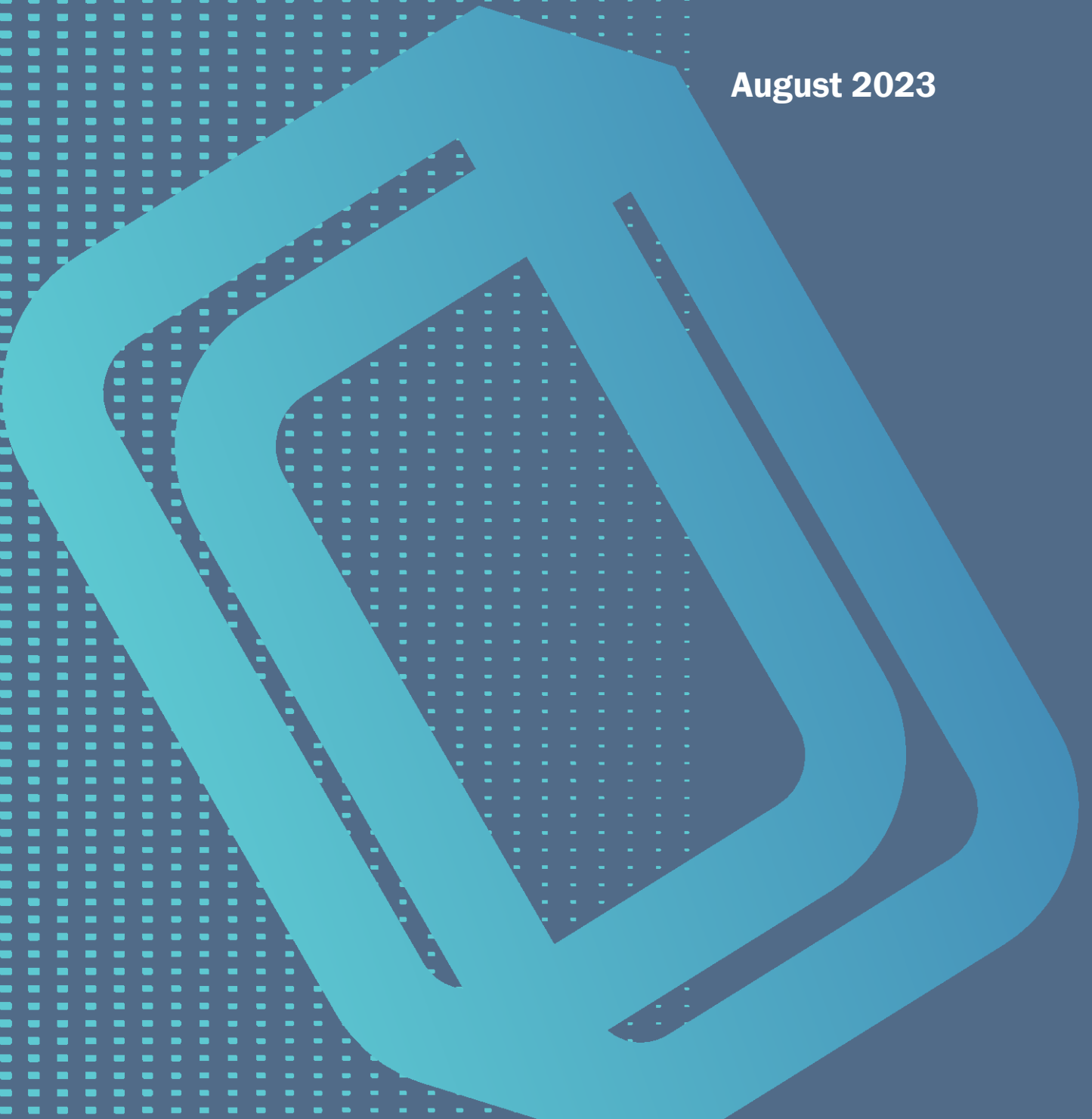


Remington Road

**Overheating
Assessment**

August 2023



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DOCUMENT CONTROL SHEET		DISCLAIMER
Report Reference	CE1956/RR/OH/202308-AV	This report is based on drawings and specifications provided along with information assumed by NRG Consulting for the purposes of compliance. Any budget costs or plant sizing contained within this document are estimated unless otherwise specified and are to be taken as guideline only.
Issue Purpose	Scheme NMA	
Client	Formation Design & Build	
Author	Alex Visintini	NRG Consulting accepts no responsibility whatsoever to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.
Approved By	Ryan Thrower	
Date of Issue	21 st August 2023	This report is for the use of the specified Client only unless in the case that there is a signed Letter of Reliance to accompany the report.

1 EXECUTIVE SUMMARY

