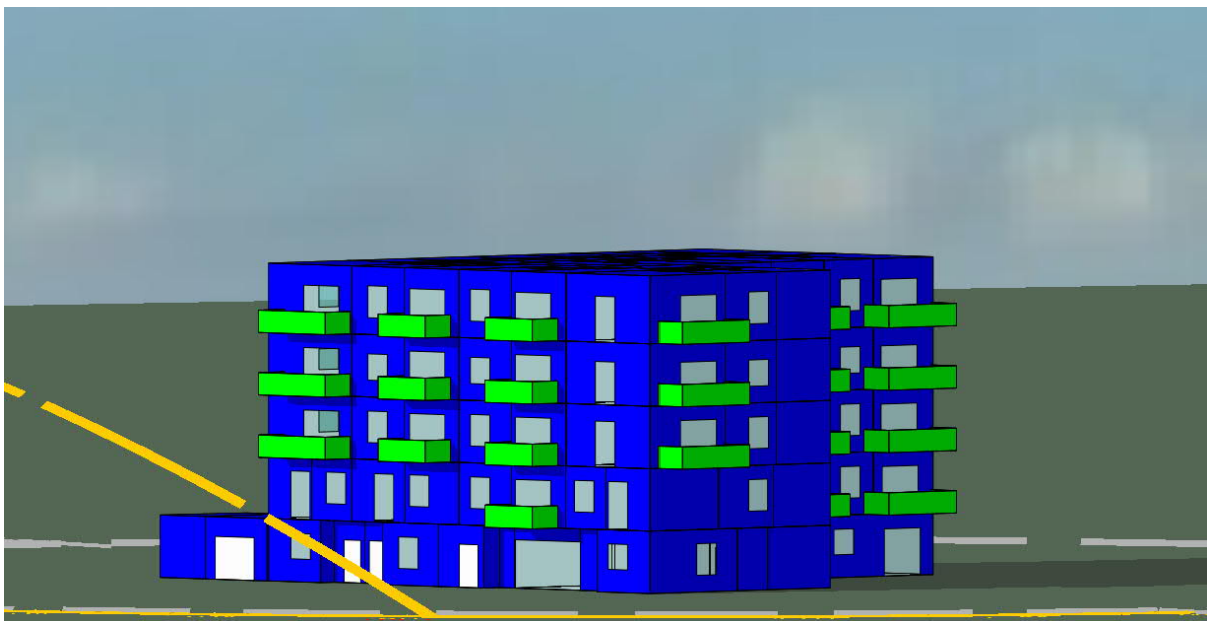


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Audit sheet

Revisions:	No.:	Date:	Approved:
	A	04/11/2021	AF
	B	18/11/2021	AF
	C	29/11/2021	JG

This report has been prepared for the Client only and expressly for the purposes of discharging planning consent conditions. 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.

The study is based on dynamic simulation modelling (DSM). All results and strategies are directly affected by the inputs listed in this document; any deviation from these is bound to output different results. It is important to note that with any modelling exercise there are assumptions and approximations that have to be made. Details of assumptions made, and approximations used are supplied as part of the report.

"Of necessity, many assumptions have been made to derive the profiles. Further work is warranted, but this methodology was developed due to the importance of defining a consistent approach for use in the interim."

"This methodology will:

- allow different designs to be compared with a common approach, based on reasonable assumptions
- support design decisions that improve comfort without cooling
- provide consistency across the industry as all consultants will be using the same methodology for overheating risk prediction."

"This methodology will not:

- guarantee that people will always be comfortable in compliant spaces, however they act
- take into account unusual use"

"It should be noted that the weather file will have the largest impact on the overheating results. We cannot control the weather or the behaviour of people in their own homes. We can, however, encourage building forms and façade designs that support better comfort in hot weather."

All results are based on the output from computer modelling software which is based on climatic conditions and patterns of use bound not to be identical to the real-life situation. Therefore, these results should be read as those following the industry-standard thermal comfort calculation methodology set out in the current CIBSE Guide A, but not as guaranteed real-life observations.

The hours of study are the occupied hours when it is expected that a dwelling would be occupied. It is to be noted that this document is not intended to demonstrate compliance with Part F or Part L of the Building Regulations.

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Executive Summary

Dynamic simulation modelling software was used to assess the risk of overheating at a representative number of dwellings within the Detailed First Phase (30 units in total) of the Hybrid Planning Application for the redevelopment of Avondale Drive Estate. Simulations were run using both present weather data and predicted climate change weather data in accordance with TM 59 and TM49, and the relevant planning policy and supplementary guidance.

