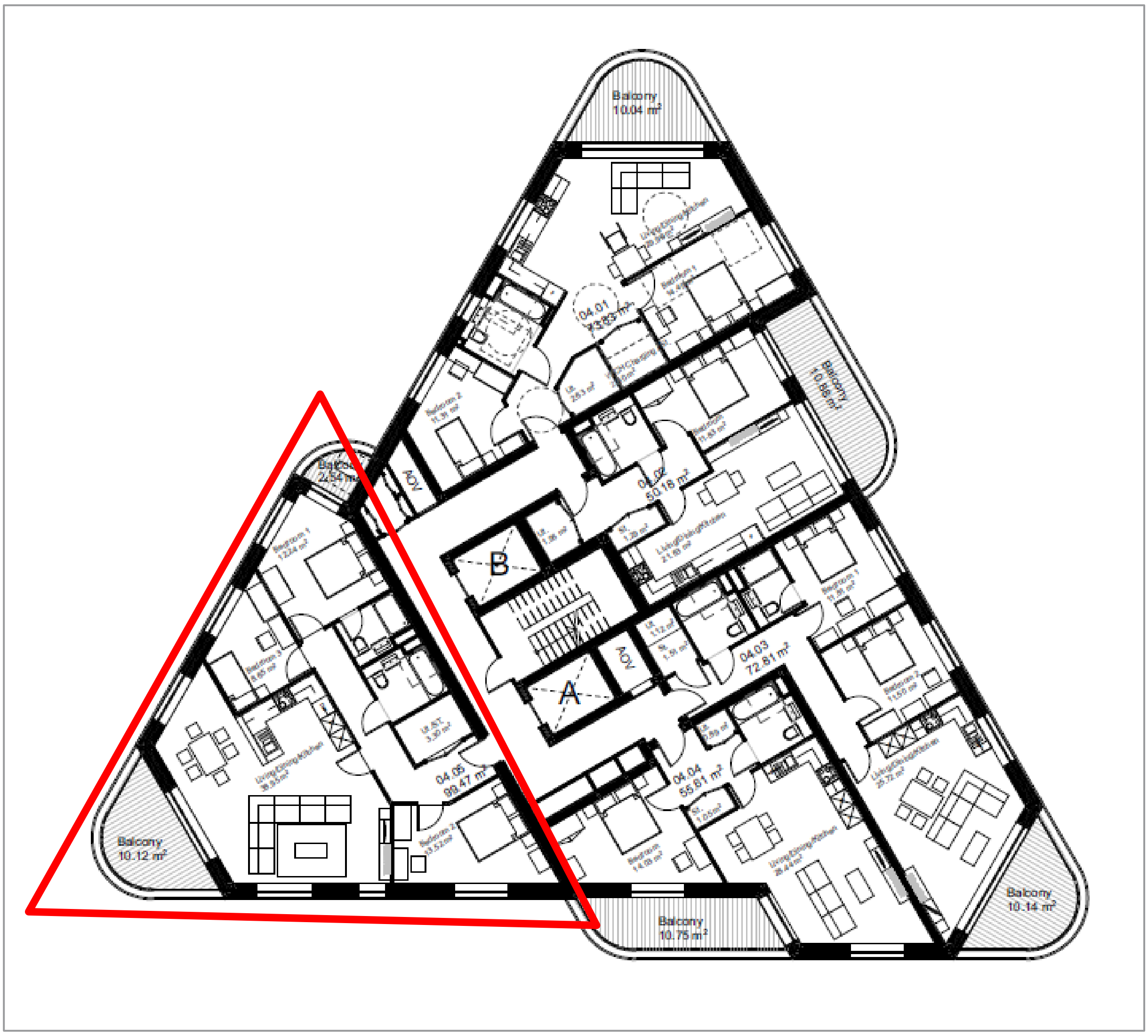


Figure A1: 4th floor plan, B.04.06 dual-aspect west facing 3bed apartment (Source: Stock Wool Architecture 17.12.2020).

