FES GROUP

CONSTRUCTION COMPLIANCE, SUSTAINABILITY, OVERHEATING, RETROFIT

Dynamic Simulation

CIBSE TM52 Analysis

Chancellors Court

Client: : Student Cribs

Reference Number: 009568

Date: April 2025

Issue: 1.0

thefesgroup.com

PLANNING

DESIGN

ON-CONSTRUCTION

EXISTING BUILDINGS

Project name: Chancellors Court

Client name: Student Cribs

Assessor EES number: EES/032417

Ref: 009568

Author: Jack Park

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Author:	Initial review by:	Secondary review by:
		
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Summary of changes:

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Company Profile

Established in 2007 as a family firm, we set out to create a sustainable, resilient business, establishing a happy and positive working environment for both clients and colleagues. It was important for us to offer adaptable and growing solutions for the areas of the construction industry that would benefit from them the most.

Creating an environment that was a pleasure to work in for both colleagues and clients was, and remains, incredibly important to us. Building our future on the foundations of honest relationships, flexibility and efficiency means that we value every client's success as though it were our own.

We have grown to become a trusted construction compliance partner. We continue to grow, to offer packages of sustainability, environmental and retrofit services, with the long-term aim of making our clients' lives easier, so they can focus on the jobs that they enjoy.

Today, the business works with a wide spectrum of clients from household name plc firms, one-off builders and everything in between. Our client list includes many of the nation's major house builders and contractors, as well as universities and public sector organisations. The team also lends their know-how to many architectural practices, M&E consultants and planners.

Limitations

Future Energy Surveys Ltd T/A The FES Group and its staff shall not to be held liable for any damage or loss sustained as a result of using the information provided in this report. The report is based on drawings and information provided by the client and/or project design team at the time of issue. The information and the drawings provided to us determine the results within the report. If anything changes during the course of the ongoing design or construction, the conclusions and calculation results may be incorrect. The FES Group will not be held responsible for the implications of such change.

As such this report should be viewed as providing a reasonable assessment of the predicted performance of the development based on current knowledge.

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Executive Results Summary

All assessed units are achieving compliance with CIBSE TM52 requirements.

System 1 intermittent extract units to kitchen (60 l/s) and bathrooms and wet rooms (15 l/s) air flow. All windows are openable where indicated on elevations. Ground-floor windows and easily accessible windows remain closed at night due to security requirements, and upper-floor window handles on windows that open outwards are calculated as not more than 650mm from the inside face of the wall when the window is at its maximum openable angle. Purge fans capable of 50 l/s air flow are required in conjunction with 0.35 g-value glazing to limit solar gain in the Meeting/Waiting Room to achieve compliance.

Disclaimer

The methodology (TM52) includes clear reporting requirements to enable all stakeholders to review the outcome and understand its basis and implications for the design. It is vital that the mitigation options selected as a result of the assessment are fully incorporated into the design or the assessment would not be an accurate representation of the completed building. In addition, this report has been prepared to cover overheating risk – it should be checked that the mitigations in this report do not implicate other building regulations.

You should check that the assessor producing this report is an Elmhurst Energy Overheating Scheme member to ensure that they are competent to complete this work. You can verify a member with their EES number on our website; https://www.elmhurstenergy.co.uk/find-an-assessor/

Introduction

Project Details	Further information
Were there any noise issues?	None
Were there any pollution issues?	None
Were there any security issues during the 'sleeping hours'?	Ground floor windows and any 'easily accessible' windows remain closed at night due to security requirements.
Is the property naturally or mechanically ventilated?	Predominantly naturally ventilated via openable windows as indicated on elevations. System 1 intermittent extracts to kitchens and wet rooms. Purge fan to Meeting/Waiting Room.
Were there any communal areas assessed as part of this project?	N/A
About the project and property	Existing building refurbishment inclusive of ground floor management suite, meeting room, flexi room and ancillary areas, with residential accommodation to upper floor. Project modelled as per specification, elevations, sections and plans provided.