The results using current climate and near future data were as follows:

- Using 0.4g glazing the dwellings pass the tests with current/2020 weather data
- Windows will need to be operable and to a degree shown on the drawings (90deg)
- Internal gains must be minimised
- To provide the most benefit, the windows of south west facing dwellings will need to remain closed during mornings in warmer periods, with the windows opened in the evening
- Blinds must be included in the base build.
- Single aspect dwellings must have secure way of keeping balcony doors slightly open.

The results using predicted climate change weather files were as follows:

- In from 2050 onwards the warmer climate means that current comfort criteria will be exceeded. Mechanical cooling could be installed to deal with uncomfortable periods.
- In order to facilitate this, refrigerant pipe routes and adequately ventilated space for condensers should be included in the scheme.

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Introduction

This overheating risk assessment has been undertaken in accordance with the requirements set out by the London Plan (2021) and CIBSE Technical Memorandum 59 - Design methodology for the assessment of overheating (2017).

The proposals have been developed within the context of national, regional, and local planning policy that seek to address the challenges of climate change and overheating risk and to minimize adverse effects on the urban heat island, and outline plans to reduce overheating risk by passive means where possible.

This overheating risk assessment complies with the requirements of London Plan section 9.4.5 which requires that residential developments pass the CIBSE TM59 risk assessment, using the appropriate weather data sets and by using passive means where possible. Where mechanical cooling is required, the overheating risk assessment details that all possible passive steps of the policy SI 4 hierarchy have been applied before using cooling to reduce the requirement and associated energy costs.

The report refers to the predicted degree of overheating when modelled against standardized weather data sets and considers various options for overheating mitigation. Reduction of overheating risk has informed the design process and all measures described herein have been incorporated in the design of the scheme where possible.

This report has been produced by Synergy in support of a Hybrid Planning Application for the redevelopment of the existing Avondale Estate to provide 240 new and replacement homes overall on behalf of the London Borough of Hillingdon (LBH). It relates specifically to the Detailed First Phase of the Hybrid Planning Application which comprises 30 residential units. The remainder of the estate forms the Outline Area comprising 210 units and is subject to a separate assessment which demonstrates compliance with the relevant planning policies and standards based on the outline parameters and will guide the detailed design of future phases through the proposed energy, sustainability and overheating risk mitigation principles as part of a coordinated approach to achieving net-zero across the estate.

This Overheating Risk Assessment should be read in conjunction with other supporting documents submitted with the planning application, including the Planning Statement and Development Specification Statement prepared by Savills and the Design and Access Statement prepared by PTE which explain the Proposed Development in more detail and relate it to the surrounding context and planning policy framework for the Site.

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Planning Policy

The main policy driver that requires overheating to be assessed in new built dwellings is the London Plan. National and local authority planning policy has not yet caught up with the detail of conducting ORAs and the soon to be released update to the Building Regulations will make overheating risk assessments mandatory by law, however these updates have been delayed.

The relevant policies of the London Plan are SI 4 and Managing heat risk and D6 Housing quality and Standards. Policy D6 requires that housing meet minimum standards and asks to avoid overheating in a general way. Policy SI 4 develops the strategy of managing overheating risk and introduces the concept of the cooling hierarchy.

The supplementary document, Energy Assessment Guidance adds further technical detail on how to apply the CIBSE TM59 methodology in accordance with SI 4 and which weather data files to use in different parts of the London Urban Heat Island. Further information is given on the use of passive, active measures, blinds, window openings and security concerns.

Policy SI 4 Managing heat risk A Development proposals should minimise adverse impacts on the 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 through orientation, shading, high albedo materials, 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. Policy D6 Housing quality and standards A Housing development should be of high quality design and provide adequately-sized rooms (see Table 3.1) with comfortable and functional layouts which are fit for purpose and meet the needs of Londoners without differentiating between tenures. B Qualitative aspects of a development are key to ensuring successful sustainable housing. Table 3.2 sets out key qualitative aspects which should be addressed in the design of housing developments. C Housing development should maximise the provision of dual aspect dwellings and normally avoid the provision of single aspect dwellings. A single aspect dwelling should only be provided where it is considered a more appropriate design solution to meet the requirements of Part B in Policy D3 Optimising site capacity through the design-led approach than a dual aspect dwelling, and it can be demonstrated that it will have adequate passive ventilation, daylight and privacy, and avoid overheating. D The design of development should provide sufficient daylight and sunlight to new and surrounding housing that is appropriate for its context, whilst avoiding overheating, minimising overshadowing and maximising the usability of outside amenity space.	MAYOR OF LONDON Energy Assessment Guidance Greater London Authority guidance on preparing energy assessments as part of planning applications (April 2020) DRAFT Top left Extract 1 Policy SI 4 Left Extract 2 policy D6 Above Extract 3 GLA supplementary Energy Assessment Guidance
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London Plan section 9.4.5:-

