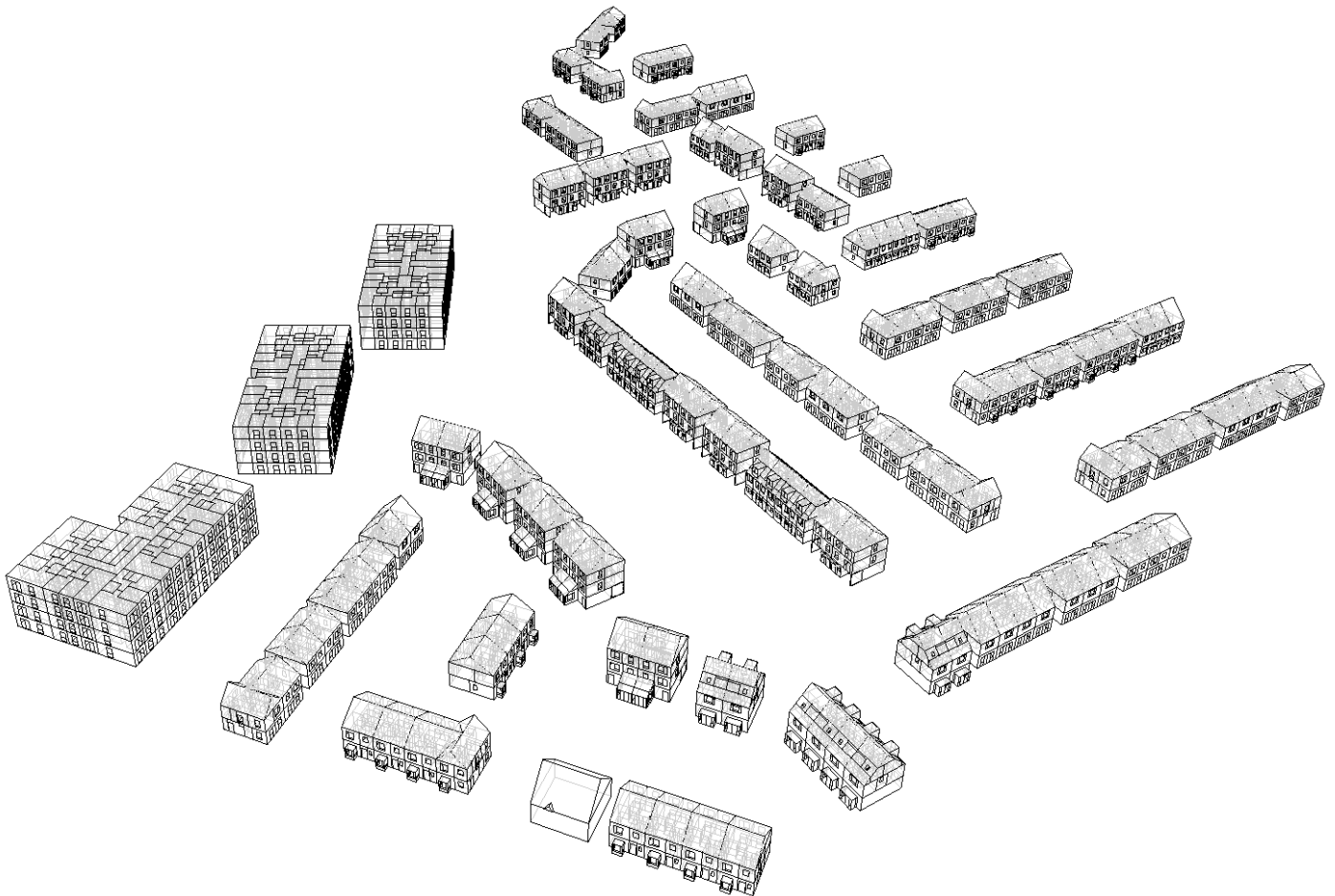


Part O – Overheating, Mitigation Report

BENNETT ST, MANCHESTER

OUR REF: 230923

DATE: 17/11/2023



PREPARED BY:

HURSTWOOD ENVIRONMENTAL CONSULTING
ATRIA
SPA ROAD
BOLTON
BL1 4AG



The present document, its content, its appendices and/or amendments ("the Document") have been created by Hurstwood Environmental Consulting ("Hurstwood") for informative purposes. They contain private information referring to Hurstwood and/or its subsidiaries (the "Company"), and are addressed exclusively to its recipients. Consequently, they shall not be, totally or partially, disclosed, published and/or distributed without the previous and written consent of Hurstwood, unless it is made an explicit reference to the ownership of Hurstwood in the intellectual property rights. The whole content of this Document, whether text, images, brands, logotypes, colour combinations or any other element, its structure or design, selection and presentation model of the materials included therein are protected by both industrial and intellectual property rights – Hurstwood's ownership – and shall be respected by both recipient and addressee of the present Document. In particular, but without restricting the generality of confidentiality obligation, any reproduction (except for private use), transformation, distribution, public communication – at any third party's disposal – and generally, any other way of exploitation – through any procedure – of the whole or part of the Document, as well as its design, selection and presentation of materials included therein is strictly forbidden.



CONTENTS

1.0	INTRODUCTION	PAGE 2
2.0	RESULTS AGAINST ORIGINAL DESIGN	PAGE 3
3.0	RESULTS AGAINST PROPOSED DESIGN	PAGE 7
4.0	CONCLUSION	PAGE 8

1.0 INTRODUCTION

Hurstwood has been appointed to provide a Part O Summary Report for the proposed 172 houses and 100 apartments at Bennett Street, Manchester, M12 5NL.



Figure 1. Site Layout, with At Risk Apartments highlighted.

During the design process it was identified that the Kitchen/Living/Dining areas of Apartments APT.3 and APT.6 across each floor on the North side of Apartment Blocks 2 and 3 were at risk of overheating.

This report is designed to:

- interrogate the results of the initial assessment.
- identify appropriate improvement measure(s).
- provide Part O compliance results for improved design.
- interrogate the results of the initial design for validation purposes.

This report is to be read in conjunction with previously issued Part O – Overheating, Summary Report Ref:230923 dated 29/10/23 and issued Part O – Overheating, Summary Report Ref:230923b dated 15/11/23.

2.0 RESULTS AGAINST ORIGINAL DESIGN

ROOM NAME	Occupied Areas % Hrs $\Delta T > 1^\circ K$, <3%	PASS/FAIL
	(criteria a)	
BLOCK 2_00_APT.03_K/L/D	5.5	FAIL
BLOCK 2_00_APT.06_K/L/D	5.6	FAIL
BLOCK 2_01_APT.03_K/L/D	5.5	FAIL
BLOCK 2_01_APT.06_K/L/D	5.5	FAIL
BLOCK 2_02_APT.03_K/L/D	5.5	FAIL
BLOCK 2_02_APT.06_K/L/D	5.5	FAIL
BLOCK 2_03_APT.03_K/L/D	5.5	FAIL
BLOCK 2_03_APT.06_K/L/D	5.5	FAIL
BLOCK 3_00_APT.03_K/L/D	5.5	FAIL
BLOCK 3_00_APT.06_K/L/D	5.5	FAIL
BLOCK 3_01_APT.03_K/L/D	5.5	FAIL
BLOCK 3_01_APT.06_K/L/D	5.5	FAIL
BLOCK 3_02_APT.03_K/L/D	5.5	FAIL
BLOCK 3_02_APT.06_K/L/D	5.5	FAIL
BLOCK 3_03_APT.03_K/L/D	5.5	FAIL
BLOCK 3_03_APT.06_K/L/D	5.5	FAIL

All apartments which are shown to fail do so by almost identical percentages across the development. This is as we would expect given that all failing apartments have the same dimensions, level of glazing, natural ventilation openings, opening profiles, internal gain profiles, and thermal massing. Consequently, the following investigation into results and proposed improvement measures will focus on a single space (the Kitchen/Living/Dining Area of the apartment in the North-West corner of the Second Floor of Block 2 (BLOCK 2_02_APT.03_K/L/D).

