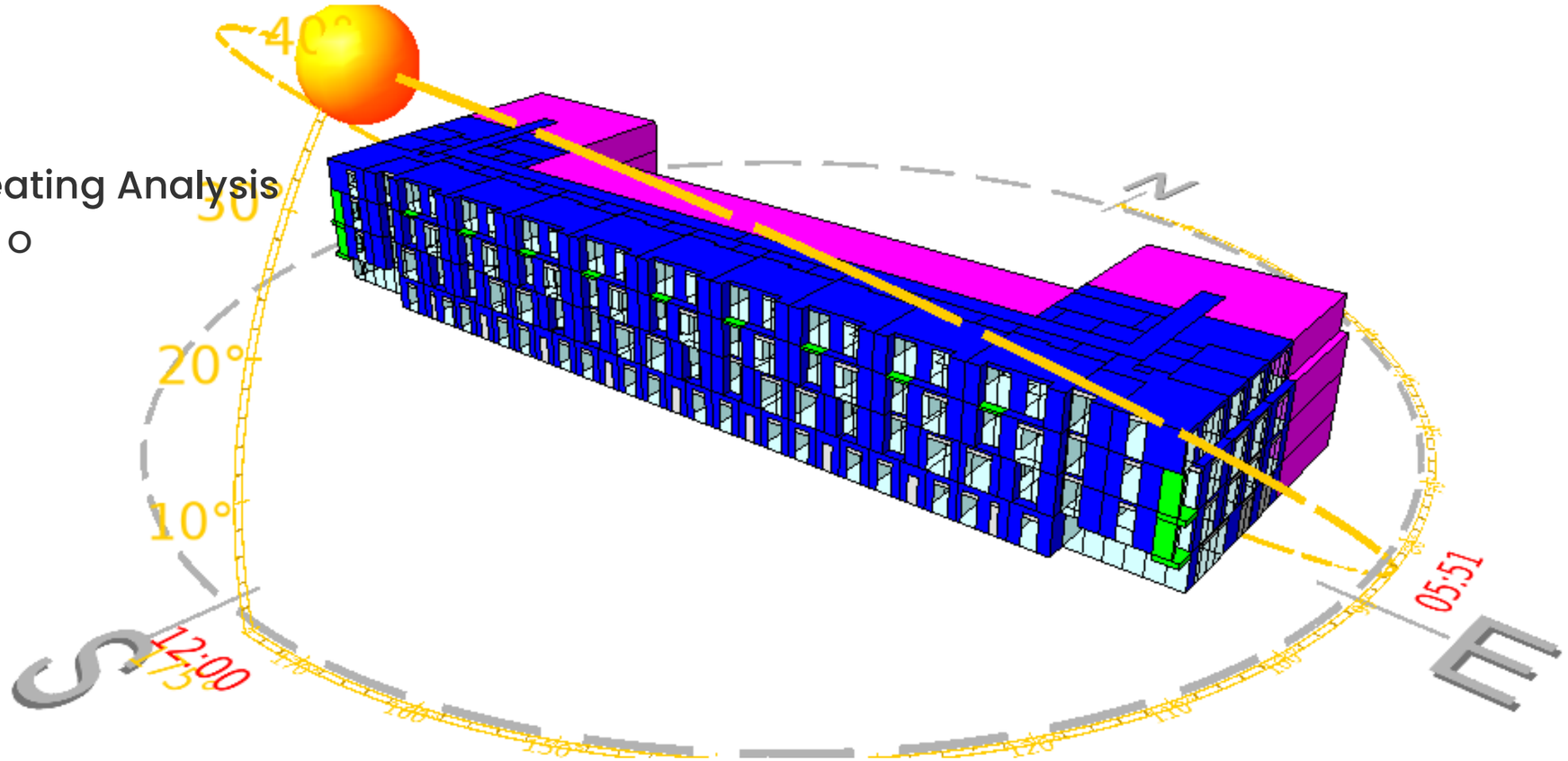
Proposed Residential Development,
Former Apollo Pub,
Miles Platting,
Manchester,
M40 8DR

Preliminary Study

CIBSE TM59 Overheating Analysis

In accordance with Part O

33300



PREPARED BY:

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1 EXECUTIVE SUMMARY

A preliminary overheating study of the proposed residential development project on Varley Street, Mile Platting in Manchester, has been undertaken to explore the potential overheating risk for the site.

