

## Thermal Comfort Analysis

Ref: Z8810A

Stephenson House Apartments,  
London

For

GLP Consulting Engineers Ltd






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## 1.0 Introduction

This report describes the thermal comfort analysis undertaken by Energy Council at the design stage. Thermal modelling has been carried out using software selected and applied in accordance with CIBSE AM11 Building Energy and Environmental Modelling.

The approach follows the methodology and recommendations of European Standard EN 15251 to determine whether a building is overheating. The criteria are based on a variable (adaptive) temperature threshold that is related to the outside running-mean dry-bulb temperature.

The Thermal Comfort Assessment will follow the procedure set out in CIBSE Technical Memorandums 49 & 52 (TM49 & TM52), and outlined below.

## 2.0 Summary

We have carried out thermal comfort analysis for all 17No apartments within the Stephenson House development.

The analysis featured in this report concludes that the current proposals will satisfy the TM49 & TM52 requirement for all of the internal areas; using the current industry standard CIBSE design weather data for London.

The internal spaces comply with TM52 for the first weather scenario as detailed in TM49 (DSY 1 - 1989) without the need for comfort cooling, however not the second or third weather scenarios (DSY 2 - 2003 and DSY 3 - 1976) where comfort cooling is required to certain areas. These spaces have been designed with comfort cooling to ensure that any overheating risk is eradicated and compliance with TM52 is achieved for the second and third weather scenarios.

## 3.0 Simulation Data

### 3.1 Software

Integrated Environmental Solutions (IES) version 2017.0.0.0 and the incorporated MacroFlo package has been used to conduct the dynamic thermal modelling analysis described within this report.

### 3.2 Weather Data

The weather data used for simulations was sourced from CIBSE (Chartered Institute for Building Services Engineers) an industry recognised organisation. London is one of the 14 locations across the UK that data is available for.

Simulations were carried out using design summer years for London as detailed within TM49. The following weather data has been used:

- London Heathrow DSY 1 - Moderately warm summer
- London Heathrow DSY 2- Short intense warm spell
- London Heathrow DSY 3 - Long but less intense warm spell

### 3.3 Analysis Criteria (TM52)

TM52 is an approved method of assessing overheating in buildings at design stage; the target for this project is to achieve a TM52 pass for each of the three weather scenarios required by TM49. The analysis criteria is as follows:

#### Criteria 1

The first criterion sets a limit for the number of hours that the operative temperature can exceed the threshold comfort temperature (upper limit of the range of comfort temperature) by 1°K or more between 1st May and 30th September. The limit is set at 3% of the occupied hours.

#### Criteria 2

The second criterion deals with the severity of overheating within any one day, the level of which is a function of both temperature rise and the duration of that temperature rise. The value of 6 daily degree hours is an initial assessment of what constitutes an acceptable limit of overheating on any single day.

#### Criteria 3

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable. The maximum value for the indoor operative temperature the value of  $\Delta T$  shall not exceed 4°K.

All occupied rooms within the building must pass at least two of the above criteria to satisfy CIBSE TM52.

## **4.0 Modelling Data**

### **4.1 Building Layout**

The IES model building layout is based upon the Brock Carmichael drawings, as follows:

A-0203-PL - Proposed First Floor General Arrangement Plan

A-0204-PL - Proposed Second Floor General Arrangement Plan

A-0205-PL - Proposed Third Floor General Arrangement Plan

A-0206-PL - Proposed Fourth Floor General Arrangement Plan

A-0207-PL - Proposed Fifth Floor General Arrangement Plan

A-0208-PL - Proposed Sixth Floor General Arrangement Plan

A-0209-PL - Proposed Seventh Floor General Arrangement Plan

A-0300-PL - Proposed East Elevation (Hampstead Road)

A-0301-PL - Proposed South Elevation (Drummond Street)

A-0302-PL - Proposed North Elevation (William Road)

A-0306-PL - Proposed West Elevation 2

## 4.2 Building Envelope Thermal Performance

The building envelope fabric performance meets or exceeds the values required for the building regulations part L2A 2013. The assumed values are tabulated below:

Building Envelope Performance Data		
Component	U-Value (W/m <sup>2</sup> K)	G-Value
Hampstead Road Elevation: Stone rain screen – 40mm facing stone, mineral wool insulation, SFS wall construction, 2 layers of plasterboard	0.20	N/A
Rear Elevations: Unitised aluminium construction – brick slip faced GRC panels mounted on unitised insulated panels, mineral wool insulation, stud wall, two layers of plasterboard.	0.20	N/A
Party Walls : Cavity Masonry wall – 1 layer Plasterboard each side, 2 layers of 100mm blockwork with 50mm mineral wool insulation in cavity	N/A	N/A
Internal Walls: Gypwall SFS wall–1 layer plasterboard each side with 25mm acoustic insulation in cavity	N/A	N/A
New Flat Roof - 250mm RC slab with PIR Insulation (new construction)	0.12	N/A
Upper Floors: 275mm hollow pot slab (retained existing), 250mm RC slab (new construction)	N/A	N/A
Glazing (with blinds included)	1.3	0.45
Air Tightness	10m <sup>3</sup> /hr.m <sup>2</sup> @ 50pa	N/A

### 4.3 Internal Gains

Thermal profiles created for each space assumed the following internal gains:

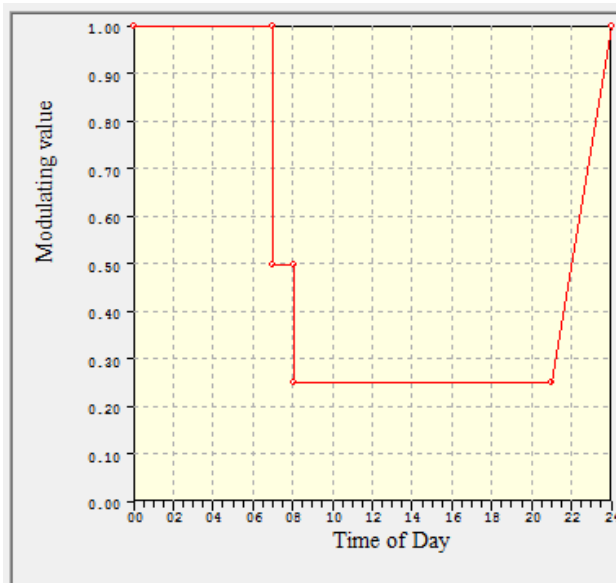
#### 4.3.1 Assumed Building Occupancy

The following maximum occupancies were assumed:

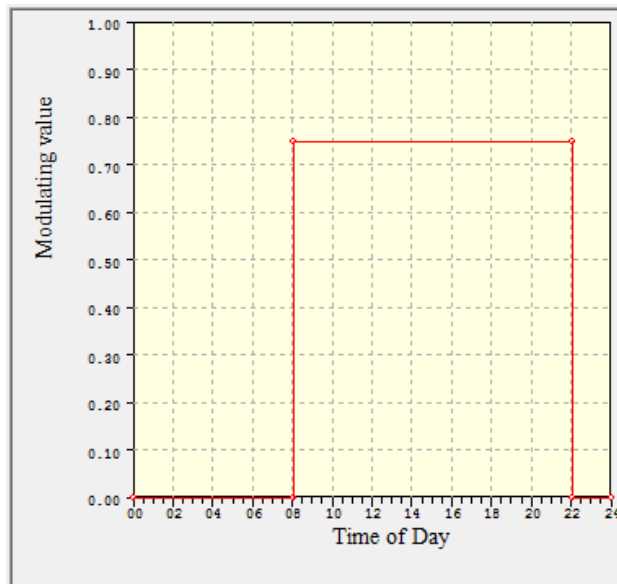
- Lounge/Kitchen/Dining: Minimum 2 people (Apt type dependent)
- Double Bedrooms: 2 people
- Single Bedrooms: 1 person
- Bathroom: 1 person
- Corridors: 1person/30m<sup>2</sup>

Assumed Occupied Hours will vary as per the following profiles:

##### Bedrooms



#### Apartment Lounge/Kitchen/Dining



#### 4.3.2 Internal Gains

The following internal gains were used in the model:

- Lighting (Generally):  $5\text{W/m}^2$
- Occupancy Gains (Generally): 70Ws / 45Wl pp – CIBSE A Table 6.3

#### Equipment Gains

- Apartment Lounge/Dining/Office:  $5\text{W/m}^2$
- Apartment Kitchen:  $700\text{W}_s$  &  $100\text{W}_l$
- Apartment Bedroom:  $5\text{W/m}^2$
- Corridors:  $2\text{W/m}^2$

#### 4.4 Natural Ventilation Openings

Where demonstrated on the Marks Barfield Architects drawings fresh air will be introduced to spaces via natural ventilation openings, when required, throughout the year.