9.4.5 The Chartered Institution of Building Services Engineers (CIBSE) has produced guidance on assessing and mitigating overheating risk in new developments, which can also be applied to refurbishment projects. TM 59 should be used for domestic developments and TM 52 should be used for non-domestic developments. In addition, TM 49 guidance and datasets should also be used to ensure that all new development is designed for the climate it will experience over its design life. Further information will be provided in guidance on how these documents and datasets should be used

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Introducing TM59 Design methodology for the assessment of overheating risk in homes 2017

The field of assessment and prediction of overheating in buildings in the UK has been evolving in recent years. The old, fixed 28°C limit for 1% occupied hours as defined by CIBSE in Guide A (2006) has been superseded by more complex criteria in CIBSE TM52 for commercial buildings (2013) and TM59 for homes (2017) which are based upon the idea of adaptive thermal comfort. The foundation of this is that comfortable room temperatures will vary depending on what recent external temperatures – in periods of warmer weather people will adapt and accept warmer room temperatures.

In the case of residential developments, compliance with TM59 is based on passing both of the following two criteria:

(a) For living rooms, kitchens and bedrooms: the number of hours during which ΔT is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3 per cent 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).

Criteria 2 and 3 of CIBSE TM52 may fail to be met, but both (a) and (b) above must be passed for all relevant rooms. TM59 also requires the design to be tested against the future weather files detailed in TM49: Design Summer Years for London (2014a) and CIBSE's Probabilistic Climate Profile.

The future weather files of 2050 and 2080, and the DSY2 'short intense warm spell' and DSY3 'long less intense warm spell' are reported upon, however only the 2020 DSY1 simulation needs to pass under (a) and (b) to achieve an overall pass.

Note for a Cat II (normal risk building) $T_{max} = 0.33 T_{rm} + 21.8$, $\Delta T = T_{op} - T_{max}$ T_{rm} is the external running mean dry bulb temperature

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Dynamic Thermal Simulation

The software and version used for the assessment is IES Virtual Environment v 2021.1.1.0. This software complies with the requirements of CIBSE AM11: Building performance modelling (2015b). This software is an industry standard and has been used to perform thermal and overheating analysis many projects within SCE and across the sector.

Location and Orientation

The site is in the London Borough of Hillingdon. The block is being constructed as part of the wider Avondale Drive Estate regeneration. Avondale Drive's Block 1a comprising 30 residential units (Class C3), is a five-storey block containing 1, 2, 3 and 4 bedroom units. There are several duplexes on the ground and first floor which permit stack and cross ventilation.



Figure 1 | Site and orientation sourced from Architects drawings

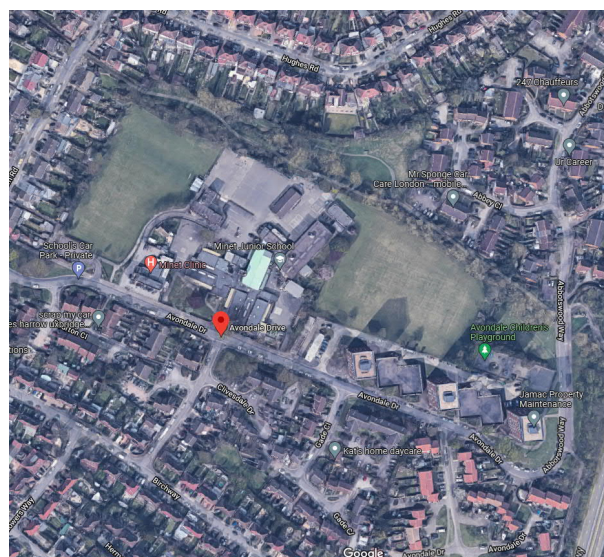


Figure 2 | Aerial photograph from Google Earth

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The Sample Units



Figure 3 | First Floor Plan dated Oct 21 By Pollard Thomas Edwards, all dwellings



Figure 4 | First Floor Plan dated Oct 21 By Pollard Thomas Edwards, all dwellings

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The Sample Units cont.



Figure 5 | Fourth Floor Plan dated Oct 21 By Pollard Thomas Edwards, all dwellings

Autocad and .pdf drawings and a BIM model from October 2021 provided by Pollard Thomas Edwards were used as the basis of the model in IES. These plans reflect the final layouts as proposed and submitted as part of the Hybrid Planning Application. The constructions of the walls were taken from the wall build-ups shown on the general arrangement. Floor, roof and window u-values were assumed to be compliant with the Building Regulations but not thermally massive and so having little impact on the overheating risk assessment.