Plans and sections
245008-MHA-XX-XX-DR-A-02-001-P2 - Ground Floor Plan
245008-MHA-XX-XX-DR-A-02-002-P2 - First Floor Plan
245008-MHA-XX-XX-DR-A-03-001-P2 - Existing & Proposed Elevations
245008-MHA-XX-XX-DR-A-04-001-P2 - Typical section & ceiling details

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Dynamic Thermal Modelling

For this overheating analysis a DSY1 weather file will be used for the year 2020 high emission scenario. Summers will have a 1 in 7 chance of being equal or hotter than this scenario.

CIBSE TM52

Following the final simulation results, the overheating was compared to CIBSE TM52 guidelines for the summer period (1st of May – 30th of October).

CIBSE TM52 overheating is composed of three criteria (as explained below) and considers the space to fail the requirements if any two criteria fail. The overheating is measured only during the occupied hours. If, for example, bedroom assumed occupancy is from 21:00 to 7:00, CIBSE TM52 measures the overheating during that period only.

Criterion 1 (hours of exceedance) – sets a limit to the number of hours that the operative temperature can exceed the threshold of comfort temperature by 1oC or more during the occupied hours of a typical non-heating season (1st of May – 30th of October). The number of hours shall not be more than 3% of occupied hours

Criterion 2 (daily weighted exceedance) – deals with the severity of overheating within one any day. The level of which is a function of both, temperature rise and duration. The criterion sets a daily limit for acceptability. To allow for the severity of overheating the weighted exceedance shall not exceed 6 in any one day

Criterion 3 (upper limit temperature) – sets an absolute maximum daily temperature of a room, beyond which the level of overheating is unacceptable. To set an absolute maximum value for the indoor operative temperature the value should not exceed 4 degrees Celsius.

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Dynamic Thermal Modelling

Limits on CIBSE's TM52 window opening modelling

CIBSE's TM52 method requires the modeller to make choices. The dynamic thermal modelling method in this section applies limits to these choices, which are detailed below. These limits should be applied when following the guidance in CIBSE's TM52.

The following window opening profiles are assigned in their appropriate circumstances:

a. When a room is occupied during the day (8am to 11pm), openings should be modelled to do all of the following.

- i. Start to open when the internal temperature exceeds 22°C.
- ii. Be fully open when the internal temperature exceeds 26°C.
- iii. Start to close when the internal temperature falls below 26°C.
- iv. Be fully closed when the internal temperature falls below 22°C.

b. At night (11pm to 8am), openings should be modelled as fully open if both of the following apply.

- i. The opening is on the first floor or above and not easily accessible.
- ii. The internal temperature exceeds 23°C at 11pm.

c. When a ground floor or easily accessible room is unoccupied, both of the following apply.

- i. In the day, windows, patio doors and balcony doors should be modelled as open, if this can be done securely, following the guidance in paragraph 3.7 below.
- ii. At night, windows, patio doors and balcony doors should be modelled as closed.

d. An entrance door should be included, which should be shut all the time.

Permitted factors in CIBSE's TM52 modelling

a) Fixed shading devices; Shutters, external blinds, overhangs, awnings.

b) Glazing design involving; size, orientation, g-value, depth of window reveal.

c) Building design

d) Shading by permanent buildings

Blinds, curtains and foliage such as tree cover should not be taken into account when considering whether the requirements of CIBSE TM52 have been met.

Mitigation measures utlised in the overheating strategy should be discussed and agreed with builder, building control and/or home warranty provider.

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Modelling Input

Model used	
Modelled as predominately naturally or mechanically ventilated?	All rooms assessed as naturally ventilated due to the predominant overheating strategy being openable windows. Supplemented by intermittent extract units to kitchens and wet rooms and 50 l/s purge fan to Meeting/Waiting Room.
Mechanical Ventilation?	Intermittent extracts: Kitchen – 60 (l/s) – extract Bathroom/en-suite – (15 l/s) - extract
Purge Fans	Meeting/Waiting Room – Capable of a minimum 50 l/s air flow. Used in conjunction with 0.35 g-value solar thermal glazing to the Meeting/Waiting Room to compensate for fixed glazing constraints to limit solar gain and provide suitable ventilation.
Additional information	Ground floor and 'easily accessible' windows remain closed at night due to security constraints but are openable during the daytime period. Upper floor windows are openable during the day and will remain open during the night-time if the internal temperature exceeds 23c by 11pm, unless the windows have been deemed as 'easily accessible', in which case windows remain closed during the night-time period.
Full property specification can be found in Appendix B.	