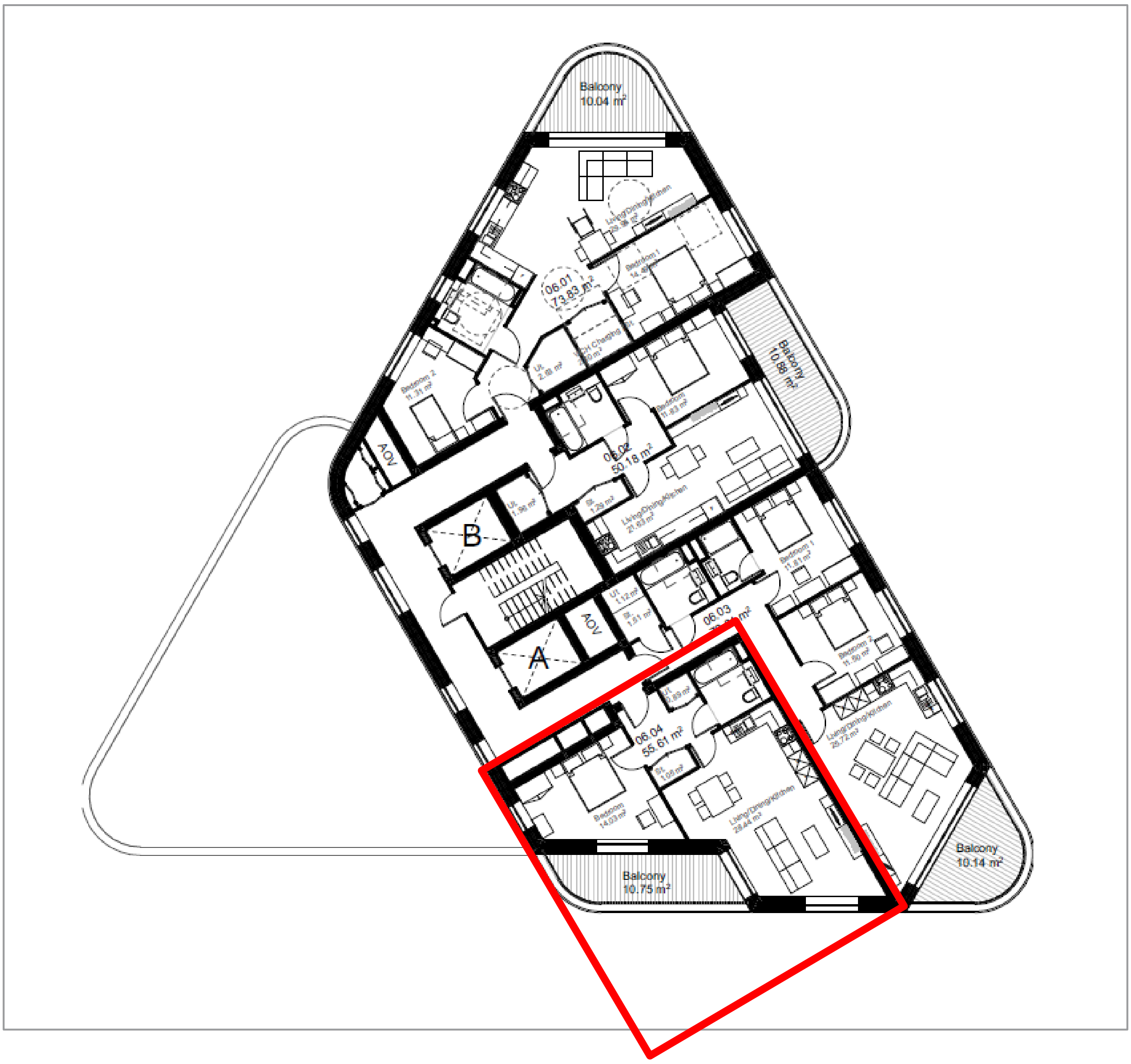


Figure A2: 6th floor plan, B.06.04 mid-floor dual-aspect south facing 1bed apartment (Source: Stock Wool Architecture 17.12.2020).