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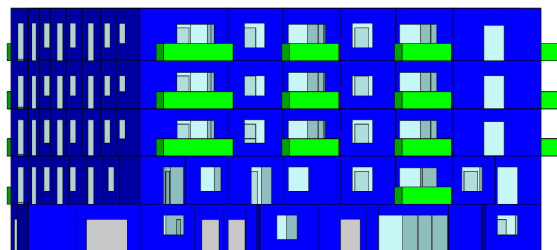
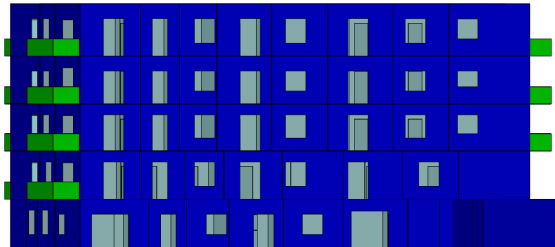
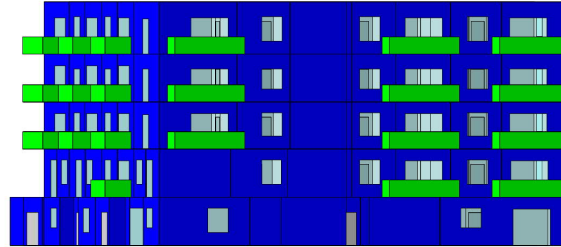


Figure 6 | Front Rear and Side elevation from the dynamic thermal model

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As can be seen in the three dimension view of the model a representative set of dwelling types have been modelled in accordance with TM59. The model includes all dwellings in the assessment.

Thermal properties - the building fabric is as proposed on the latest plans for the external walls and internal partitions. The remaining information has been assumed based upon Building Regulation compliant constructions are very likely to reflect what will be constructed.

Note that SAP may require better u-value performance than that modelled below. Opaque fabric transmittance has little effect on ORA. Dominant factors are thermal mass and the g-value of the glazing.

Element	Proposed Standard
Roof	0.18 W/m ² K
Wall	0.18 W/m ² K
Floor	0.13 W/m ² K
Openings	1.6 W/m ² K
Glazing G value	0.40

Table 1 | Proposed standard of thermal elements

Element	Proposed Standard
Soffit	17 KJ/m ² .K (lightweight)
External Wall	30 KJ/m ² .K (lightweight)
Internal wall	17.5KJ/m ² .K (lightweight)

Table 2 |Table of thermal masses

Internal gains – Taken from TM59

Thermal Template
 ■ TM59 - 1 Bedroom - Living / Kitchen
 ■ TM59 - 2 Bedroom - Living / Kitchen
 ■ TM59 - 3 Bedroom - Kitchen
 ■ TM59 - 3 Bedroom - Living
 ■ TM59 - Bathroom
 ■ TM59 - Circulation - Corridors
 ■ TM59 - Circulation - in flats
 ■ TM59 - Cupboards
 ■ TM59 - Cupboards with HIU
 ■ TM59 - Double Bedroom
 ■ TM59 - Riser - Communal Pipework
 ■ TM59 - Single Bedroom

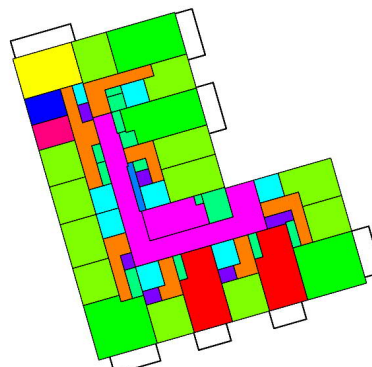


Figure 7 | Extract from model showing where different thermal templates have been applied

For the purposes of the assessment, lighting energy is assumed to be proportional to floor area, and lighting loads are measured in W/m². From 6 pm to 11 pm, 2 W/m² should be assumed as the default for an efficient new-build home. This assumes that good daylight levels are available. Domestic Hot Water (DHW) storage has been assumed to lose 50 W to the airing cupboards. DHW pipe loss has been assumed to be 8 w/m.