The table below shows the types of opening that will be utilised in the model to provide natural ventilation:

Opening Type	Control
Openable windows (300mm restriction) - William Road = $1.10\text{m}^2$ , $0.98\text{m}^2$ , $0.96\text{m}^2$ or $0.69\text{m}^2$ free area Rear Elevation = $1.37\text{m}^2$ free area	Manual Occupant control (open once temperature exceeds $22^\circ\text{C}$ )
Trickle Vents to each glazing panel	Permanently open
Balcony Doors	Manual Occupant control (open once temperature exceeds $22^\circ\text{C}$ ) between 8am & 10pm

#### 4.5 Mechanical Ventilation

The Apartments are to be provided with Mechanical Extract Ventilation from the kitchens and bathrooms. The following flow rates will be provided for the various areas:-

Ventilation Type	Flow Rate	Controls
Continuously running extract ventilation from the Bathroom/En-suite	2ac/hr for each occupied space	Continuously running

#### 4.6 Comfort Cooling

Comfort Cooling is currently proposed for every apartment to provide cool air to each occupied space. A cooling unit will be provided in the main lobby area with transfer grilles provided to distribute cool air to the adjoining spaces.

## 5.0 Results

The dynamic simulations were run for a whole calendar year. The results were viewed in IES Vista Pro, and where necessary extracted to Excel for analysis.

Section 3.3 describes the TM49 and TM52 compliance criteria for this project.

The tables below demonstrates the results for the building, which show that all of the internal spaces within the building assessed meet compliance with the TM52 criteria for all of the TM49 weather scenarios.

CIBSE TM49 & TM52					
08/09/2017					
DSY 1 - 1989					
Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
2nd - 3B-5p - North Dbl Bedroom	0.2	12	3	2	Pass
2nd - 3B-5p - WC	0.4	4	3	-	Pass
2nd - 3B-5p - East Dbl Bedroom	0.3	17	4	2	Pass
2nd - 3B-5p - East Sgl Bedroom	0.5	21	4	2	Pass
2nd - 3B-5p - Kit/Din	0.9	23	4	2	Pass
2nd - 3B-5p - Lounge	0.5	15	3	2	Pass
2nd - 3B-5p - Bathroom	0	0	0	-	Pass
2nd - 3B-5p - Circulation	0	0	0	-	Pass
2nd - 2B-3p - K/L/D	0.5	13	3	2	Pass
2nd - 2B-3p - WC	0.1	1	1	-	Pass
2nd - 2B-4p - Dbl Bedroom 1	0.3	15	3	2	Pass
2nd - 2B-4p - Dbl Bedroom 2	0.3	16	3	2	Pass
2nd - 2B-4p - K/L/D	0.5	14	3	2	Pass
2nd - 2B-4p - Bathroom	0.2	2	1	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
3rd - 3B-5p - North Dbl Bedroom	0.2	14	3	2	Pass
3rd - 3B-5p - WC	0.4	5	4	-	Pass
3rd - 3B-5p - East Dbl Bedroom	0.4	18	4	2	Pass
3rd - 3B-5p - East Sgl Bedroom	0.5	21	4	2	Pass
3rd - 3B-5p - Kit/Din	0.9	23	4	2	Pass
3rd - 3B-5p - Lounge	0.5	15	3	2	Pass
3rd - 3B-5p - Bathroom	0	0	0	-	Pass
3rd - 3B-5p - Circulation	0	0	0	-	Pass
3rd - 2B-4p - Dbl Bedroom 1	0.3	15	3	2	Pass
3rd - 2B-4p - Dbl Bedroom 2	0.3	16	3	2	Pass
3rd - 2B-4p - K/L/D	0.5	14	3	2	Pass
3rd - 2B-4p - Bathroom	0.2	2	1	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
3rd - 2B-3p - Dbl Bedroom	0.3	15	3	2	Pass
3rd - 2B-3p - Sgl Bedroom	0.4	21	4	2	Pass
3rd - 2B-3p - Stairs	0	0	0	-	Pass
3rd - 2B-3p - Circulation	0	0	0	-	Pass
3rd - 2B-3p - Bathroom	0	0	0	-	Pass
4th - 3B-5p - North Dbl Bedroom	0.2	14	3	2	Pass
4th - 3B-5p - WC	0.4	5	4	-	Pass
4th - 3B-5p - East Dbl Bedroom	0.4	19	4	2	Pass
4th - 3B-5p - East Sgl Bedroom	0.5	21	4	2	Pass
4th - 3B-5p - Kit/Din	0.9	23	4	2	Pass
4th - 3B-5p - Lounge	0.5	15	3	2	Pass
4th - 3B-5p - Bathroom	0.1	1	1	-	Pass
4th - 3B-5p - Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
4th - 2B-3p - K/L/D	0.5	15	3	2	Pass
Circulation	0	0	0	-	Pass
4th - 2B-3p - Bathroom	0	0	0	-	Pass