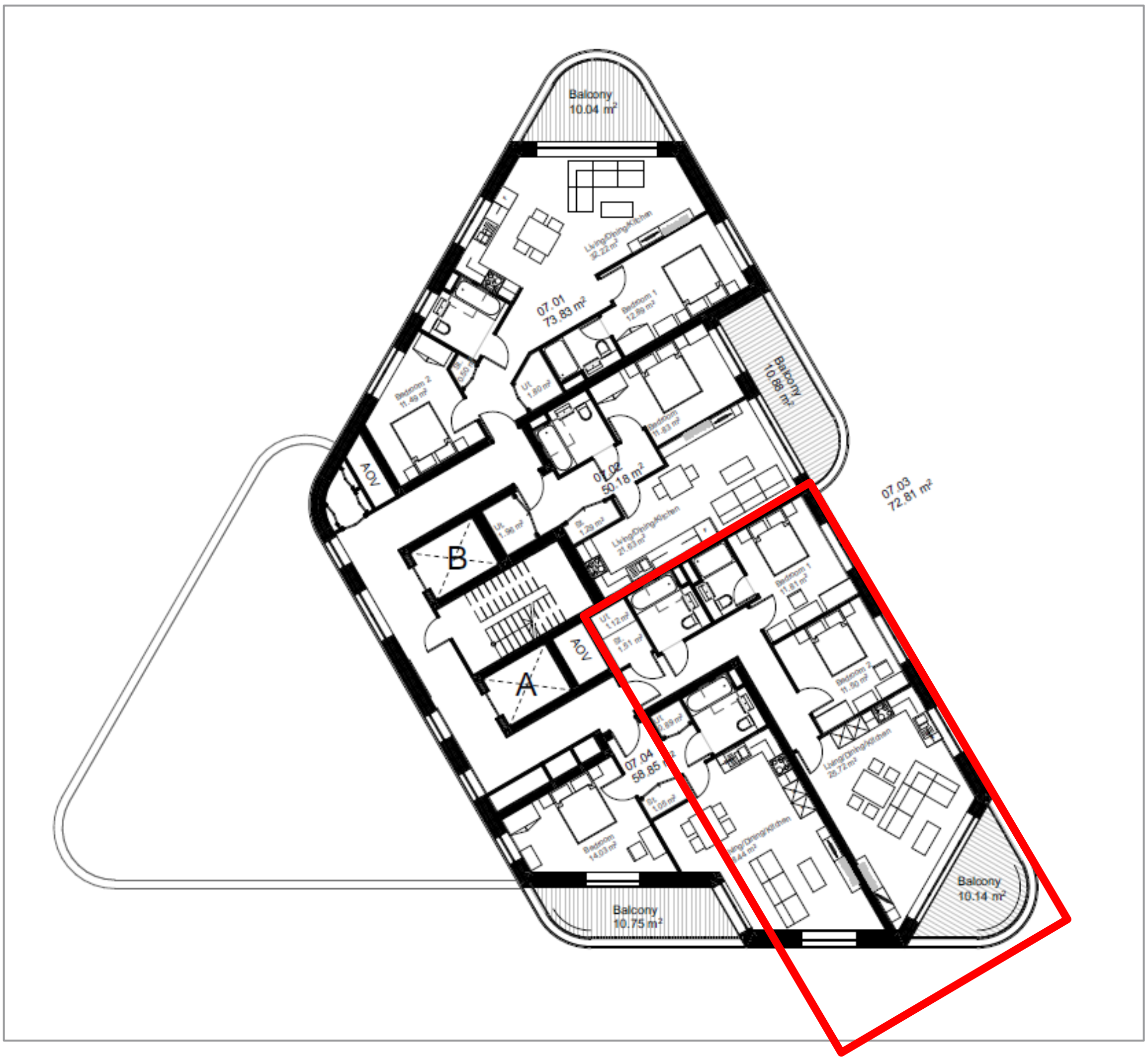


Figure A3: 7th floor plan, B.07.03 Top-floor dual-aspect east facing 2bed apartment, Medium noise risk category (Source: Stock Wool Architecture 17.12.2020).

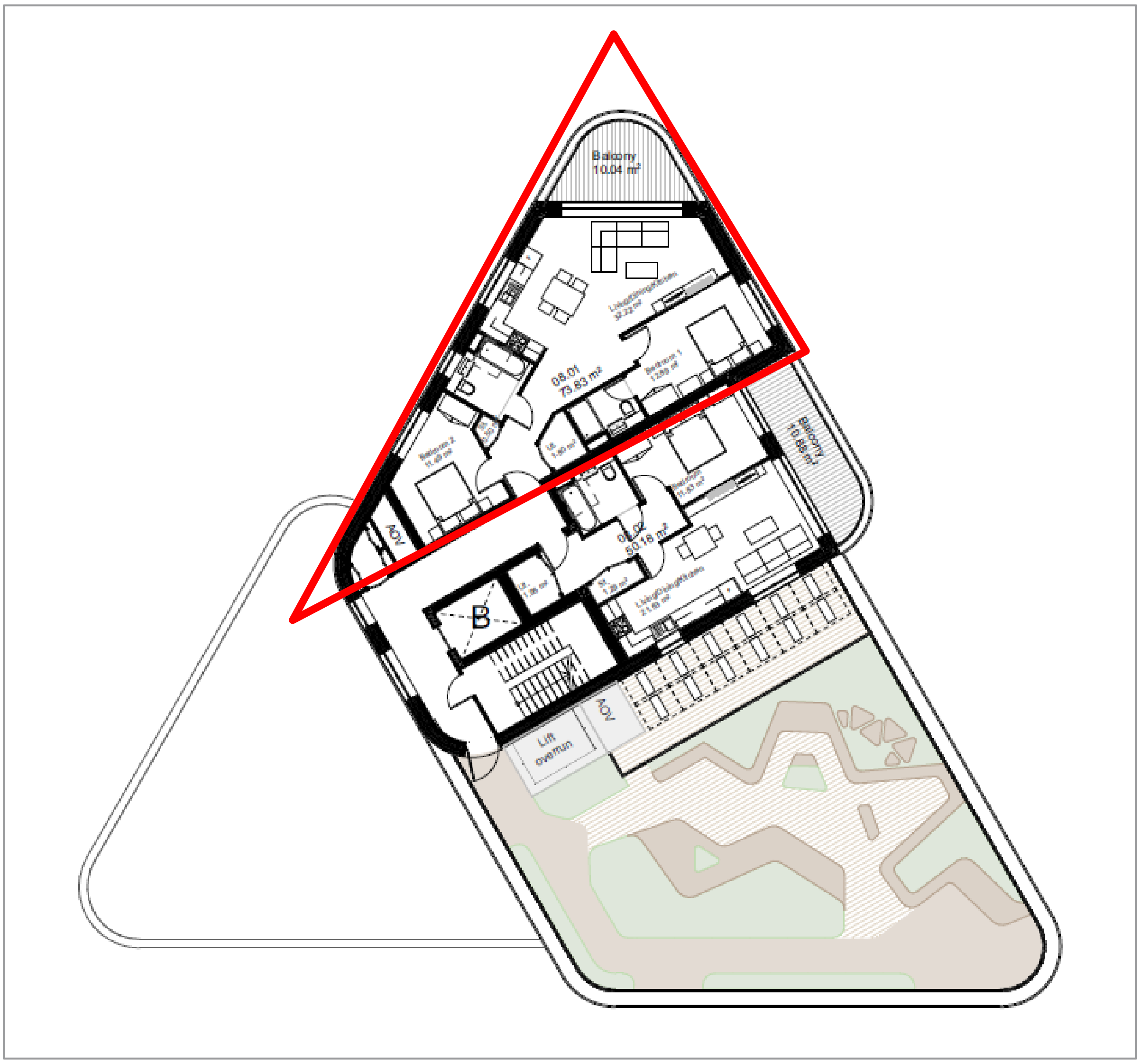


Figure A4: 8th floor plan, B.08.01 mid-floor dual-aspect north facing 2bed apartment, Medium noise risk category (Source: Stock Wool Architecture 17.12.2020).