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Internal gains – Taken from TM59

Room type	Occupancy (75/55 W/person)	Equipment
Studio	2 people at 70% gains from 11 pm to 8 am 2 people at 100% gains from 8 am to 11 pm	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 10 pm to 12 pm Base load of 85 W for the rest of the day
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
1-bedroom apartment: 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 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
1-bedroom apartment: 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 Base load of 50 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
2-bedroom apartment: 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 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
2-bedroom apartment: 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 Base load of 50 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
3-bedroom apartment: 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 60 W from 9 am to 6 pm and from 10 pm to 12 pm Base load of 35 W for the rest of the day
3-bedroom apartment: 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 base load of 50 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 gains 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 (too small to accommodate double bed)	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
Communal corridors	Assumed to be zero	Pipework heat loss only

Table 3|Table of gains taken from TM59

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Glazing

Glazing has been modelled with a g-value of 0.4. Frame factors vary between 0.8 and 0.85 for the small and larger window opening respectively. Proportions of frame have been taken from the Revit model.

Blinds and Shading Devices

Blinds have been modelled as being pulled down during the daytime. To allow for blinds to be down where windows are open the performance for Venetian blinds have been assumed, an open Venetian blind being less restrictive to air movement than a roller blind.

The following properties were assigned to blinds where modelled.

Blinds on Fixed Panes

- Shading Coefficient =0.4
 - Short-wave radiation factor =0.3
- These values are taken from a BRE study and are based on a “Cream Holland linen blind”.

Blinds on Opening windows

- Shading Coefficient =0.6
 - Short-wave radiation factor =0.3
- These values are taken from a BRE study and are based on a “Venetian blind open”.

Blinds must be included as part of the base build and must be explained within specific home user guidance if they are to be included in TM59 results

External shading has been provided based upon the architectural information noted previously. The south facing façade has extensive external shading from full width overhanging balconies. The overshadowing provided by the balconies has helped to pass the overheating risk assessment.

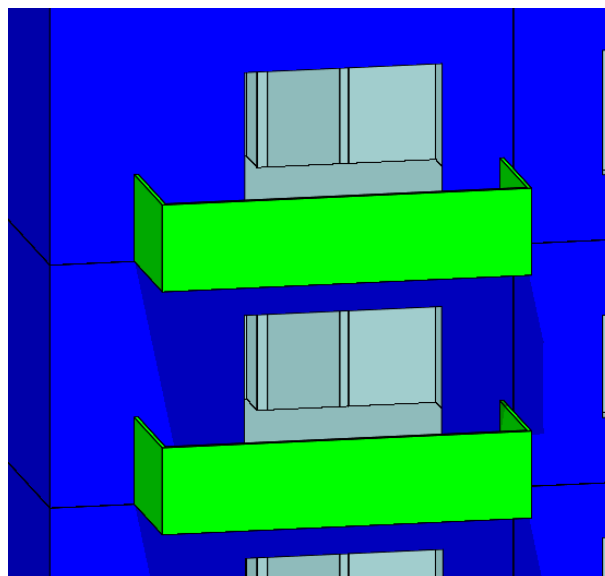


Figure 7 | Extract from model showing the external shading to the south facade

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Ventilation strategy

The infiltration rates have been determined from CIBSE guide A 2015 to be approximately 0.25 air changes per hour, at described by TM59. Boost modes of the ventilation units present are not allowed to be taken into account for overheating risk analysis under TM59.

As directed by TM59 operable windows are opened when rooms are occupied once internal temperatures exceed 22°C. Windows are also left open at night. Generally the windows are in secure locations due to the nature of the shape and layout of the building but where this is not the case it would be sensible to include a method of locking out windows and doors so that they can provide 100mm of clear opening whilst locked and therefore secure from outside intrusion. This is especially important with rooms with only sliding doors.

Internal doors have been modelled as open until sleeping time from 10pm as directed by the guidance in TM59.

Air Speed and Thermal Comfort

Operative temperature calculations (used within CIBSE TM52 (2013)) require assumptions on air speed. The operative temperature includes the room temperature as measured by a thermostat, the radiant temperature which involves effects such as being in direct sunlight and the air speed to provide a better measure of thermal comfort temperature than room temperature alone. The modelled air speed in a space must be set at 0.1 m/s where the software provides this option unless there is a ceiling fan or other means of reliably generating air movement. Level of risk criteria II from TM52 has been used which represents a normal level of risk in a new build.

Weather Files

- CIBSE LHR DSY1 2020 current High Emissions
- CIBSE LHR DSY2 2020 current High Emissions
- CIBSE LHR DSY3 2020 current High Emissions
- CIBSE LHR DSY1 CC 2050 High Emissions
- CIBSE LHR DSY1 CC 2050 High Emissions

Weather files have been used in compliance with TM59, TM49 and the current London Plan.