The site contains a mixture of 1 and 2-bed units. The study examines the potential overheating risk posed to the site, with four sample apartments being assessed to help determine an outline overheating mitigation strategy.

The analysis assumes openings of windows and patio doors on ground floor during daytime hours only (due to security and accessibility stipulations outlined in Approved Document O), whereas windows on the upper floors, in particular bedrooms, are subject to varying closing restrictions as a result of the noise impact assessment findings, which are detailed within this report.

This study explores the required measures that would need to be implemented to ensure compliance with Part O can be achieved sitewide.

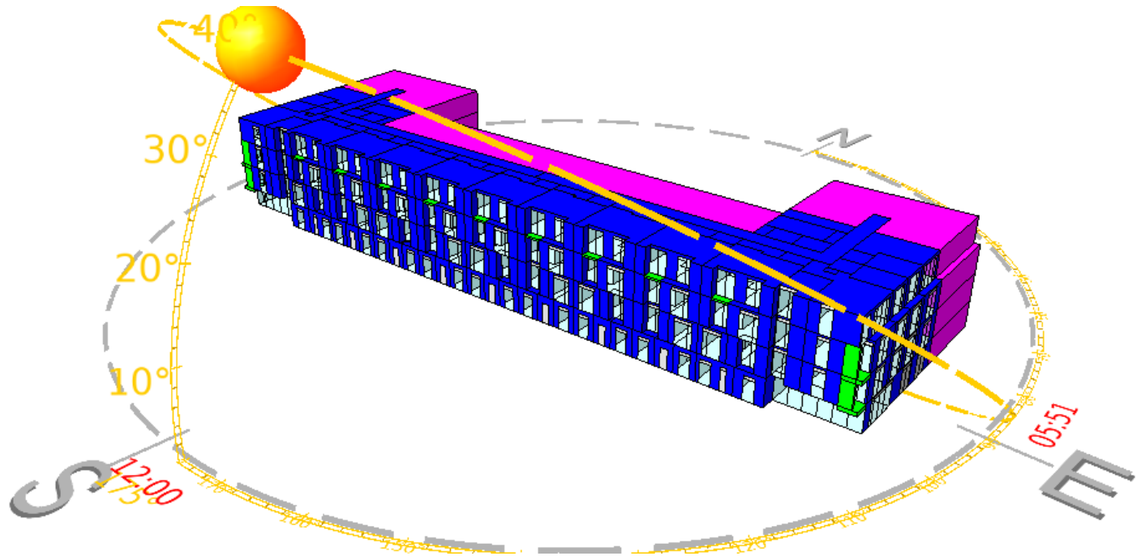


Figure 1: Assessed block in this overheating study

Assessment findings

The assessment found all four assessed sample apartments are able to meet the TM59 overheating criteria and therefore achieve Part O compliance with the building design described in this report. A summary of measures that form the overheating mitigating strategy include:

- Openings on Ground floor are assumed to be fully openable during day time only.
- Openings on upper floors to non-bedroom areas are assumed to be fully openable during day and night time.
- Openings on upper floors to bedroom areas have varying opening restrictions as a result of the noise impact assessment findings
- Glazing (glass only) solar performance (g value) of 0.50 (BS EN 410)
- Internal doors to be left open, when possible, to promote air movement within internal spaces
- MVHR (system 4) to all units, providing minimum Approved Document F ventilation rates and;
- MVHR units are expected to run in summer pass mode at boosted overheating rates (where specified) as detailed in this report to ensure Part O compliance is achieved.