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Modelling Input

Modelling details		
Dynamic software name and version	IES 2024.0.1.0 using ApacheSim v7.0.27.0	
Weather file location used, including any additional, more extreme weather files	Manchester_DSY1_2020High50_.epw	
Number of sample units modelled, including an explanation of why the size/selection has been chosen	All habitable rooms within redevelopment have been selected for analysis to demonstrate CIBSE TM52 compliance in all areas,	
Modelled occupancy		
Has the project passed the assessment described in CIBSE's TM52, taking into account the limits detailed within CIBSE guidance?	**Yes**	No
Details of the occupancy profiles used		
Details of the equipment profiles used	As per IES results output documents	
Details of the opening profiles used	As per IES results output documents	
Modelled overheating mitigation strategy		
Free Areas		
Openings that can be opened wider than 100mm may form part of the overheating mitigation strategy where they meet all of the following conditions. **a. Window handles on windows that open outwards are not more than 650mm from the inside face of the wall when the window is at its maximum openable angle.** **b. Guarding meets the minimum standards within the building regulations.** **c. Guarding does not allow children to easily climb it. For example, horizontal bars should generally be avoided.** **If window limiters have been used to restrict openings to less than 100mm these would need to be agreed with the builder, building control and/or warranty provider.**		
Do all the rooms meet the above requirements? Full free area specification can be found in appendix C	Yes	
Infiltration and mechanical flow rates	0.15 ACH infiltration Kitchen – 60 (l/s) – extract Bathroom/en-suite – 15 (l/s) – extract Purge fan – 50 l/s – Meeting/Waiting Room	
Window g-value	0.63 (standard windows) & 0.35 (Meeting/Waiting Room)	
Shading strategy (agreed with builder, building control and/or home warranty provider)	No external or internal shading as part of model	
Mechanical cooling	Not present	

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Results

CIBSE TM52 guideline performance under the calculated specification – CIBSE DSY1 2020 High 50% weather file

	Criterion 1	Criterion 2	Criterion 3
Pass	7	6	6
Fail	0	1	1

A dynamic simulation using the initial specification was undertaken, and determined that all occupied spaces achieved compliance with Criterion 1-3 requirements under CIBSE TM52 guidelines by passing two or more of the specified criteria

This simulation assumes that windows are allowed to be openable at the discretion of the occupant. The calculation was undertaken assuming windows would be opened by occupants using the window opening parameters as described on Page 8 of this document.

It is recommended that the amendment or introduction of any new thermal specification elements should be re-assessed under the CIBSE TM52 guidelines to ensure compliance to indicate the likelihood of thermal comfort for future residents.

It is important to note that the modelled scenario represent an intense summer scenario, with summers having a 1 in 7 chance of being equal or hotter within the next 30-year period. There are also several variables not taken directly into account as well as assumptions through the TM52 methodology, as air is presumed to be perfectly mixed, and placement features of glazing/openings, air flow patterns and direct discomfort levels are not assessed. All heating, cooling and ventilation systems are assumed to be able to meet the peak demand requirements in order to maintain temperatures.

It is important to note that achieving a pass rating does not guarantee that overheating will not occur. Performance is always dependant of factors beyond the control of the design team, such as occupant behaviour, and future weather conditions along with a number of additional potential variables.