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Results

Scenario/Weather	with Blinds DSY1		without Blinds DSY1		DSY 2 Short Intense		DSY 3 Long less intense		DSY 1 2050CC		DSY 1 2080CC	
	Criteria (a) For living rooms, kitchens and bedrooms: 3% occupied summer hours	Criteria (b) For bedrooms only: 32 hour annual limit	Criteria (a) For living rooms, kitchens and bedrooms: 3% occupied summer hours	Criteria (b) For bedrooms only: 32 hour annual limit	Criteria (a) For living rooms, kitchens and bedrooms: 3% occupied summer hours	Criteria (b) For bedrooms only: 32 hour annual limit	Criteria (a) For living rooms, kitchens and bedrooms: 3% occupied summer hours	Criteria (b) For bedrooms only: 32 hour annual limit	Criteria (a) For living rooms, kitchens and bedrooms: 3% occupied summer hours	Criteria (b) For bedrooms only: 32 hour annual limit	Criteria (a) For living rooms, kitchens and bedrooms: 3% occupied summer hours	Criteria (b) For bedrooms only: 32 hour annual limit
Space ID												
4256 Kitchen/Living	1.5	61	1.9	70	3.3	93	4.8	142	4.4	176	9.3	448
1443 Living	1.7	47	1.9	47	3.2	82	4.6	128	4.7	125	8.6	336
1445 Kitchen	2	15	2.3	17	3.5	26	5.3	40	4.6	41	9.2	112
1451 Living	2.8	45	3.4	53	4	80	6.5	123	5.9	122	12.2	322
1453 Kitchen	1.6	26	1.8	26	3.1	52	4.7	74	4.4	79	8.8	210
1454 Double Bedroom	1.6	22	1.9	22	2.1	36	3.5	50	3.2	56	6.5	153
1456 Twin Bedroom	1.5	27	1.7	28	2.1	43	3.4	71	3.2	80	6.7	193
1457 Double Bedroom	1.4	23	1.4	24	2	35	3.1	51	2.8	60	5.8	155
1458 Single Bedroom	1.4	25	1.5	25	2.2	36	3.3	52	3	63	6	161
1461 Double Bedroom	0.4	24	0.5	24	1.4	42	1.8	63	1.3	79	3.6	201
1478 Double Bedroom	1.3	21	1.3	21	1.9	35	3.1	50	2.9	57	5.4	151
1502 Kitchen	3	17	3.5	17	4.1	25	6.4	43	5.6	44	11.3	127
1504 Living	2.8	17	2.9	17	3.8	25	6.2	47	5.9	46	11.2	135
1511 Twin Bedroom	1.4	27	1.5	27	2	43	3.4	66	2.9	74	5.8	188
1512 Double Bedroom	1.3	21	1.4	23	2	35	3.2	50	2.8	57	5.8	151
1513 Single Bedroom	1.5	25	1.6	25	2.2	36	3.6	53	3	62	6.2	164
1618 Single Bedroom	1	23	1.1	25	1.8	36	2.8	53	2.5	62	5.2	163
1620 Kitchen/Living	1.8	28	2.2	29	3.4	50	5.1	77	4.8	85	9.4	218
1643 Twin Bedroom	0.6	26	0.7	27	1.4	40	2.2	61	2	78	4.2	197
1654 Double Bedroom	0.5	24	0.5	24	1.4	40	1.9	61	1.6	74	3.8	195
1657 Kitchen/Living	1.7	65	2.1	73	3.4	95	5.7	153	4.9	184	9.9	452
1661 Twin Bedroom	0.6	27	0.7	27	1.5	43	2.3	64	2.2	84	4.5	204
1663 Double Bedroom	0.5	26	0.5	26	1.4	45	1.9	66	1.4	87	3.8	228
1666 Kitchen/Living	1.7	71	2	82	3.3	97	5.5	156	4.6	195	9.8	491
1670 Twin Bedroom	0.6	31	0.7	33	1.5	48	2.3	75	2	97	4.5	235
1672 Double Bedroom	0.5	24	0.5	24	1.4	39	1.9	60	1.6	78	3.9	200
1675 Kitchen/Living	1.8	64	2.2	76	3.3	94	5.4	152	4.9	187	10.5	467
1679 Twin Bedroom	0.6	27	0.7	27	1.5	41	2.3	65	2.1	84	4.5	206
1681 Kitchen/Living	1.8	64	2.2	74	3.5	92	5.5	144	5	182	10.6	465
1682 Double Bedroom	0.8	27	0.9	28	1.7	42	2.5	65	2.5	85	5.1	205
1684 Kitchen/Living	1.9	64	2.2	74	3.5	93	5.6	144	5.1	183	10.5	454
1685 Double Bedroom	0.8	27	0.9	29	1.7	42	2.5	68	2.5	85	5.3	207
4117 Kitchen/Living	1.3	53	1.7	63	3.2	86	4.6	132	4.2	156	8.7	411
4119 Double Bedroom	0.7	27	0.8	28	1.7	42	2.5	64	2.3	85	4.9	195
4133 Kitchen/Living	1.7	64	1.9	68	3.4	93	5.2	145	4.6	174	9.4	439
4135 Double Bedroom	0.8	27	0.9	30	1.8	43	2.6	70	2.5	85	5.3	206