2 Modelling of Proposed Blocks

The buildings' specification has been informed using the following:

2.1 Air Permeability

An air infiltration rate of 0.15ACH has been applied to the apartments based on Table 4.24 of CIBSE Guide A. This is based on an air permeability target of 2m³/hr/m² @ 50 pascals.

2.2 Building Fabric

Element	Modelled U Value (W/m²K)
External Wall	0.18
Roof	0.13 / 0.09
Ground Floor	0.13
Glazing	1.20
Doors	1.20
Party Walls	-
Internal Floors	-

2.3 Glazing Specification

A glazing g value of 0.50 (BS EN 410) has been modelled – this is for the glass element only, a 20% frame factor has also been selected.

2.4 Internal and External Shading

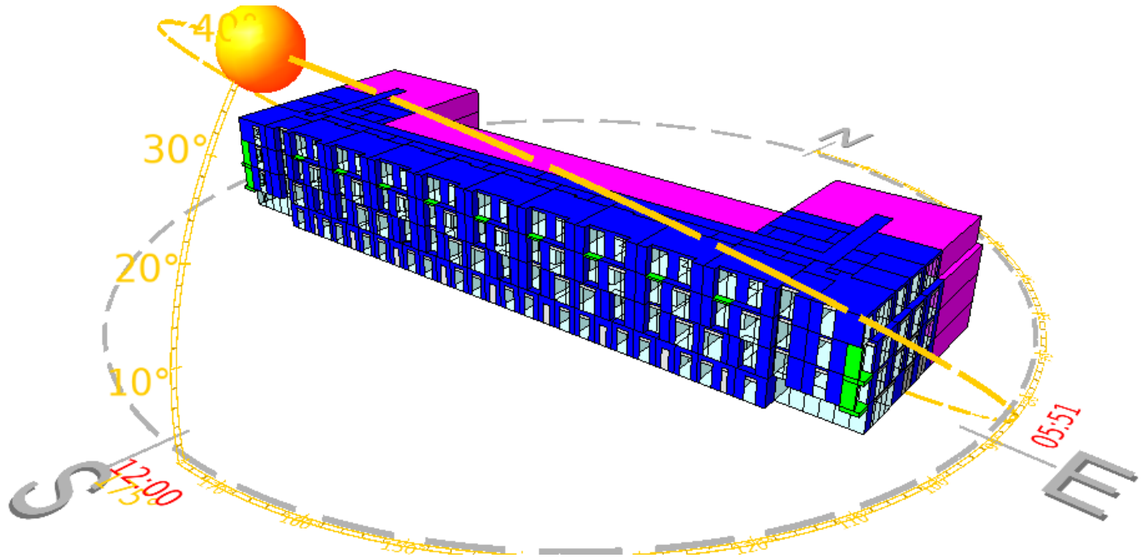
No internal (i.e. blinds) or additional external shading (i.e. shutters) has been modelled. External balconies have been modelled to provide beneficial shading.

2.5 Weather Data

Weather file used in the calculation:- **Manchester _DSY1_2020High50.epw.** The peak summer temperature is 30.0°C.

2.6 Site Orientation

The blocks are orientated as shown in figure 3. As the scheme develops further, local buildings may be modelled to provide beneficial shading.