Results

Modelling results		
Has the project passed the assessment described in CIBSE's TM52, taking into account the limits detailed within guidance?	**Yes**	No
What is the overall overheating strategy (i.e. what design features are key to the project passing)?	Specified fabric specification as per appendices with openable windows as specified and intermittent extract systems to kitchens and wet rooms. 50 l/s purge fan and 0.35 g-val glazing to Meeting/Waiting Room	

Designer's declaration		
Has the building construction proposal been modelled accurately?	**Yes**	No
Name	Jack Park	
Organisation	The FES Group	
Signature		
Reviewed by	Dan Looker	
Registration number (if applicable)	EES/032417	
Date of design	April 2025	

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Appendices

Appendix A – IES Result Output Documents

Appendix B – Full Dwelling Specification

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Appendix A – IESVE Software Output Results

Overall												
Passed:	7 rooms:											
Failed:	0 rooms:											
Unoccupied:	0 rooms:											
Data:												
Building category:	Category II (new builds.)											
Weather file:	Manchester_DSY1_2020High50_.epw											
Days data=	365	01-Jan	31-Dec									
Days (summer)=	153	01-May	30-Sep									
Data OK?	OK	Full summer										
Occupancy:												
Note:	This report assesses occupied periods only. Please be aware that TM52 should be conducted for occupied and/or “available hours”.											
	Use of educational NCM profiles may be seen as inappropriate due to prolonged unoccupied periods during summer months.											
	See Section 6.1.2 (a) of TM52 for further information.											
Passed:	7 rooms:											
Room Name	Room ID	Occupied	Criteria 1 (	Criteria 2 (	Criteria 3 (	Criteria failing						
00 - Kitchen	11	100	0	0	0	-						
00 - Residential Management Suite	12	100	0	0	0	-						
01 - Kitchen/Living/Dining	13	100	0	0	0	-						
00 - Flexi Space	15	100	1.9	7	2	2						
01 - Bed 2	17	100	0	0	0	-						
01 - Bed 1	1000000	100	0	0	0	-						
00 - Meeting Waiting Room	14	100	2.7	5	5	3						
Failed:	0 rooms:											
Room Name	Room ID	Occupied	Criteria 1 (	Criteria 2 (	Criteria 3 (	Criteria failing						
Unoccupied:	0 rooms:											
Room Name	Room ID	Occupied	Criteria 1 (	Criteria 2 (	Criteria 3 (	Criteria failing						
Note:	A TM 52 2013 analysis provides an assessment of comfort compliance based on bulk air modelling											
	i.e. each space is considered idealised and the air in the space perfectly mixed. The assessment does											
	not assess placement of space features e.g. windows & openings, airflow patterns or discomfort issues.											
	The user should assess these design aspects outside of the TM52 analysis.											

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Appendix B – Input Specification Summary

As the results table demonstrates, all rooms have achieved compliance under Criterion 1-3 requirements of the CIBSE TM52 guidelines. The following specification has been used within calculations:

Fabric Specification

- Masonry cavity wall - 0.51 W/m2k
- Pitched roof, insulation at rafters (1990 Part L regs) - 0.36 W/m2k
- Flat Roof 90/95 regs - 0.45 W/m2k
- Solid ground floor - 1995 Part L regs - 0.45 W/m2k
- 1995 personnel door - 3.0 W/m2k
- Windows - DG uPVC - 3.31 W/m2k - 0.63 g-value
- Windows – DG uPVC - 3.31 W/m2k – 0.35 g-value – Meeting/Waiting Room only
- Glazing calculated with an assumption that it is feasible for occupants to open windows at their discretion in line with window opening profile parameters as listed on Page 8.
- Ground floor and 'easily accessible' windows remain closed at night due to security constraints but are openable during the daytime period. Upper floor windows are openable during the day and will remain open during the night-time if the internal temperature exceeds 23c by 11pm, unless the windows have been deemed as 'easily accessible', in which case windows remain closed during the night-time period.

Building Services

- All heating, cooling, lighting, occupancy, infiltration and miscellaneous profiles have been input in line with relevant TM52 NCM profiles for the NCM activity input
- Purge fan capable of 50 l/s air flow present within Meeting/Waiting room to compensate for fixed window openings

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