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
4th - 2B-3p - Sgl Bedroom	0.5	21	4	2	Pass
4th - 2B-3p - Dbl Bedroom	0.3	14	3	2	Pass
4th - 2B-3p - En-suite	0	0	0	-	Pass
4th - 3B-5p - Circulation	0	0	0	-	Pass
4th - 3B-5p - Dbl Bedroom 1	0.5	20	4	2	Pass
4th - 3B-5p - Sgl Bedroom	0.6	20	4	2	Pass
4th - 3B-5p - Dbl Bedroom 2	0.4	9	2	2	Pass
4th - 3B-5p - En-suite	0.2	2	1	-	Pass
4th - 3B-5p - Bathroom	0	0	0	-	Pass
4th - 3B-5p - K/L/D	0.5	15	3	2	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
5th - 2B-3p - K/L/D	0.5	15	3	2	Pass
5th - 2B-3p - Bathroom	0	0	0	-	Pass
5th - 2B-3p - Sgl Bedroom	0.5	21	4	2	Pass
5th - 2B-3p - Dbl Bedroom	0.3	14	3	2	Pass
5th - 2B-3p - En-suite	0	0	0	-	Pass
5th - 3B-5p - East Dbl Bedroom	0.4	18	4	2	Pass
5th - 3B-5p - WC	0.3	4	3	-	Pass
5th - 3B-5p - North Dbl Bedroom	0.3	15	3	2	Pass
5th - 3B-5p - Bathroom	0.6	5	2	-	Pass
5th - 3B-5p - East Sgl Bedroom	0.5	22	4	2	Pass
5th - 3B-5p - Kit/Din	0.5	15	3	2	Pass
5th - 1B-2p - Dbl Bedroom	0.3	15	3	2	Pass
5th - 3B-5p - Dbl Bedroom 1	0.3	15	3	2	Pass
5th - 1B-2p - K/L/D	0.3	9	2	2	Pass
5th - 1B-2p - Bathroom	0	0	0	-	Pass
5th - 3B-5p - En-suite	0.7	5	4	-	Pass
Circulation	0.9	15	3	2	Pass
5th - 3B-5p - Dbl Bedroom 2	0.6	21	4	2	Pass
5th - 3B-5p - Bathroom	0.1	1	1	-	Pass
5th - 3B-5p - Circulation	0.2	7	2	2	Pass
5th - 3B-5p - Sgl Bedroom	0.6	16	3	2	Pass
5th - 3B-5p - K/L/D	0.5	15	3	2	Pass
Circulation	0	0	0	-	Pass
Circulation	1.1	18	4	2	Pass
6th - 3B-5p - En-suite	0	0	0	-	Pass
6th - 2B-3p - N - K/L/D	0.7	20	4	2	Pass
6th - 2B-3p - N - Bathroom	1.9	14	2	2	Pass
6th - 2B-3p - Stairs	0.2	8	2	2	Pass
6th - Circulation	0	0	0	-	Pass
6th - 2B-3p - K/L/D	0.5	15	3	2	Pass
6th - 2B-3p - WC	0	0	0	-	Pass
6th - 3B-5p - K/L/D	0.5	15	3	2	Pass
6th - 3B-5p - WC	0	0	0	-	Pass
6th - 3B-5p - Stair	0.2	9	2	2	Pass
6th - 2B-4p - Shower	0	0	0	-	Pass
6th - 2B-4p - Dbl Bedroom 1	0.3	19	4	2	Pass
6th - 2B-4p - Dbl Bedroom 2	0.5	21	4	2	Pass
6th - 2B-4p - Bathroom	0	0	0	-	Pass
6th - 2B-4p - Circulation	0	0	0	-	Pass
6th - 2B-4p - K/L/D	0.5	13	3	2	Pass
6th - 3B-5p - Dbl Bedroom 1	0.4	18	4	2	Pass