Solar Gain

It has been noted that the single aspect K/L/D areas in Apartments 4 and 5 passed the Part O requirements on the original design. A possible explanation for this could be the increased solar exposure of the dual aspect K/L/D areas and the increased glazed area.

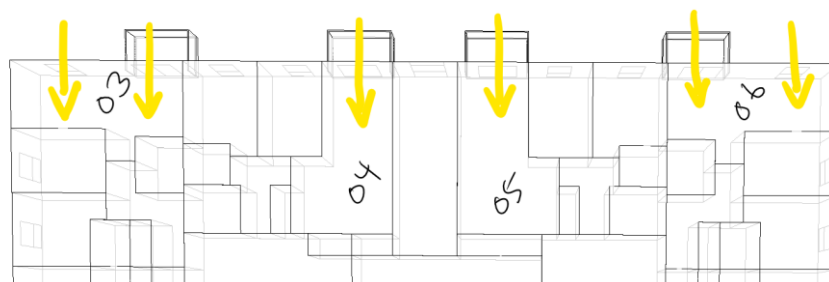


Figure 2. External openings for Solar Gain.

The North Elevation does not point due North, it is rotated slightly to the East (please see Figure 1) and as such result receives direct sunlight first thing in the morning as can be seen in the following Peak Day Chart:

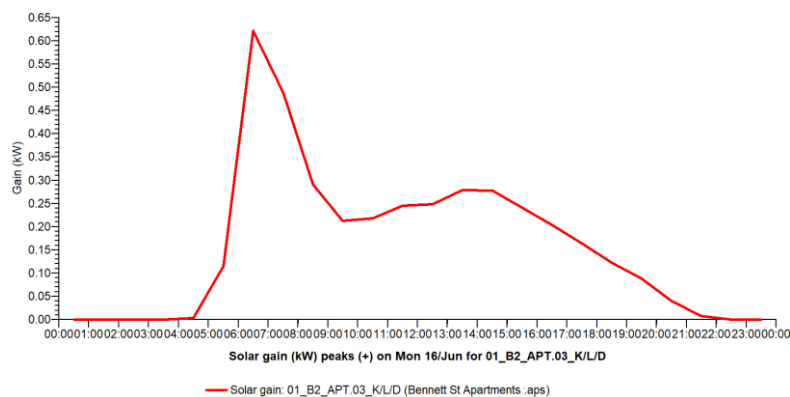


Figure 3. Diurnal Variation in Solar Gain for Peak Day

Location	IES Filename	Type	Max. Val.	Max. Time	Mean
01_B2_APT.03_K/L/D	Bennett St Apartments.aps	Solar Gain (kW)	0.6215	06:30,16/Jun	0.0577
01_B2_APT.04_K/L/D	Bennett St Apartments.aps	Solar Gain (kW)	0.3339	06:30,16/Jun	0.0334

The dual aspect K/L/D areas have 46.3% higher Peak Solar Gain than the single aspect K/L/D areas on the same elevation. This is equivalent to an additional 288W of heat into the space.

The cumulative impact on the additional Solar Gain is an additional 212kW of heat over the year:

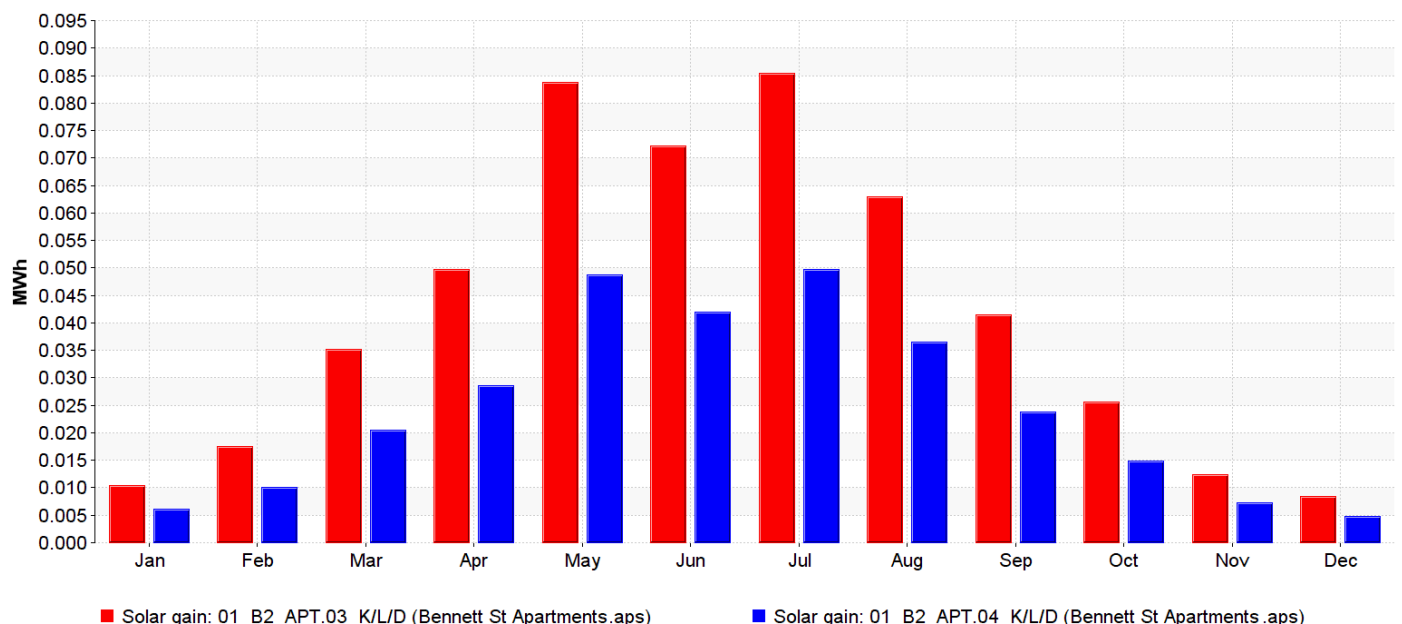


Figure 4. Monthly total Solar Gain

While the additional heat is a benefit during the Winter it can present overheating risk during the summer.

Conduction Gain

The dual aspect apartments have greater exposure for external heat gains via conduction gains through the building fabric.

Location	IES Filename	Type	Max. Val.	Max. Time
01_B2_APT.03_K/L/D	Bennett St Apartments.aps	Conduction Gain (kW)	0.0531	13:30,09/Aug
01_B2_APT.04_K/L/D	Bennett St Apartments.aps	Conduction Gain (kW)	0.0141	13:30,09/Aug

The peak external conduction gain for the K/L/D area of the dual aspect apartment is 73% higher than K/L/D area of the single aspect apartment.

Natural Ventilation

Whilst it is accepted that the additional glazed area results in increased Solar Gain, it is also accepted that there will be greater potential for Natural Ventilation.

Assessment of the simulated bulk airflow modelling completed as part of the Dynamic Thermal modelling shows the Natural Ventilation is working as expected.