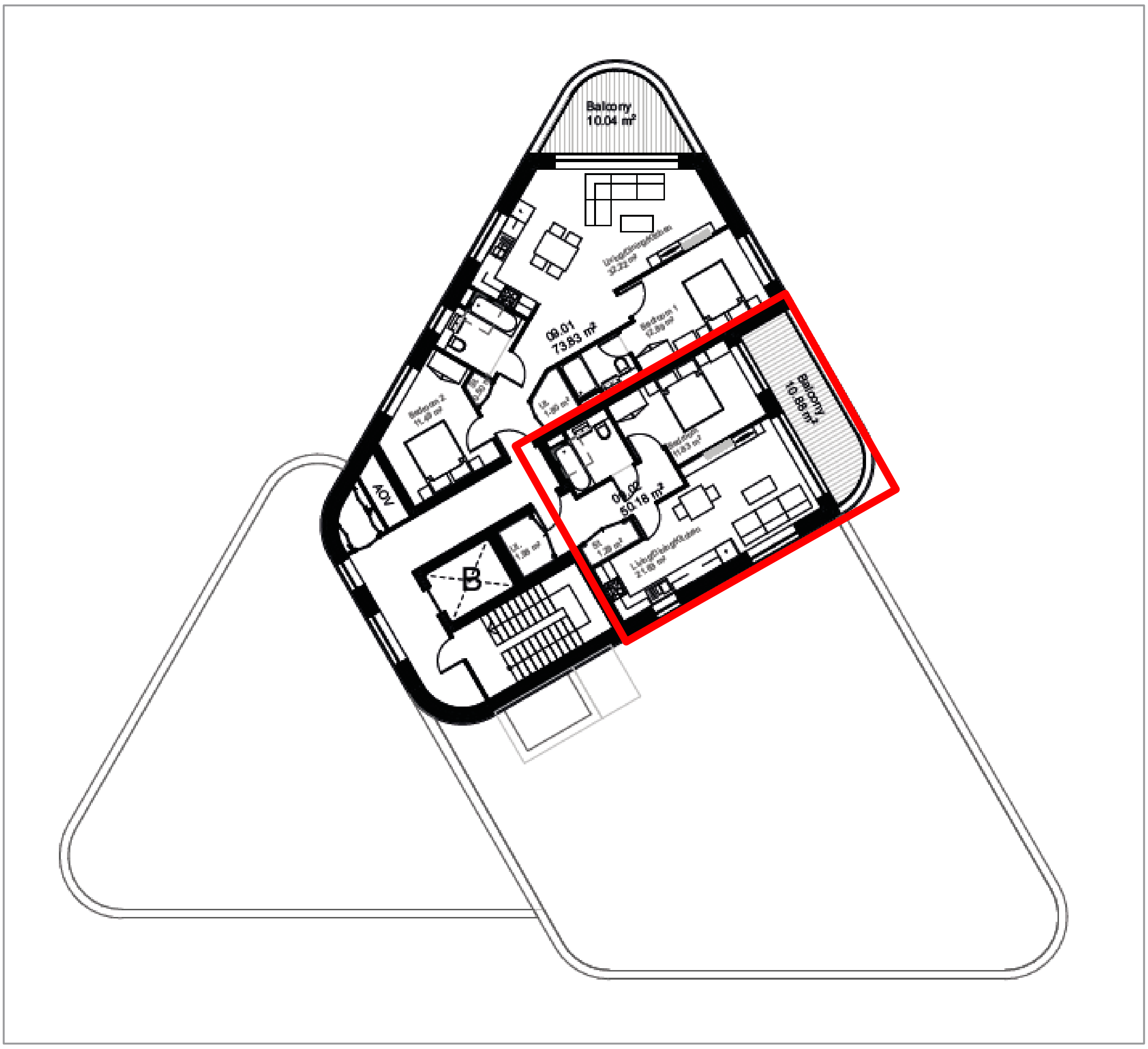


Figure A5: 9th floor plan, B.08.02 Top-floor dual-aspect south facing 1bed apartment (Source: Stock Wool Architecture 17.12.2020).

APPENDIX B

Extreme DSY2 and DSY3 Weather Scenarios

Based on the CIBSE TM59 guidance, achieving compliance with the DSY1 (Design Summer Year) file most appropriate for the site location for the 2020s, high emissions, 50% percentile scenario is mandatory.

Further weather scenarios can be tested to explore the performance of the design under extreme weather events (e.g. heatwaves and prolonged warmth). Meeting the criteria for the DSY2 and DSY3 weather files can be challenging and therefore the CIBSE Guidance sets out that where compliance criteria are not met, the assessment should demonstrate how the risk of overheating has been reduced as far as practical.

The overheating mitigation measures for the proposed development are set out in Chapter three and four of this report. In future extreme weather scenarios, occupants may use additional measures to mitigate overheating such as the use of ceiling fans to increase air movement and internal blinds to block out solar heat gain.

The results of the overheating assessment for the DSY2 and DSY3 weather files with the current overheating mitigation strategy are presented in Tables B1 to B2.