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
6th - 3B-5p - Sgl Bedroom	0.7	22	4	2	Pass
6th - 3B-5p - En-suite	0.2	2	1	-	Pass
6th - 3B-5p - Bathroom	0.2	2	1	-	Pass
6th - 3B-5p - Dbl Bedroom 2	0.6	15	3	2	Pass
6th - 3B-5p - Circulation	0	0	0	-	Pass
6th - 3B-5p - K/L/D	0.5	15	3	2	Pass
7th - 2B-3p-N - Sgl Bedroom	0.2	9	2	2	Pass
7th - 2B-3p-N - Dbl Bedroom	0.5	21	4	2	Pass
7th - 2B-3p-N - Bathroom	0.1	1	1	-	Pass
7th - 2B-3p-N - Circulation	0.4	16	3	2	Pass
7th - 2B-3p - Stairs	0	0	0	-	Pass
7th - 2B-3p - Circulation	0	0	0	-	Pass
7th - 2B-3p - Sgl Bedroom	0.5	21	4	2	Pass
7th - 2B-3p - Bathroom	0	0	0	-	Pass
7th - 2B-3p - Dbl Bedroom	0.4	19	4	2	Pass
7th - 2B-3p - Circulation	0	0	0	-	Pass
7th - 3B-5P - Dbl Bedroom E	0.5	21	4	2	Pass
7th - 3B-5P - Dbl Bedroom W	0.8	22	4	2	Pass
7th - 3B-5P - Bathroom	0	0	0	-	Pass
7th - 3B-5P - Bathroom	0	0	0	-	Pass
7th - 3B-5P - Sgl Bedroom	0.5	21	4	2	Pass
7th - 3B-5P - Circulation	0.2	5	2	-	Pass

CIBSE TM49 & TM52					
08/09/2017					
DSY 2 - 2003					
Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
2nd - 3B-5p - North Dbl Bedroom	1.1	22	4	2	Pass
2nd - 3B-5p - WC	1.1	7	3	2	Pass
2nd - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
2nd - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
2nd - 3B-5p - Kit/Din	0	0	0	-	Pass
2nd - 3B-5p - Lounge	0	0	0	-	Pass
2nd - 3B-5p - Bathroom	0.1	1	1	-	Pass
2nd - 3B-5p - Circulation	0	0	0	-	Pass
2nd - 2B-3p - K/L/D	0	0	0	-	Pass
2nd - 2B-3p - WC	0	0	0	-	Pass
2nd - 2B-4p - Dbl Bedroom 1	0	0	0	-	Pass
2nd - 2B-4p - Dbl Bedroom 2	0	0	0	-	Pass
2nd - 2B-4p - K/L/D	0	0	0	-	Pass
2nd - 2B-4p - Bathroom	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
3rd - 3B-5p - WC	1.2	7	3	2	Pass
3rd - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
3rd - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
3rd - 3B-5p - North Dbl Bedroom	1.1	18	3	2	Pass
3rd - 3B-5p - Kit/Din	0	0	0	-	Pass
3rd - 3B-5p - Lounge	0	0	0	-	Pass
3rd - 3B-5p - Bathroom	0.1	1	1	-	Pass
3rd - 3B-5p - Circulation	0	0	0	-	Pass
3rd - 2B-4p - Dbl Bedroom 1	0	0	0	-	Pass
3rd - 2B-4p - Dbl Bedroom 2	0	0	0	-	Pass
3rd - 2B-4p - K/L/D	0	0	0	-	Pass
3rd - 2B-4p - Bathroom	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
3rd - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
3rd - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
3rd - 2B-3p - Stairs	0	0	0	-	Pass
3rd - 2B-3p - Circulation	0	0	0	-	Pass
3rd - 2B-3p - Bathroom	0	0	0	-	Pass
4th - 3B-5p - WC	1.2	7	3	2	Pass
4th - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
4th - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
4th - 3B-5p - Kit/Din	0	0	0	-	Pass
4th - 3B-5p - Lounge	0	0	0	-	Pass
4th - 3B-5p - Bathroom	0.1	1	1	-	Pass
4th - 3B-5p - Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
4th - 2B-3p - K/L/D	0	0	0	-	Pass