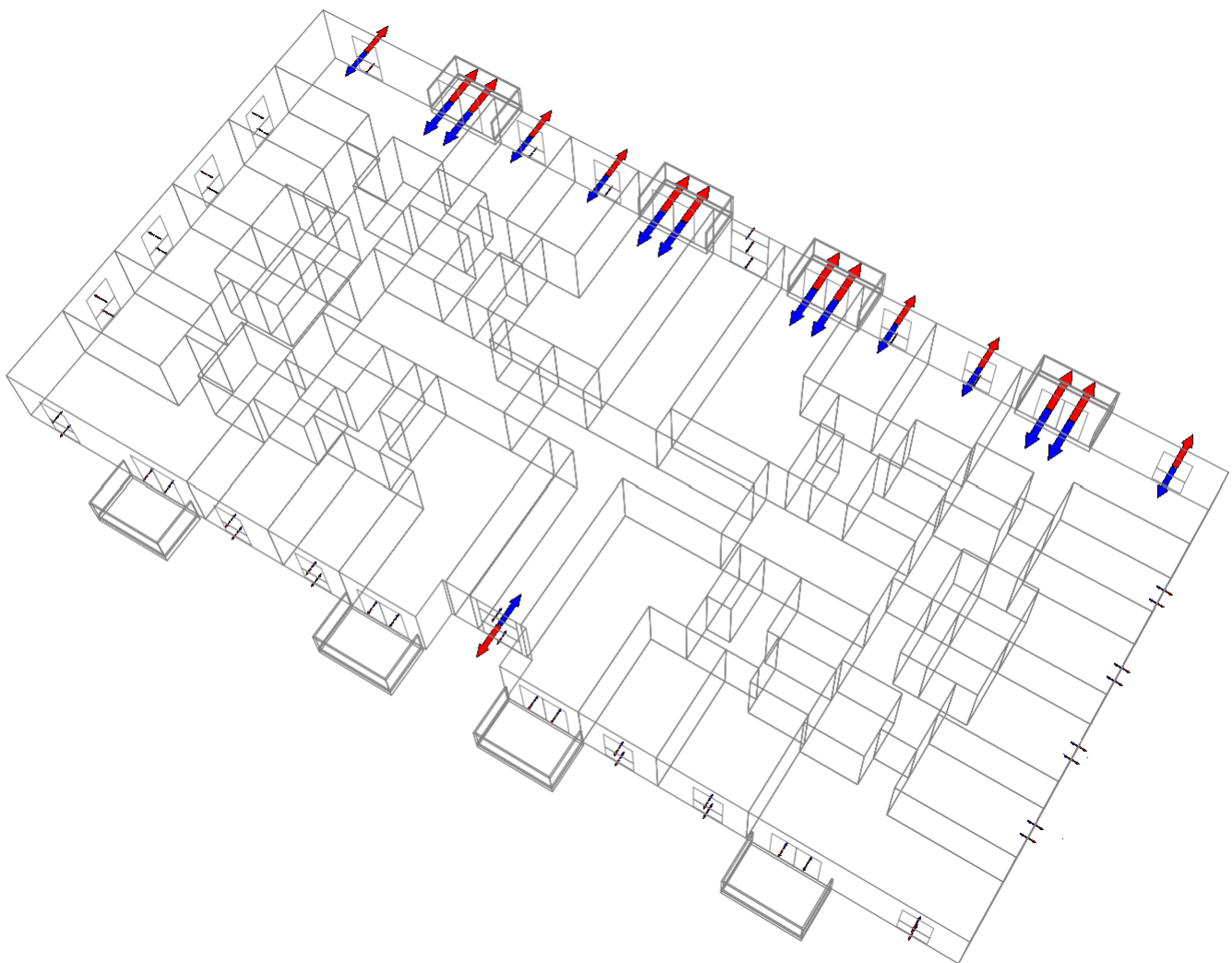


Figure 5. Natural Ventilation Airflow

The total cumulative impact of the Solar Gain, Conduction Gain, into the dual aspect K/L/D when compared to the single aspect equivalent is just 327W.

The following chart shows the the predicted internal temperatures for the hottest week of the year:

Date: Wed 06/Aug to Wed 13/Aug

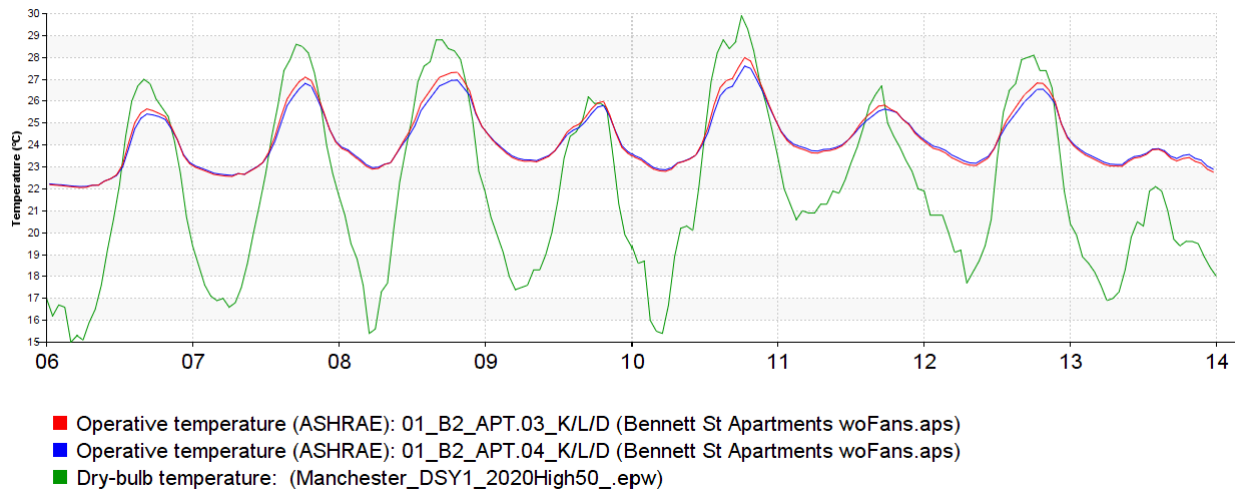


Figure 6. Weekly Variation in Operative Temperature for Peak Week

Location	IES Filename	Type	Max. Val.	Max. Time
01_B2_APT.03_K/L/D	Bennett St Apartments.aps	Operative Temperature (°C)	28.27	18:30,19/Aug
01_B2_APT.04_K/L/D	Bennett St Apartments.aps	Operative Temperature (°C)	27.91	18:30,19/Aug

The impact of the additional gains is marginal. It is therefore proposed that a single extract fan capable of 30l/s is added to the currently failing K/L/D areas, such as is installed in the acoustically affected bedrooms.



Figure 7. Proposed ventilation rates

3.0 RESULTS AGAINST PROPOSED DESIGN

Despite extract ventilation being provided for boost, the spaces are still predominantly naturally ventilated and as such fall under the same TM59 assessment criteria as the original design.

ROOM NAME	Occupied Areas % Hrs $\Delta T > 1^\circ\text{K}$, <3% (criteria a)	PASS/FAIL
BLOCK 2_00_APT.03_K/L/D	0.0	PASS
BLOCK 2_00_APT.06_K/L/D	0.0	PASS
BLOCK 2_01_APT.03_K/L/D	0.0	PASS
BLOCK 2_01_APT.06_K/L/D	0.0	PASS
BLOCK 2_02_APT.03_K/L/D	0.0	PASS
BLOCK 2_02_APT.06_K/L/D	0.0	PASS
BLOCK 2_03_APT.03_K/L/D	0.0	PASS
BLOCK 2_03_APT.06_K/L/D	0.0	PASS
BLOCK 3_00_APT.03_K/L/D	0.0	PASS
BLOCK 3_00_APT.06_K/L/D	0.0	PASS
BLOCK 3_01_APT.03_K/L/D	0.0	PASS
BLOCK 3_01_APT.06_K/L/D	0.0	PASS
BLOCK 3_02_APT.03_K/L/D	0.0	PASS
BLOCK 3_02_APT.06_K/L/D	0.0	PASS
BLOCK 3_03_APT.03_K/L/D	0.0	PASS
BLOCK 3_03_APT.06_K/L/D	0.0	PASS

Pre and Post mitigation measures temperature for Apartment BLOCK 2_01_APT.03_K/L/D:

Location	IES Filename	Type	Max. Val.	Max. Time
01_B2_APT.03_K/L/D	Bennett St Apartments.aps	Operative Temperature ($^\circ\text{C}$)	28.27	18:30,19/Aug
01_B2_APT.04_K/L/D	Bennett St Apartments.aps	Operative Temperature ($^\circ\text{C}$)	27.66	18:30,19/Aug