4178 Double Bedroom	0.5	20	0.6	20	1.5	33	2.1	51	1.8	60	3.9	156
4185 Kitchen/Living	2.6	23	2.7	28	3.8	49	6.1	65	5.3	78	10.6	203
4193 Kitchen/Living	2.5	20	2.7	20	3.8	32	6	50	5.1	57	10.6	155
4195 Twin Bedroom	1.3	26	1.4	27	2	41	3.4	65	2.8	76	6	186
4196 Master Bedroom	1.6	22	1.8	22	2.2	36	3.6	50	3.3	59	6.7	150
4197 Single Bedroom	1.7	23	1.9	27	2.3	36	3.8	54	3.6	64	7	160
4201 Kitchen/Living	2.6	21	2.8	22	3.9	44	6.1	61	5.4	69	10.6	186
4202 Kitchen/Living	2.7	21	3.1	26	4	44	6.4	62	5.6	73	11	194
4205 Twin Bedroom	1.4	30	1.5	32	2	47	3.3	72	3.1	88	6.3	219
4211 Twin Bedroom	1.4	27	1.6	28	2	41	3.4	68	3.1	80	6.4	191
4217 Twin Bedroom	1.4	27	1.6	27	2	41	3.4	65	3.1	79	6.3	189
4227 Kitchen/Living	2.6	19	2.8	20	3.9	31	6.2	48	5.2	56	10.6	149
4228 Kitchen/Living	2.5	19	2.8	20	3.7	31	6	48	5.1	55	10.6	152
4229 Kitchen	3.2	17	3.7	17	4.2	24	6.5	41	5.9	44	11.8	126
4234 Living	2.9	17	3	17	3.8	26	6.4	47	5.9	46	11.3	135
4257 Double Bedroom	0.7	27	0.8	28	1.6	41	2.4	67	2.4	84	4.9	201
1298 Double Bedroom	1.4	21	1.6	22	2	35	3.5	50	3.1	57	6.3	156
1304 Double Bedroom	1.4	23	1.5	25	2	35	3.3	53	3	61	6.2	160
1330 Twin Bedroom	1.1	29	1.3	31	1.9	45	3.3	70	2.8	85	5.9	209
1331 Master Bedroom	1.6	23	1.7	24	2.2	36	3.6	53	3.1	61	6.4	157
1332 Single Bedroom	1.6	26	1.8	27	2.3	38	3.7	62	3.3	73	6.6	180
1333 Kitchen	3.1	17	3.6	19	4.1	25	6.4	44	5.6	45	11.4	128
1337 Living	2.7	17	2.9	17	3.8	28	6.2	48	5.8	47	11.2	135
1338 Twin Bedroom	1.1	26	1.3	26	1.8	40	3.3	63	2.7	73	5.7	185
1339 Master Bedroom	1.6	21	1.7	21	2.2	34	3.6	49	3	59	6.2	150
1340 Single Bedroom	1.6	23	1.8	24	2.3	36	3.6	53	3.2	64	6.6	159
1341 Kitchen	3	19	3.4	21	4.2	33	6.5	48	5.8	53	11.6	146
1345 Living	2.6	17	2.9	17	3.5	25	6.1	43	5.6	46	11	130
1346 Master Bedroom	1.1	26	1.1	26	1.8	40	2.8	63	2.6	70	4.9	183
1347 Twin Bedroom	0.9	26	1	26	1.9	41	2.6	63	2.3	74	5	186
1348 Kitchen/Living	2.2	22	2.3	22	3.4	36	5.3	53	4.9	63	9.6	176
1351 Master Bedroom	0.7	26	0.7	26	1.5	40	2.3	63	2.2	69	4.4	182
1352 Twin Bedroom	0.7	26	0.8	26	1.6	40	2.3	63	2.2	74	4.5	190
1353 Kitchen/Living	2.4	18	2.8	20	3.7	30	5.9	45	5.4	52	10.3	139
1355 Kitchen/Living	1.7	65	1.9	71	3.4	93	4.9	144	4.4	178	9.4	449
1356 Master Bedroom	1	27	1.1	27	1.8	45	2.7	67	2.6	81	4.8	203
1357 Twin Bedroom	0.8	28	1	29	1.7	46	2.5	69	2.2	84	5	212
1358 Kitchen/Living	2.1	22	2.3	24	3.4	36	5.2	53	4.8	63	9.5	182
1360 Double Bedroom	0.7	31	0.8	33	1.7	47	2.4	73	2.3	92	5	233
1361 Master Bedroom	1	25	1.1	26	1.8	40	2.8	62	2.6	71	4.8	182
1362 Twin Bedroom	0.9	24	1	26	1.8	40	2.5	63	2.2	75	4.9	185
1363 Kitchen/Living	2.2	22	2.3	22	3.4	35	5.3	53	4.9	64	9.6	181
1367 Double Bedroom	1.2	25	1.3	26	1.9	41	3	62	2.6	74	5.4	183
1368 Master Bedroom	1	21	1	23	1.8	35	2.6	52	2.6	57	4.8	154
1371 Master Bedroom	1	23	1	24	1.8	36	2.6	54	2.5	61	4.7	159
1374 Master Bedroom	1	20	1	21	1.7	35	2.6	51	2.5	56	4.7	153
1381 Kitchen/Living	1.8	65	2	70	3.4	94	5.2	147	4.6	181	9.6	448
1382 Double Bedroom	0.7	32	0.9	33	1.7	47	2.5	74	2.3	97	5.2	238
1476 Kitchen/Living	1.5	24	1.7	26	3	45	4.6	71	4.3	74	8.7	203
1557 Kitchen/Living	1.4	53	1.8	61	3.1	83	4.9	136	4.7	159	9.4	419
1370 Double Bedroom	1	27	1.3	30	1.9	46	2.9	68	2.5	85	5.3	205
1373 Double Bedroom	1	25	1.2	25	1.8	40	2.9	61	2.5	73	5.2	180