Table B1: TM59 Overheating Results for DSY2 2020s

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3%)	TM59 Criterion B: Bedroom temperature hours >26°C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
B.04.06	Bedroom 1	0.00	53.17	Fail
	Bedroom 2	0.05	55.17	Fail
	Bedroom 3	0.00	62.67	Fail
	Living / Dining / Kitchen	0.51	N/A	Pass
B.06.04	Bedroom	0.02	31.67	Pass
	Living / Dining / Kitchen	0.35	N/A	Pass
B.07.03	Bedroom 1	0.00	61.83	Fail
	Bedroom 2	0.00	64.33	Fail
	Living / Dining / Kitchen	0.40	N/A	Pass
B.08.01	Bedroom 1	0.00	49.67	Fail
	Bedroom 2	0.16	60.67	Fail
	Living / Dining / Kitchen	0.39	N/A	Pass
B.09.02	Bedroom	0.08	60.83	Fail
	Living / Dining / Kitchen	0.60	N/A	Pass

Table B2: TM59 Overheating Results for DSY3 2020s

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3%)	TM59 Criterion B: Bedroom temperature hours >26°C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
B.04.06	Bedroom 1	0.00	66.33	Fail
	Bedroom 2	0.13	68.50	Fail
	Bedroom 3	0.00	72.17	Fail
	Living / Dining / Kitchen	0.24	N/A	Pass
B.06.04	Bedroom	0.00	24.33	Pass
	Living / Dining / Kitchen	0.00	N/A	Pass
B.07.03	Bedroom 1	0.00	62.83	Fail
	Bedroom 2	0.00	67.67	Fail
	Living / Dining / Kitchen	0.00	N/A	Pass

Table B2: TM59 Overheating Results for DSY3 2020s

Unit	Room	TM59 Criterion A: Hours of exceedance (pass ≤ 3%)	TM59 Criterion B: Bedroom temperature hours >26°C (pass ≤ 32)	Overall compliance with TM59
		% Hours of overheating	Hours of overheating	
B.08.01	Bedroom 1	0.00	43.17	Fail
	Bedroom 2	0.18	72.50	Fail
	Living / Dining / Kitchen	0.35	N/A	Pass
B.09.02	Bedroom	0.00	58.83	Fail
	Living / Dining / Kitchen	0.05	N/A	Pass

APPENDIX C

Façade Noise Risk Categories

The following drawing has been provided by Ardent Consulting Engineers, Acousticians, indicating that there are no high noise risk areas at this development, with regards to balancing noise and overheating.

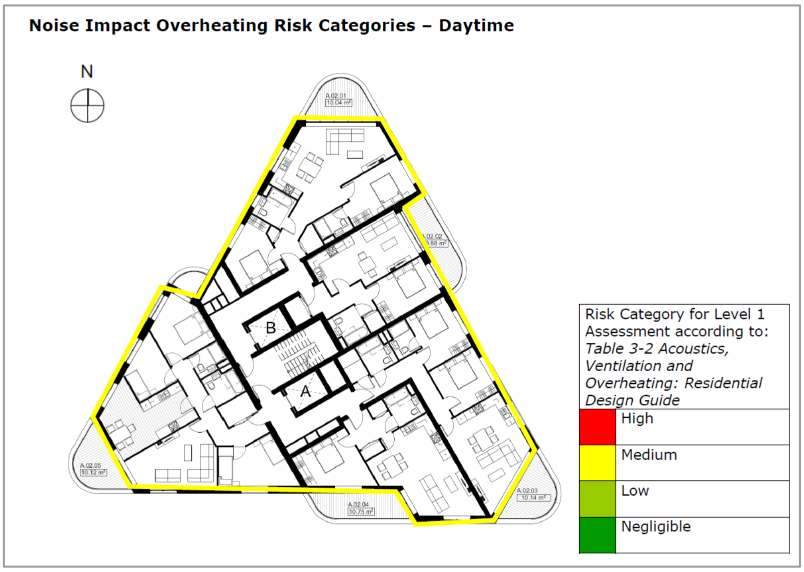


Figure C1: 1-4 floors plans, AVOG Noise risk categories for daytime provided by Ardent Consulting Engineers (December 2020).

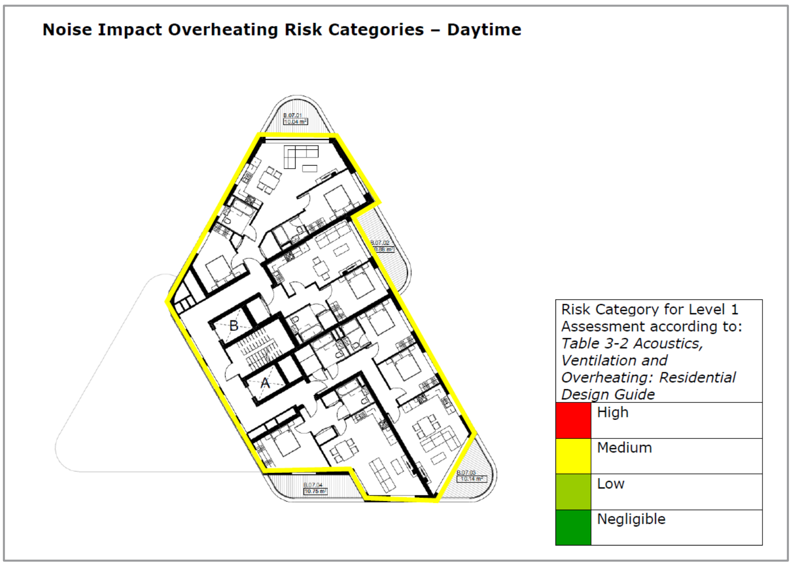


Figure C2: 5-7 floors plans, AVOG Noise risk categories for daytime provided by Ardent Consulting Engineers (December 2020).