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
Circulation	0	0	0	-	Pass
4th - 2B-3p - Bathroom	0	0	0	-	Pass
4th - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
4th - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
4th - 2B-3p - En-suite	0	0	0	-	Pass
4th - 3B-5p - Circulation	0	0	0	-	Pass
4th - 3B-5p - Dbl Bedroom 1	0	0	0	-	Pass
4th - 3B-5p - Sgl Bedroom	0	0	0	-	Pass
4th - 3B-5p - Dbl Bedroom 2	0	0	0	-	Pass
4th - 3B-5p - North Dbl Bedroom	1.1	18	3	2	Pass
4th - 3B-5p - En-suite	0	0	0	-	Pass
4th - 3B-5p - Bathroom	0	0	0	-	Pass
4th - 3B-5p - K/L/D	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
5th - 2B-3p - K/L/D	0	0	0	-	Pass
5th - 2B-3p - Bathroom	0	0	0	-	Pass
5th - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
5th - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
5th - 2B-3p - En-suite	0	0	0	-	Pass
5th - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
5th - 3B-5p - WC	0.9	5	2	-	Pass
5th - 3B-5p - North Dbl Bedroom	1.1	24	4	2	Pass
5th - 3B-5p - Bathroom	0	0	0	-	Pass
5th - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
5th - 3B-5p - Kit/Din	0	0	0	-	Pass
5th - 1B-2p - Dbl Bedroom	0	0	0	-	Pass
5th - 3B-5p - Dbl Bedroom 1	0	0	0	-	Pass
5th - 1B-2p - K/L/D	0	0	0	-	Pass
5th - 1B-2p - Bathroom	0	0	0	-	Pass
5th - 3B-5p - En-suite	1.6	8	4	2	Pass
Circulation	2.2	25	4	2	Pass
5th - 3B-5p - Sgl Bedroom	0	0	0	-	Pass
5th - 3B-5p - Dbl Bedroom 2	0	0	0	-	Pass
5th - 3B-5p - Bathroom	0	0	0	-	Pass
5th - 3B-5p - Circulation	1	10	2	2	Pass
5th - 3B-5p - K/L/D	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
6th - 3B-5p - En-suite	0	0	0	-	Pass
6th - 2B-3p-N - K/L/D	0	0	0	-	Pass
6th - 2B-3p-N - Bathroom	2.8	24	3	2	Pass
6th - 2B-3p - Stairs	0	0	0	-	Pass
6th - Circulation	0	0	0	-	Pass
6th - 2B-3p - K/L/D	0	0	0	-	Pass
6th - 2B-3p - WC	0	0	0	-	Pass
6th - 3B-5p - K/L/D	0	0	0	-	Pass
6th - 3B-5p - WC	0	0	0	-	Pass
6th - 3B-5p - Stair	0	0	0	-	Pass
6th - 2B-4p - Shower	0	0	0	-	Pass
6th - 2B-4p - Dbl Bedroom 1	0	0	0	-	Pass

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
6th - 2B-4p - Dbl Bedroom 2	0	0	0	-	Pass
6th - 2B-4p - Bathroom	0	0	0	-	Pass
6th - 2B-4p - Circulation	0	0	0	-	Pass
6th - 2B-4p - K/L/D	0	0	0	-	Pass
6th - 3B-5p - Dbl Bedroom 1	0	0	0	-	Pass
6th - 3B-5p - Sgl Bedroom	0	0	0	-	Pass
6th - 3B-5p - Dbl Bedroom 2	0	0	0	-	Pass
6th - 3B-5p - En-suite	0	0	0	-	Pass
6th - 3B-5p - Bathroom	0	0	0	-	Pass
6th - 3B-5p - Circulation	0	0	0	-	Pass
6th - 3B-5p - K/L/D	0	0	0	-	Pass
7th - 2B-3p-N - Sgl Bedroom	0.8	17	3	2	Pass
7th - 2B-3p-N - Dbl Bedroom	0	0	0	-	Pass
7th - 2B-3p-N - Bathroom	0	0	0	-	Pass
7th - 2B-3p-N - Circulation	0.3	4	1	-	Pass
7th - 2B-3p - Stairs	0	0	0	-	Pass
7th - 2B-3p - Circulation	0	0	0	-	Pass
7th - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
7th - 2B-3p - Bathroom	0	0	0	-	Pass
7th - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
7th - 3B-5P - Dbl Bedroom E	0	0	0	-	Pass
7th - 3B-5P - Dbl Bedroom W	0	0	0	-	Pass
7th - 3B-5P - Bathroom	0	0	0	-	Pass
7th - 3B-5P - Bathroom	0	0	0	-	Pass
7th - 3B-5P - Sgl Bedroom	0	0	0	-	Pass
7th - 3B-5P - Circulation	0	0	0	-	Pass