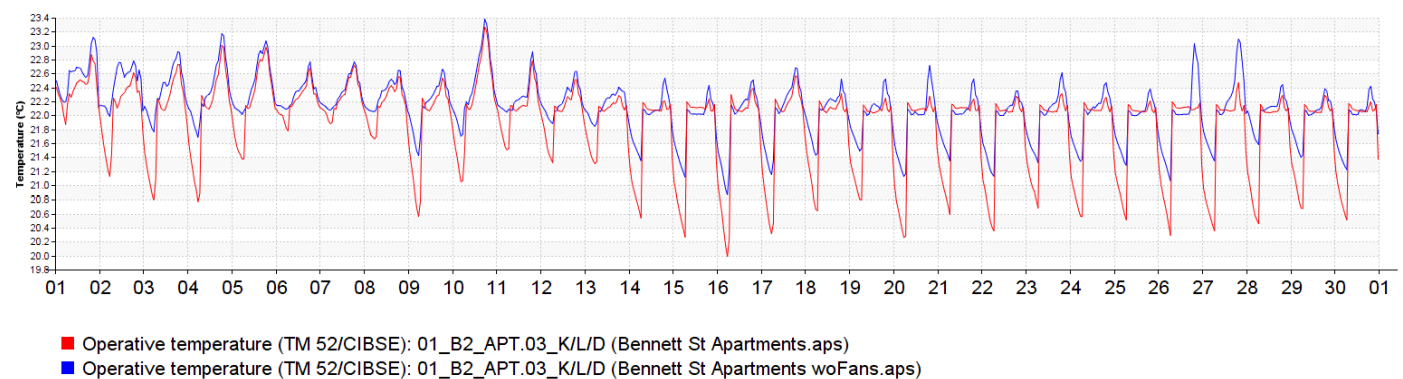


Figure 7. Variation in Operative Temperature over example Summer month (June) with and without boost fan.

The red line represents the Operative Temperature of the space when the 30l/s extract fan is added. Peak temperatures are reduced, and the space is able to cool more effectively.

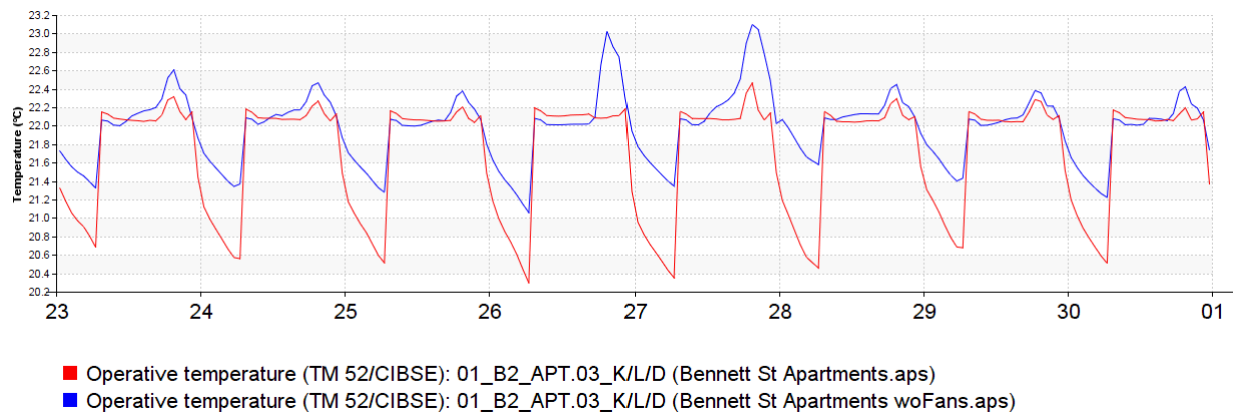


Figure 8. Variation in temperature over example Summer week with and without boost fans.

4.0 CONCLUSION

The addition of 30l/s boost fans to assist with ventilation cooling design in the previously failing K/L/D spaces is sufficient to limit the peaks in Operational Temperature such that the percentage of hours where criteria (a) is exceeded falls within acceptable levels.

Adding 30l/s boost fans to the failing K/L/D spaces ensures that all previously failing area now comply with the thermal comfort requirements of Part O.

-END-