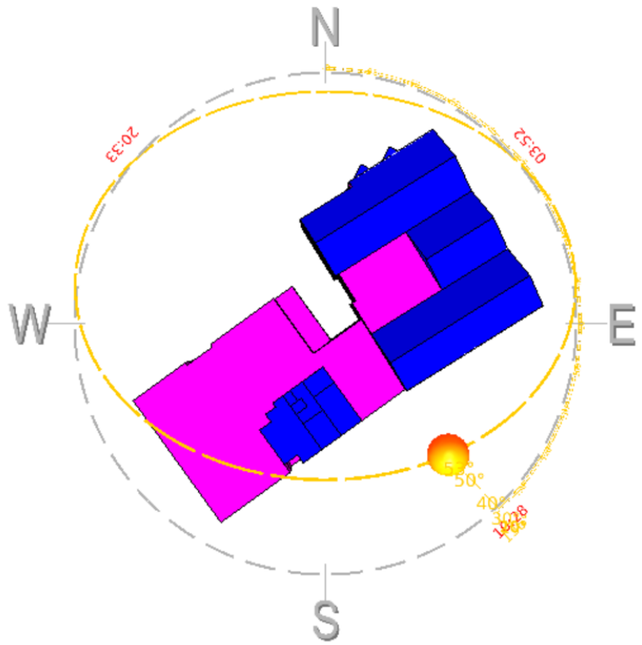


Figure 2: Thermal Model of proposed development

3 SAMPLE APARTMENTS ANALYSED

The following sample apartments have been selected for this study, based on worst-case scenarios (ground floor) and Excess Glazing / South facing



Figure 3: Ground /Second and Third Floors



Figure 4: Proposed Elevations

Apartment Number/Name	Floor	Type	Reason Selected
8	Ground	2B3P	Ground floor, Excess glazing
12	First	2B3P	Corner, South Facing
16	First	1B2P	Mid floor, Severe Acoustical Constraints
31	Third	2B3P	Top floor, Excess glazing

4 Noise Impact Assessment

A noise impact assessment for the site has found that bedroom windows on certain elevations will likely require the partial or full closure of its windows overnight to ensure the internal noise levels are kept within AD O thresholds.

Noise

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am).

As per the '*Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)*', a partially open window can provide between 10-13dB of attenuation from external to internal, meaning that despite external noise level exceeding the above AD O noise thresholds, it may be possible to keep windows partially open on some facades overnight to help mitigate the overheating risk.

The four sample apartments are impacted in the following ways:

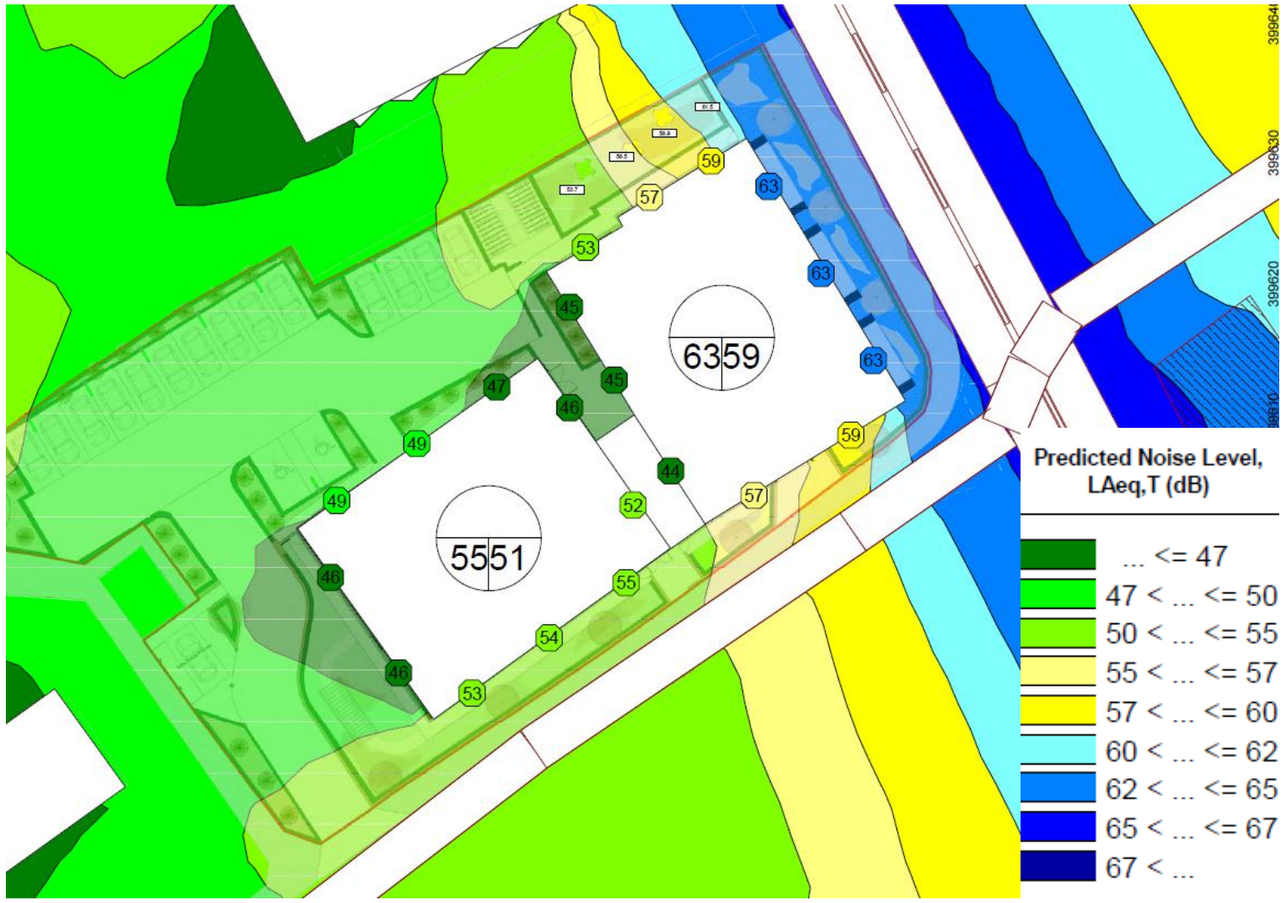


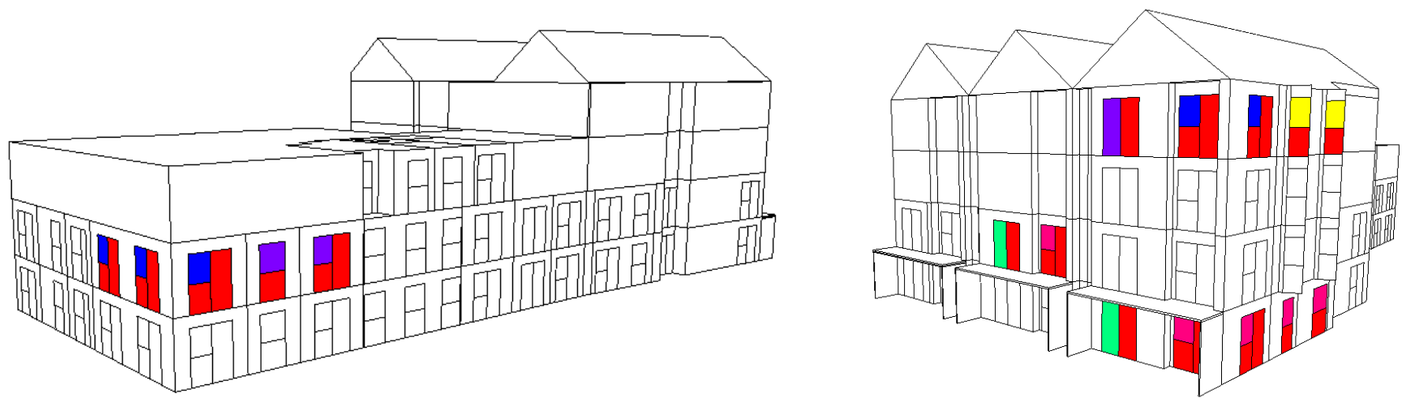
Figure 5: Noise impact assessment findings (night-time levels) of the site)