Avondale – Overheating Risk Assessment (ORA)

Project/Ref: 07900 – Avondale

29/11/2021

Discussion

All living areas and bedrooms pass criteria a and b of TM59 when tested against the mandatory current DSY1 and 2020 future weather files.

Blinds are required to be used to achieve a pass in some of the flats in an iteration of the model run against the current 2020 weather file.

An earlier iteration of the building featured approximately 20 percent more glazing per area of façade than the one modelled and more glazing was on the southwest façade. Preliminary modelling was used to inform the architecture, which resulted in the reduction in glazed area and the move from the southwest façade. This has helped to achieve a pass in some of the most at-risk spaces.

The g-value of the glazing is as low as one would reasonably want to go without making the glazing too dark and restricting the amount of natural light which could increase electricity bills for electric lighting.

As a result, and in order to keep the standard of the flats similar and uniform in appearance, good quality blinds should be included within the base build as per the requirements of TM59.

Further testing

The building when modelled against the current DSY 2 weather file passes in all spaces. This demonstrates the building is adapted well against weather spells with short sharp peak temperature.

There is no requirement to pass the DSY3 check under TM59, however for thermal comfort to be achieved in this type of weather then air conditioning would need to be installed.

Climate change

The building fails in nearly all spaces against the far future climate change scenarios with 2080 being the worst performing test. Against the 2050 weather file most spaces fail. The CIBSE TM59 overheating risk assessment methodology permits a failure against the future climate change weather data so long as the 2020 iteration passes, which is the case, however the scheme should be adaptable to deal with climate change in the future.

Given the design life of the building of approximately 50 years it would be prudent to build in some service space and distribution routes so that air conditioning can be retrofitted. The building heating system uses centrally located heat pumps which in summertime can produce coolth as a waste product of generating domestic hot water. This coolth could be directed against the worst performing flats to provide a degree of air tempering during periods of hot water. Please see the Energy and Sustainability Statement for further details on implementation of this strategy.

Conclusion

The building as designed is well adapted to deal with overheating in the near future when compared with current data and near future data. There are very high levels of operable windows and blinds which enable occupants to adapt the building in order to achieve thermal comfort. The design of the glazing and the overhangs in the façade has helped to minimise the amount of solar gain getting in through the building fabric. Internal gains from waste heat will be minimised. Blinds should be included in the base build specification.

There will come a point in the future though where, if the climate change weather data is correct, the building will no longer be able to operate in free running mode due to overheating risk. At this point it is likely that air conditioning will need to be installed.

The proposed development is compliant with policies D6 and SI 4 plus CIBSE TM59 and has a reduced risk of overheating which provides a good standard of internal residential amenity.