NRG Consulting have been commissioned to undertake an Overheating Assessment on a proposed development consisting of part 3, 5 and 6 storey apartment buildings (31 homes) and 1, 2 and 3 storey houses and maisonettes (15 homes) at Remington Road & Pulford Road, London, N15.

The following guidelines have been followed to assess the proposed development:

- CIBSE TM59: 2017 – Design methodology for the assessment of overheating risk in homes.

These calculations have been performed based on the assumptions contained within the report with regard to lighting, occupancy, building operation, construction thermal properties and windows openings. The ventilation strategy for the building shall be primarily via natural ventilation. Although mechanical ventilation will be used, windows will still be openable for summer purge ventilation.

Based on the information and statement made within this report, we have constructed and simulated a dynamic thermal model of proposed occupied rooms for the residential development in order to comply with CIBSE TM59.

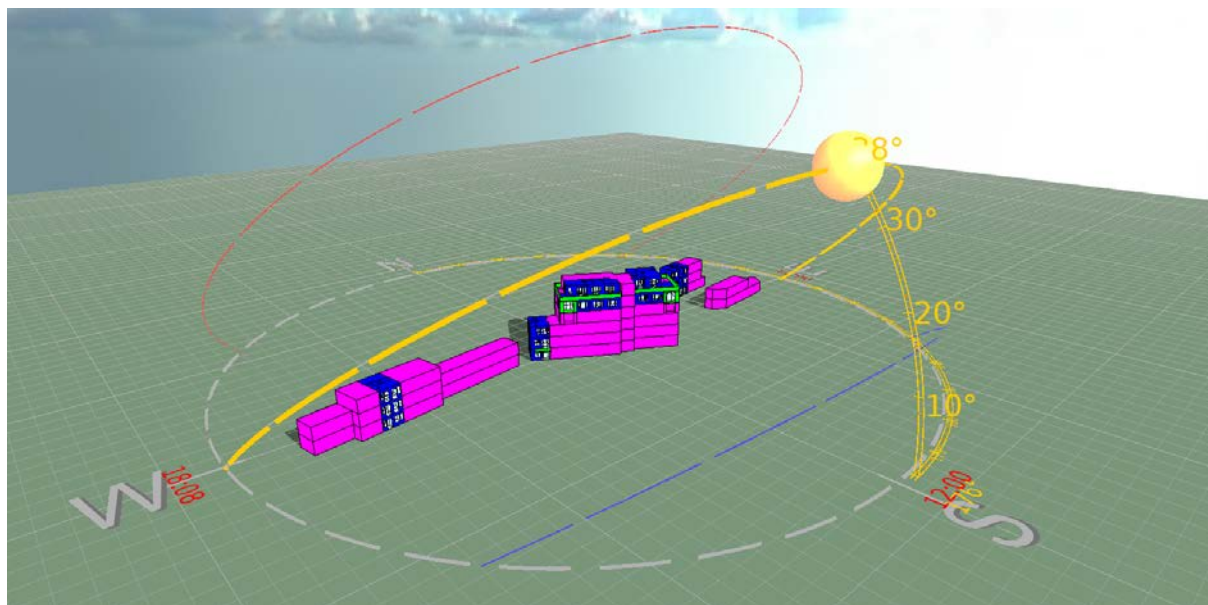


Figure 1: 3D model of proposed buildings.