Apartment Number/Name	Floor	Type	External façade dB level from acoustic report	Acoustic impact on bedroom window openings overnight
8	Ground	2B3P	57-63	Required to close overnight for security reasons
12	First	2B3P	46-53	Requires partial closure of bedroom windows overnight, assumed 50mm restrictors
16	First	1B2P	63	Required to close overnight for acoustic reasons – attenuation though partial opening not possible
31	Third	2B3P	57-63	Required to close overnight for acoustic reasons – attenuation though partial opening not possible

5.1 NATURAL VENTILATION

windows across the site have been assumed to be openable to mitigate overheating risks of the development.

Opening Type
- XTRN0000 (Window / Door Closed)
- XTRN0002 (Internal Doors Living)
- XTRN0003 (Internal Doors Bedrooms)
- XTRN0004 (Patio Doors (Section 26a))
- XTRN0005 (Openable Windows (Section 26a))
- XTRN0007 (Openable Windows (Section 26ab))
- XTRN0009 (Openable Windows (Section 26a))
- XTRN0015 (Patio Doors (Section 26ab))
- XTRN0016 (Openable Windows (Section 26abP))



Window opening description

- Window/Door Closed/Fixed: Fixed pane, unopenable
- ADO section 2.6a: Opening during day, closed overnight
- ADO section 2.6ab: Fully opening during day and night (when required)
- ADO section 2.6abP (Fully opening during day, partially open (for noise attenuation) at night (when required)

Figure 6: Window opening schedule across the site

5.2 MECHANICAL VENTILATION

The thermal modelling has found that to ensure Part O compliance is achieved, MVHR will be required to be specified to each apartment, as this will be the primary ventilation and overheating mitigation strategy of the apartments.

The MVHR units may be required to operate in a true summer bypass mode, and with highly boosted overheating flow rates during the warmest periods of the year to mitigate the overheating risk to the units in the proposed apartment block, as detailed in the table below.

During the thermal modelling process, boosted rates are activated gradually as the internal and external air temperatures rise, with the below table detailing the maximum flow rates each apartment and space(s) must meet for the overheating risk to be overcome.

Apartment	Level	Ventilation Requirement for Part O Compliance	Required Kitchen/Living/Dining Flow Rate (l/s) for Part O Compliance	Required Bedroom Flow Rates (l/s) for Part O Compliance (**Double bedroom**)	Required Bedroom Flow Rates (l/s) for Part O Compliance (**Single bedroom**)	Total Flow Rate Required by Apartment (l/s)
8	Ground	MVHR	25	15	10	50
12	First	MVHR	25	10	6	41
16	First	MVHR	13	6	-	19
31	Third	MVHR	13	6	6	25

6 OVERHEATING ASSESSMENT CRITERIA

TM59 sets different overheating compliance criteria for homes that are predominantly naturally ventilated and for homes that are predominantly mechanically ventilated.

For homes that are predominantly naturally ventilated, the method with two criteria should be used to assess overheating. The first overheating criteria, which applies to both living rooms/kitchens and bedrooms, is an adaptive criteria. The second overheating criterion is a fixed temperature criteria which applies only to bedrooms. Both criteria must be met for all spaces within a home to demonstrate compliance.

For mechanically ventilated homes, the fixed temperature method with a single criterion should be used to assess overheating. This single criterion must be met for all spaces (living rooms/kitchens and bedrooms) within a mechanically ventilated home to demonstrate compliance.

The TM59 criteria for naturally and mechanically ventilated homes are summarised in the following table. The kitchen/dining/living areas in this assessment are assessed against 'predominantly naturally ventilated' criteria, whilst bedrooms against the 'predominantly mechanically ventilated' criteria.

All criteria must be met for all spaces within a home to demonstrate full compliance.