CIBSE TM49 & TM52					
08/09/2017					
DSY 3 - 1976					
Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
2nd - 3B-5p - North Dbl Bedroom	1.4	19	3	2	Pass
2nd - 3B-5p - WC	1.9	10	4	2	Pass
2nd - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
2nd - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
2nd - 3B-5p - Kit/Din	0	0	0	-	Pass
2nd - 3B-5p - Lounge	0	0	0	-	Pass
2nd - 3B-5p - Bathroom	0.4	2	1	-	Pass
2nd - 3B-5p - Circulation	0	0	0	-	Pass
2nd - 2B-3p - K/L/D	0	0	0	-	Pass
2nd - 2B-3p - WC	0	0	0	-	Pass
2nd - 2B-4p - Dbl Bedroom 1	0	0	0	-	Pass
2nd - 2B-4p - Dbl Bedroom 2	0	0	0	-	Pass
2nd - 2B-4p - K/L/D	0	0	0	-	Pass
2nd - 2B-4p - Bathroom	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
3rd - 3B-5p - North Dbl Bedroom	1.4	20	3	2	Pass
3rd - 3B-5p - WC	1.9	12	4	2	Pass
3rd - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
3rd - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
3rd - 3B-5p - Kit/Din	0	0	0	-	Pass
3rd - 3B-5p - Lounge	0	0	0	-	Pass
3rd - 3B-5p - Bathroom	0.4	2	1	-	Pass
3rd - 3B-5p - Circulation	0	0	0	-	Pass
3rd - 2B-4p - Dbl Bedroom 1	0	0	0	-	Pass
3rd - 2B-4p - Dbl Bedroom 2	0	0	0	-	Pass
3rd - 2B-4p - K/L/D	0	0	0	-	Pass
3rd - 2B-4p - Bathroom	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
3rd - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
3rd - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
3rd - 2B-3p - Stairs	0	0	0	-	Pass
3rd - 2B-3p - Circulation	0	0	0	-	Pass
3rd - 2B-3p - Bathroom	0	0	0	-	Pass
4th - 3B-5p - North Dbl Bedroom	1.4	20	3	2	Pass
4th - 3B-5p - WC	1.9	12	4	2	Pass
4th - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
4th - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
4th - 3B-5p - Kit/Din	0	0	0	-	Pass
4th - 3B-5p - Lounge	0	0	0	-	Pass
4th - 3B-5p - Bathroom	0.3	2	1	-	Pass
4th - 3B-5p - Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
4th - 2B-3p - K/L/D	0	0	0	-	Pass