2 INTRODUCTION

2.1 Background

CIBSE TM59 is a standardised approach to predicting overheating risk for residential building using dynamic thermal analysis. It provides a set of profiles that represent reasonable usage patterns for a home suitable for evaluating overheating risk. Where possible the magnitude of gains is taken from CIBSE guidance. Profiles are developed to test the building design, not to cover all usage modes.

The Approved Document Part O applies to new residential buildings only. It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for each building is started before 15 June 2023. The Requirements of O1 Overheating mitigation are to (a) limit unwanted solar gains in summer; (b) provide an adequate means to remove heat from the indoor environment.

Part O of the Building Regulations does not apply to this scheme.

2.2 Assessment Criteria

The performance of the spaces has been assessed in accordance with the hierarchy noted in the London Plan Policy 5.9: Overheating and Cooling, the guidance published by the Chartered Institute of Building Services Engineers (CIBSE) guidance “Design Methodology for the Assessment of Overheating Risk in Homes CIBSE TM59: 2017.”

This report verifies compliance against the criteria set out by the following standards:

- **CIBSE Guide A:** Environmental Design - Overheating Criteria
- **CIBSE TM59:** Methodology for the Assessment of Overheating in Homes
- **CIBSE TM49:** Design Summer Years for London

2.3 Weather Data and Climate Change

Simulations were carried out for DSY1 (Design Summer Year 1) High Emission, 50% percentile for 2020s.

Weather data is for London Weather Central which provides the best currently available weather station to represent the building site.

3 OVERHEATING RISK GUIDANCE

3.1 Operative Temperature

The principal metric for thermal comfort is specified based on operative temperature (t_o), which is an expression of the temperature you experience or feel. The operative temperature can be expressed as a function of air temperature (t_a), radiant temperature (t_r) and air speed (v) and CIBSE suggests the following formula (CIBSE 2015).

$$t_o = \frac{t_a \sqrt{(10v)} + t_r}{1 + \sqrt{(10v)}}$$

3.2 CIBSE Guide A: 2015 and BS EN 15251:2007

For free-running naturally ventilated buildings, BS EN 15251:2007 [Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics (BSI, 2007)] specifies indoor environmental parameters which have an impact on the energy performance of buildings. The CIBSE Guide A (2015) recommendations for testing for the presence or likelihood of overheating follows the methodology and recommendations of BS EN 15251 (2007).

The method used in the BS to define overheating in buildings sets acceptable temperature ranges for naturally ventilated buildings based on the sensitivity of occupants and their comfort expectation.

Expectation levels are set out in the following categories:

- Category I: High level of expectation (only used for spaces occupied by very sensitive and fragile persons).
- Category II: Normal expectation (for new buildings and renovations).
- Category III: Moderate expectation (used for existing buildings).

This report assesses the proposed development against Category II criteria.

3.3 Naturally Ventilated buildings

For naturally ventilated buildings the designer should aim for an indoor operative temperature close to that calculated from the running mean of the outdoor temperature, in accordance with the following equation:

$$t_{com} = 0.33 t_{rm} + 18.8$$

Where t_{com} is the comfort operative temperature and t_{rm} is the running mean outdoor air temperature. The upper limit conditions for avoiding overheating, t_{max} , in a Category II expectation level is represented by the following formula:

$$t_{max} = t_{com} + 3$$

CIBSE TM59 sets two criteria by which a building can be classed as overheating. It should be noted that, according to BS EN 15251, it is possible to increase comfort temperature upper limits if the operative temperature is higher than 25 °C and internal air speed is higher than 0.1 m/s, by the use of personal fans for example.

3.4 Testing by simulation

Where dynamic thermal modelling is used to assess overheating risk, realistic algorithms for occupant behaviour, the use of windows, boosted operation of continually running ventilation systems, and other adaptive behaviour should be used, and a realistic occupancy schedule is necessary.