Assessment Type	Assessment Criteria	Applicable Rooms	Occupied Hours	Naturally Ventilated Homes (open windows)	Mechanically Ventilated Homes (closed windows)
Predominantly Natural Ventilation	Criterion 1	Living rooms, kitchens and bedrooms	Living / Kitchen / Dining rooms – 9am to 10pm (13 hours/day) Bedrooms – 24-hour occupancy	The number of hours during which external and internal temperature difference is greater than or equal to one degree (K) during the period May to September inclusive shall not be more than 3% of occupied hours.	Not Applicable
	Criterion 2	Bedrooms only	Bedrooms – 24-hour occupancy	The operative temperature in the bedroom from 10 pm to 7 am shall not exceed 26 °C for more than 1% of annual hours. 33 or more hours above 26˚C will be a fail	Not Applicable
Predominantly Mechanical Ventilation	Criterion 3	Living rooms, kitchens and bedrooms	Living / Kitchen / Dining rooms – 9am to 10pm (13 hours/day) Bedrooms – 24-hour occupancy	Not applicable	The operative temperature in occupied all occupied rooms should not exceed 26˚C for more than 3% of the annual occupied annual hours. 143 or more hours above 26˚C for living rooms and kitchens will be a fail. 263 or more hours above 26 ˚C for bedrooms will be a fail

7 SUMMARY OF RESULTS

7.1 CONCLUSION

As shown in the appendices, compliance with Part O can be achieved for the sample assessed units of the development with the proposed overheating mitigation strategy. However, it is encouraged that a full, detailed overheating analysis for the whole building is undertaken to provide the most realistic representation how the building is likely to thermally behave and perform.

Two key pillars of the proposed overheating strategy as follows:

- Sufficient flow rates provided by the mechanical ventilation system (especially prevalent to ground floor, acoustically impacted units and south and west facing units)
- Glazing g value of 0.50 (BS EN 410) (prevalent to south and west facing units)

Analysis found that units on the ground floor, and those on south-west facing facades were at the highest risk of overheating across the site, with sample plots each requiring boosted overheating flow rates beyond Part F minimum rates to ensure Part O compliance could be achieved. Sample plots on the north and east elevations were at least risk, despite being impacted the most by the noise impact assessment findings, and the required flow rates for Part O compliance were at Part F minimum rates.

The assumptions within this study, as detailed, have been based on window openings being modelled to bedrooms in accordance with the noise impact assessment, whereby varying limitations have been applied throughout the site. As the design progresses, measures to prevent changes to the strategy proposed from this study should be taken by the design team to ensure the overheating mitigation strategies outlined within this report are not impacted, otherwise the findings of this assessment would be invalidated.

Appendix A to the foot of this report provides a detailed analysis of the overheating assessment of the sample apartments in the form of the Approved Part O Compliance Document.

7.2 MODELLING DISCLAIMER

The calculations produced by Complete Sustainability have been carried out with the information provided by others to determine whether the thermal model of the proposed building can achieve compliance, at design stage, with the stated criteria within this report.

It should be noted that the data generated by this work is obtained using computer simulations. These simulations are the best means of predicting the performance of the building at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

The actual operative temperatures within the building once occupied may vary from the calculated values within this report. These differences will occur due to a number of variable parameters between the modelled building and the actual building. Such differences will include the hours, levels of occupancy, equipment, how the windows are used etc.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, Complete Sustainability can take no responsibility for differences between the computer simulations and the actual performance of the completed development due to the inherent complexity and variability of the physics in a building and its environment.

On the Approved Document O detailed report appendices, although Complete Sustainability Solutions Ltd. is listed in the Approved Document O detailed report appendices under designer details, including organisation and address, we hold no responsibility for the design of the building, houses, or dwellings referenced. The term "designer" in this context refers solely to our role as a consultant interpreting drawings and details provided by the architect, client, or contractor. Our responsibility is limited to constructing and simulating the Part O overheating model within the IES software based on this information.