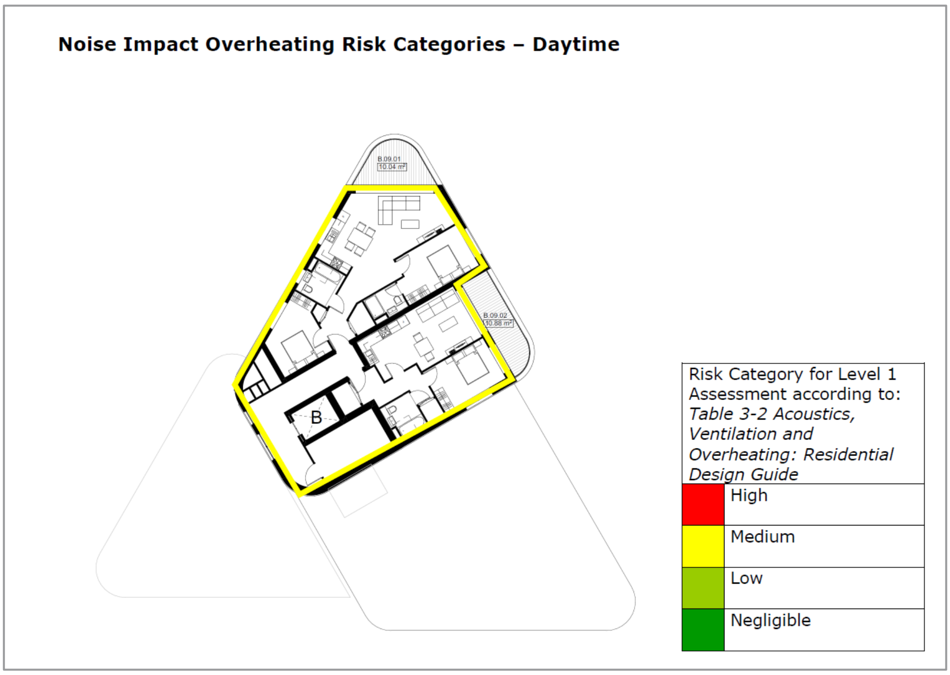


Figure C3: 8-9 floors plans, AVOG Noise risk categories for daytime provided by Ardent Consulting Engineers (December 2020).

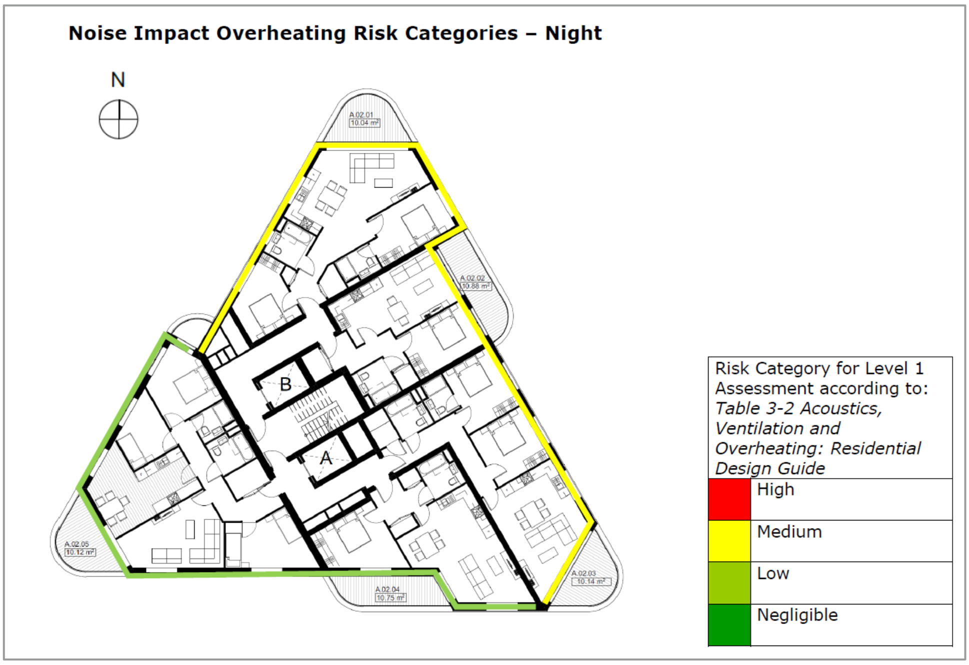


Figure C4: 1-4 floor plans, AVOG Noise risk categories for night-time provided by Ardent Consulting Engineers (December 2020).