3.5 CIBSE TM59: 2017

The TM59: 2017 is a design methodology for the assessment of overheating risk in homes, published by the Chartered Institution of Building Services Engineers (CIBSE), in April 2017. This is a standardised approach to predict overheating risk for residential building designs using a dynamic thermal analysis. It provides a baseline which includes specific weather files, defined internal gains and a set of profiles that represent reasonable usage patterns for a home suitable for evaluating overheating risk. In addition, defined thresholds to provide a pass / fail result are clearly provided as written in the results section on Page 15.

Test	Assessment Criterion	Acceptable Criterion	Investigated Period	Weather File
Criterion a	The frequency of the time when operative temperature is higher than maximum acceptable temperature	3% of occupied hours	May-September	DSY1, 2020s, High Emission, 50% percentile scenario
Criterion b	Number of hours where temperature is above required	32 hours between 22:00 and 7:00	May-September	

Table 1: Assessment criteria for naturally ventilated buildings

4 METHODOLOGY APPLIED

The TM59 methodology provides a baseline and guidance for a domestic overheating risk assessment. In line with this methodology, this section includes the model inputs used to assess overheating risks to the proposed representative sample dwellings on the proposed development.

4.1 Dwellings

Ten sample dwellings are included within the overheating analysis.

These are the same units that were assessed during the Planning Application stage by Iceni and that form the basis of the Planning Condition requirements for the scheme.

4.2 Basis for Model

The following methodology was applied to the Overheating Analysis to the occupied spaces of the proposed development.

A 3D model was carried out with the entire relevant envelope, including U-values, façade specifications, internal heat gains, occupancy hours and opening details. A series of simulations were then run using Dynamic Thermal Simulation software: IES VE, including the specialist modules SunCast and MacroFlow.

The geometry was modelled based on the NMA Drawing Package from Delta Architects (2023).

Dynamic Thermal Modelling (DTM) software tracks the thermal state of the building on an hourly basis using real weather data, resulting in a detailed picture of the building's performance.

DTM combines several mechanisms to calculate the building response:

- Conduction
- Convection
- Long wave radiation
- Short wave radiation – absorbed, reflected and transmitted
- Internal conditions – gains from lights, equipment and occupants along with plant operating hours and natural infiltration rates
- Ventilation and air movement from internal natural convection.

The accredited software IES Virtual Environment version 2017 was used for this assessment. This software tool is fully compliant with the CIBSE Applications Manual 11: Building Energy and Environment Modelling.

4.3 Occupancy Patterns and Behaviour

In line with CIBSE guidance, realistic algorithms for occupant behaviour, the use of windows and other adaptive behaviour were used in the dynamic thermal model, as well as a realistic occupancy schedule. Internal heat gains are based on 'Table 2 Occupancy and equipment gain description' content in CIBSE TM59 (Appendix 1) and on the table below.

Room	People Heat Gain w/person		Light Heat Gain W/m ²	Other Small Power W/m ²
	Sensible	Latent		
Kitchen/Living Room	75	55	2	450
Bedroom	75	55	2	80

Table 2: Heat Gain Figures – Flats – Modelling & Data Inputs

4.4 Fabric

The proposed design incorporates several passive design measures, to reduce the energy demand and associated CO₂ emissions of the development to comply with Building Regulations Part L1a criteria. Note that these measures are primarily focussed on the control of heat loss.

Thermal Element	Proposed U-value W/m ² K	G-Value (%)
Ground/Exposed Floor – Houses	0.12	-
Ground/Exposed Floor – Flats	0.13	-
External Wall – Houses	0.19	-
External Wall – Flats	0.23	-
Roof – Houses	0.14	-
Roof – Flats	0.18	-
Windows	1.46	0.44

Table 3: Building Envelope Specification – Modelling & Data Inputs

4.5 Windows Operation & Ventilation

Windows are assumed to be opened during occupied hours when internal temperature is 22°C or more. Internal doors are assumed always open to improve cross ventilation.

Windows Openable Area and Maximum Angle Open are assumed as per the table below.