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
Circulation	0	0	0	-	Pass
4th - 2B-3p - Bathroom	0	0	0	-	Pass
4th - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
4th - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
4th - 2B-3p - En-suite	0	0	0	-	Pass
4th - 3B-5p - Circulation	0	0	0	-	Pass
4th - 3B-5p - Dbl Bedroom 1	0	0	0	-	Pass
4th - 3B-5p - Sgl Bedroom	0	0	0	-	Pass
4th - 3B-5p - Dbl Bedroom 2	0	0	0	-	Pass
4th - 3B-5p - En-suite	0	0	0	-	Pass
4th - 3B-5p - Bathroom	0	0	0	-	Pass
4th - 3B-5p - K/L/D	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
5th - 2B-3p - K/L/D	0	0	0	-	Pass
5th - 2B-3p - Bathroom	0	0	0	-	Pass
5th - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
5th - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
5th - 2B-3p - En-suite	0	0	0	-	Pass
5th - 3B-5p - East Dbl Bedroom	0	0	0	-	Pass
5th - 3B-5p - WC	1.4	6	3	-	Pass
5th - 3B-5p - North Dbl Bedroom	1.3	20	3	2	Pass
5th - 3B-5p - Bathroom	0.2	2	1	-	Pass
5th - 3B-5p - East Sgl Bedroom	0	0	0	-	Pass
5th - 3B-5p - Kit/Din	0	0	0	-	Pass
5th - 1B-2p - Dbl Bedroom	0	0	0	-	Pass
5th - 3B-5p - Dbl Bedroom 1	0	0	0	-	Pass
5th - 1B-2p - K/L/D	0	0	0	-	Pass
5th - 1B-2p - Bathroom	0	0	0	-	Pass
5th - 3B-5p - En-suite	2.1	9	4	2	Pass
Circulation	2.7	23	4	2	Pass
5th - 3B-5p - Sgl Bedroom	0	0	0	-	Pass
5th - 3B-5p - Dbl Bedroom 2	0	0	0	-	Pass
5th - 3B-5p - Bathroom	0	0	0	-	Pass
5th - 3B-5p - Circulation	0.9	8	2	2	Pass
5th - 3B-5p - K/L/D	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
6th - 3B-5p - En-suite	0	0	0	-	Pass
6th - 2B-3p-N - K/L/D	0	0	0	-	Pass
6th - 2B-3p - Stairs	0	0	0	-	Pass
6th - Circulation	0	0	0	-	Pass
6th - 2B-3p - K/L/D	0	0	0	-	Pass
6th - 2B-3p-N - Bathroom	2.3	24	4	2	Pass
6th - 2B-3p - WC	0	0	0	-	Pass
6th - 3B-5p - K/L/D	0	0	0	-	Pass
6th - 3B-5p - WC	0	0	0	-	Pass
6th - 3B-5p - Stair	0	0	0	-	Pass
6th - 2B-4p - Shower	0	0	0	-	Pass
6th - 2B-4p - Dbl Bedroom 1	0	0	0	-	Pass
6th - 2B-4p - Dbl Bedroom 2	0	0	0	-	Pass
6th - 2B-4p - Bathroom	0	0	0	-	Pass

Room Name	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing	Pass/Fail
6th - 2B-4p - Circulation	0	0	0	-	Pass
6th - 2B-4p - K/L/D	0	0	0	-	Pass
6th - 3B-5p - Dbl Bedroom 1	0	0	0	-	Pass
6th - 3B-5p - Sgl Bedroom	0	0	0	-	Pass
6th - 3B-5p - Dbl Bedroom 2	0	0	0	-	Pass
6th - 3B-5p - En-suite	0	0	0	-	Pass
6th - 3B-5p - Bathroom	0	0	0	-	Pass
6th - 3B-5p - Circulation	0	0	0	-	Pass
6th - 3B-5p - K/L/D	0	0	0	-	Pass
7th - 2B-3p-N - Sgl Bedroom	1	14	2	2	Pass
7th - 2B-3p-N - Dbl Bedroom	0	0	0	-	Pass
7th - 2B-3p-N - Bathroom	0	0	0	-	Pass
7th - 2B-3p-N - Circulation	0.4	3	1	-	Pass
7th - 2B-3p - Stairs	0	0	0	-	Pass
7th - 2B-3p - Circulation	0	0	0	-	Pass
7th - 2B-3p - Sgl Bedroom	0	0	0	-	Pass
7th - 2B-3p - Bathroom	0	0	0	-	Pass
7th - 2B-3p - Dbl Bedroom	0	0	0	-	Pass
Circulation	0	0	0	-	Pass
7th - 3B-5P - Dbl Bedroom E	0	0	0	-	Pass
7th - 3B-5P - Dbl Bedroom W	0	0	0	-	Pass
7th - 3B-5P - Bathroom	0	0	0	-	Pass
7th - 3B-5P - Bathroom	0	0	0	-	Pass
7th - 3B-5P - Sgl Bedroom	0	0	0	-	Pass
7th - 3B-5P - Circulation	0	0	0	-	Pass

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## 6.0 Conclusion

This report confirms that that we comply with CIBSE TM52 for each of the weather scenarios listed in TM49.

The specification listed in Section 4 will mean that comfort cooling is not required to ensure thermal comfort, in accordance with TM52, for the first weather scenario listed in TM49 - DSY 1: 1989 - a moderately warm summer. However, Comfort Cooling is required in certain areas to ensure that the building meets compliance with the other two weather scenarios listed in TM49, i.e. DSY 2: 2003 and DSY 3: 1976.