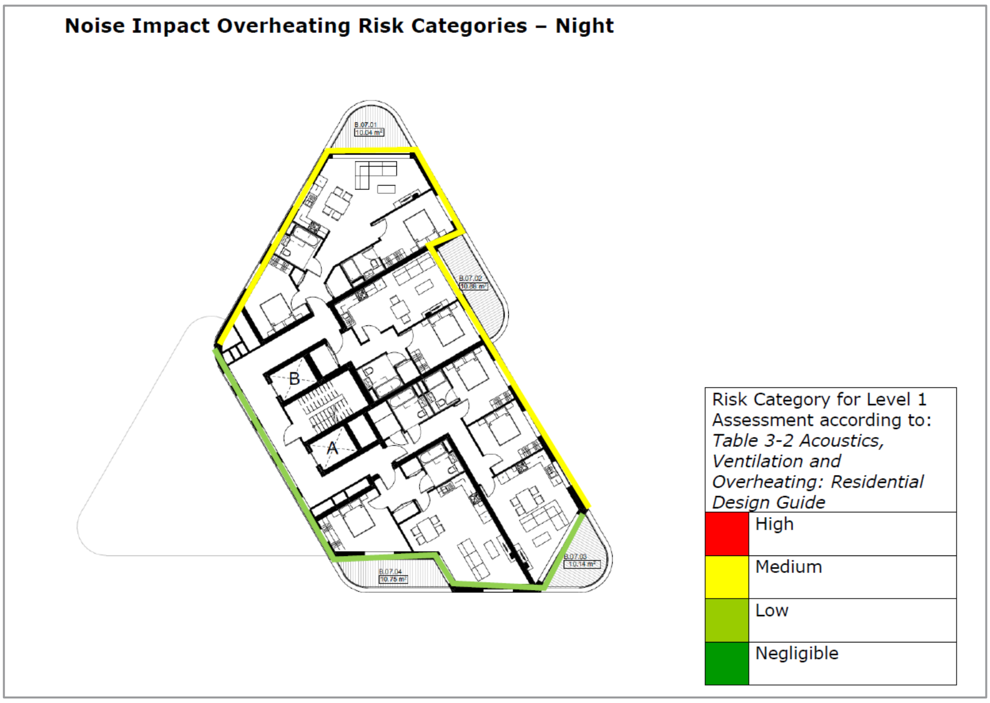


Figure C5: 5-7 floor plans, AVOG Noise risk categories for night-time provided by Ardent Consulting Engineers (December 2020).

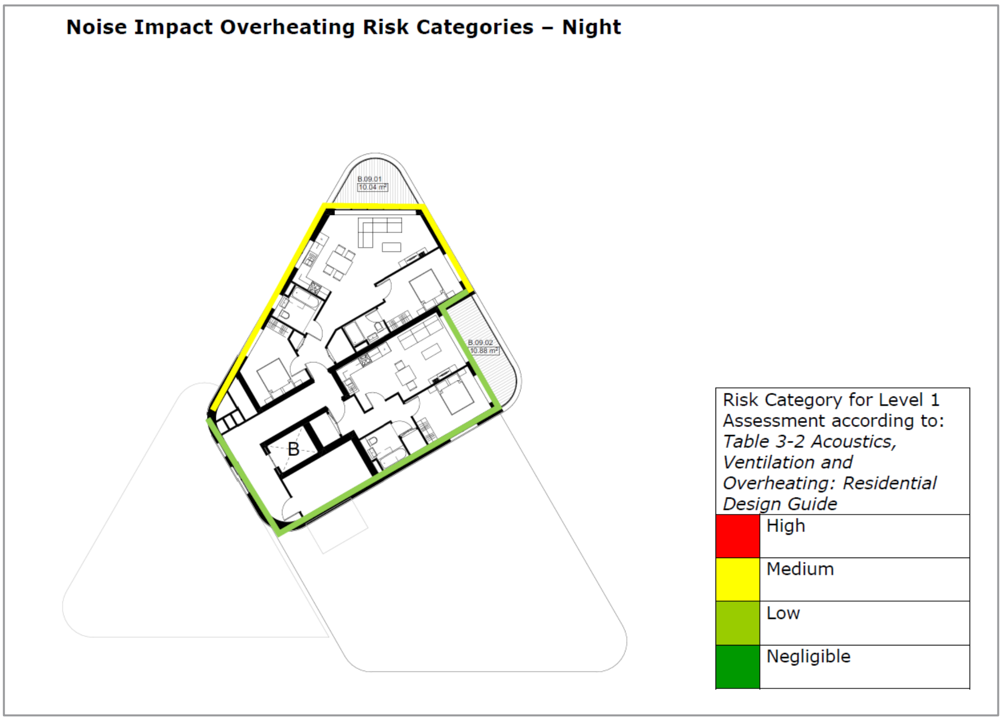


Figure C6: 8-9 floor plans, AVOG Noise risk categories for night-time provided by Ardent Consulting Engineers (December 2020).