Window Type	Openable Area	Maximum Angle Open	Internal Shading
Fixed	-	-	Blinds – SC 0.21
Side Hung – Glazed Door	100%	90°	
Side Hung	100%	15°	

Table 4: Building Window Specification – Modelling & Data Inputs

Room	Flow rate
Kitchen	13 l/s
Bathroom	8 l/s
Bedroom	6.5-20 l/s (depending on unit)
Living Room	8 l/s
Infiltration	
3 m ³ /(h·m ²)	

Table 5: Ventilation Specification – Modelling & Data Inputs

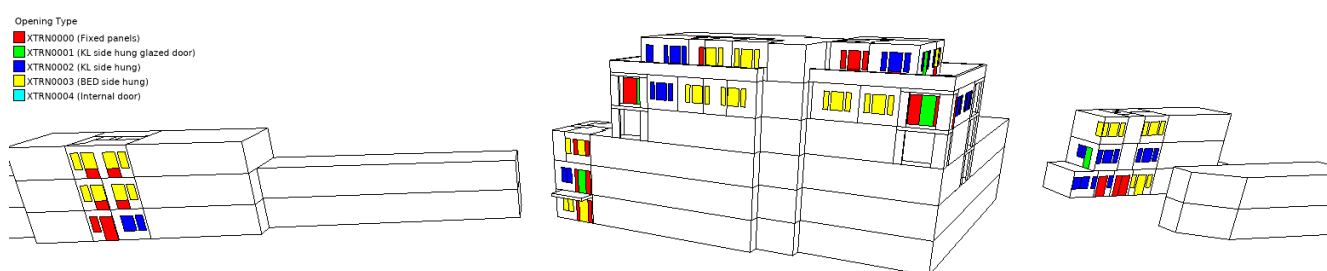


Figure 2: 3D view of the building – Opening types

5 RESULTS

The table below shows the results based on the current design proposals (as outlined in Section 5) for homes that are predominantly naturally ventilated.

Compliance for kitchens and living rooms is based on passing Criterion A, bedrooms must pass both criteria.

Room:	CIBSE TM 59 – Predominantly Naturally Ventilated Homes Weather file: London_LWC_DSY1_2020High50.epw		
	Criterion A (%Hrs Top-Tmax>=1K) Pass with value < 3	Criterion B – Bedrooms only (Hrs Top>26°C) Pass with value < 33	PASS
A2.03 bedroom	0.7	27	Y
A2.03 kitchen/living room	1.3		Y
A4.01 bedroom 1	0.7	32	Y
A4.01 bedroom 2	0.6	27	Y
A4.01 bedroom 3	0.6	33	N
A4.01 kitchen/living room	1.4		Y
A4.02 bedroom 1	0.7	31	Y
A4.02 bedroom 2	0.7	32	Y
A4.02 kitchen/living room	1.4		Y
A5.01 bedroom 1	0.9	24	Y
A5.01 bedroom 2	0.8	29	Y
A5.01 kitchen/living room	1.6		Y
A5.02 bedroom 1	0.7	21	Y
A5.02 bedroom 2	0.8	21	Y
A5.02 kitchen/living room	1.5		Y
C0.01 bedroom	3.3	20	N
C0.01 kitchen/living room	1.5		Y
C1.01 bedroom 1	1.6	18	Y
C1.01 bedroom 2	0.9	17	Y
C1.01 kitchen/living room	2.4		Y
E1.0.01 bedroom	0.9	18	Y
E1.0.01 kitchen/living room	1.5		Y
E1.0.03 bedroom 1	0.8	16	Y
E1.0.03 bedroom 2	0.9	20	Y
E1.0.03 bedroom 3	0.7	32	Y
E1.0.03 kitchen	1.3		Y
E1.0.03 living	2.8		Y

W.0.03 bedroom 1	0.7	17	Y
W.0.03 bedroom 2	0.7	13	Y
W.0.03 bedroom 3	0.7	17	Y
W.0.03 bedroom 4	0.7	14	Y
W.0.03 kitchen	1.3		Y
W.0.03 living room	1.3		Y

Table 6: CIBSE TM59 Overheating Results for 2020s