APPENDIX D
Mechanical Ventilation Rates

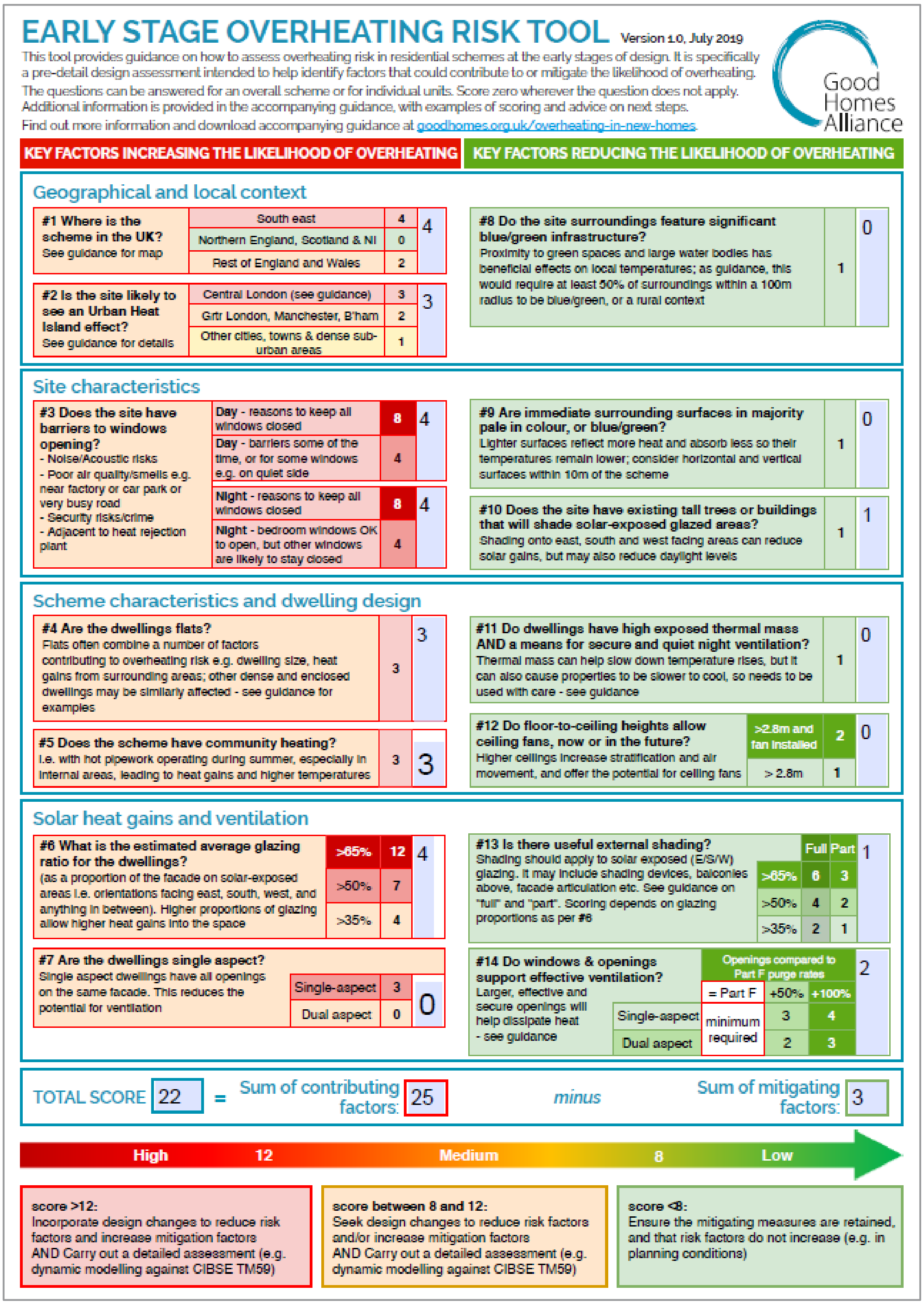
Minimum Part F ventilation rates have been calculated as per the table below and used in the overheating assessment. A mechanical ventilation system capable of delivering at least these rates should be used and designed to perform as per the Energy Statement stated efficiencies and maintain acceptable internal noise levels.

Table D1: Mechanical Ventilation Rates (minimum Part F)

Dwelling	B.04.06	B.06.04	B.07.03	B.08.01	B.09.02
Floor area (m^2)	99.47	56.13	72.81	73.83	50.24
Storey height (m)	2.5	2.5	2.5	2.5	2.5
Volume (m^3)	248.675	140.325	182.025	184.575	125.6
Minimum high rate					
Kitchen (l/s)	13	13	13	13	13
Utility cupboard (l/s)	8	8	8	8	8
Bathroom 1 (l/s)	8	8	8	8	8
Bathroom 2 (l/s)	8		8	8	
Toilet (l/s)					
Boost Rate* (l/s)	37.0	29.0	37.0	37.0	29.0
Whole dwelling ventilation rate (m^3/hr)	104.4	133.2	133.2	104.4	133.2
Air change Rate (ach)	**0.58**	**0.74**	**0.73**	**0.73**	**0.75**

APPENDIX E

GHA Overheating Checklist



EARLY STAGE OVERHEATING RISK TOOL

Version 1.0, July 2019

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply.

Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes.

Good Homes Alliance

KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING | **KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING**

Geographical and local context

#1 Where is the scheme in the UK? See guidance for map	South east	4	4
	Northern England, Scotland & NI	0	
	Rest of England and Wales	2	
#2 Is the site likely to see an Urban Heat Island effect? See guidance for details	Central London (see guidance)	3	3
	Grtr London, Manchester, B'ham	2	
	Other cities, towns & dense sub-urban areas	1	

#8 Do the site surroundings feature significant blue/green infrastructure? Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context	1	0

Site characteristics

#3 Does the site have barriers to windows opening? - Noise/Acoustic risks - Poor air quality/smells e.g. near factory or car park or very busy road - Security risks/crime - Adjacent to heat rejection plant	Day - reasons to keep all windows closed	8	4
	Day - barriers some of the time, or for some windows e.g. on quiet side	4	
	Night - reasons to keep all windows closed	8	4
	Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green? Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme	1	0
#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas? Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels	1	1

Scheme characteristics and dwelling design

#4 Are the dwellings flats? Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples	3	3
#5 Does the scheme have community heating? i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures	3	3

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation? Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance		1	0
#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future? Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans	>2.8m and fan installed	2	0
	> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings? (as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space	>65%	12	4
	>50%	7	
	>35%	4	
#7 Are the dwellings single aspect? Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation	Single-aspect	3	0
	Dual aspect	0	

#13 Is there useful external shading? Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per #6		Full	Part	1
	>65%	6	3	
	>50%	4	2	
	>35%	2	1	

#14 Do windows & openings support effective ventilation? Larger, effective and secure openings will help dissipate heat - see guidance		Openings compared to Part F purge rates			2
		= Part F	+50%	+100%	
	Single-aspect	minimum required	3	4	
	Dual aspect		2	3	

TOTAL SCORE 22 = Sum of contributing factors: 25 *minus* Sum of mitigating factors: 3

High 12 Medium 8 Low

score >12: Incorporate design changes to reduce risk factors and increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)	**score between 8 and 12:** Seek design changes to reduce risk factors and/or increase mitigation factors AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)	**score <8:** Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)