



A REPORT BY
WILSON GRAY CONSULTING

THERMAL COMFORT ANALYSIS REPORT

MEP DESIGN & BIM

Validation. Completion. Construction.

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Document History

Date	Rev	Comments
24.05.22	00	First Issue

Executive Summary

The thermal analysis shows that all primary and secondary teaching areas comply with BB101 2018 in terms of the following:

All teaching satisfy BB101 2018 Criterion 1 in that the teaching areas Hours of exceedance (minimum standard) ΔT (Deg K)= Top -Tmax ΔT are not greater or equal to 1 Deg K From May – Sept between 9am and 4 pm Mon - Fri for more than 40 hours as detailed in the results section of this report.

Future climate analysis [2050 and 2080 weather data] shows that the design is capable of satisfying the BB101 Criterion 1 with only a few none teaching areas exceeding the 40 hours criterion.

None of the assembly hall areas are used for examinations so the 18 hour criterion for these areas has not been used in the design and analysis.

TM52 Criterion 2 and 3 have also been included in the analysis for reporting purposes.

1.0 Introduction

This report has been prepared by the following Low Carbon Energy Assessor:

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The information contained in this document is based on design data, thermal templates and assignments, reference to the specified design criteria was used for casual load and occupancy loads.

This document contains specific information on the following:

- Thermal comfort factors and results

Comfort metrics are summarised as follows and are the basis of the design and have been accepted as other appropriate industry standards and key performance indicators defined in the BREEAM credit criteria.

- BB101 for School and Teaching areas

1.2 Design Stage Information

BB101 design stage criteria has been used in the analysis which is summarised in the following section of this report:

Fig 1.1 BB101 input criterion

BB101 Overheating Risk Assessment

- Criterion 1 of CIBSE TM52 is used as the minimum requirement for demonstrating compliance with BB101 (threshold of 40 hours exceedance)
- CIBSE DSY1 2020 50% weather file (high emissions)
- Occupied throughout summer period, 09:00 to 16:00, Monday-Friday
- No internal gains in teaching spaces during the lunch period 12:00 to 13:00

Primary School

Equipment: 5W/m²

Lighting: 7.2W/m²

People: 60W (pupil), 70W (teacher)

Secondary School

Equipment: 10W/m²

Lighting: 7.2W/m²

People: 70W/person

Fig 1.2 Profile [Occupancy]

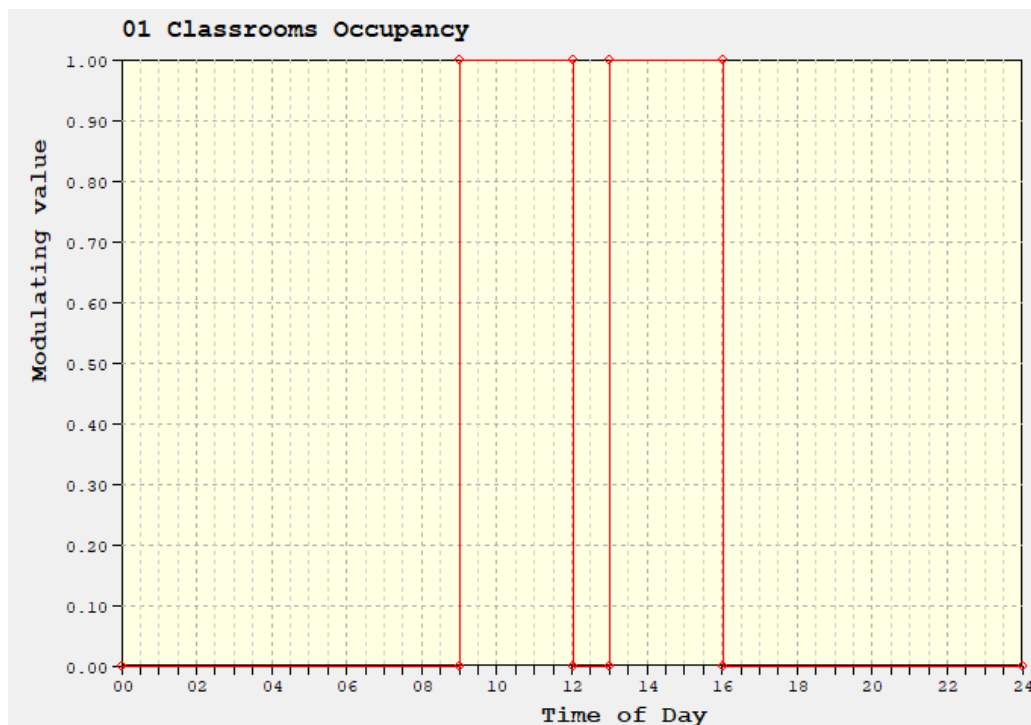


Fig 1.3 Profile [Equipment]

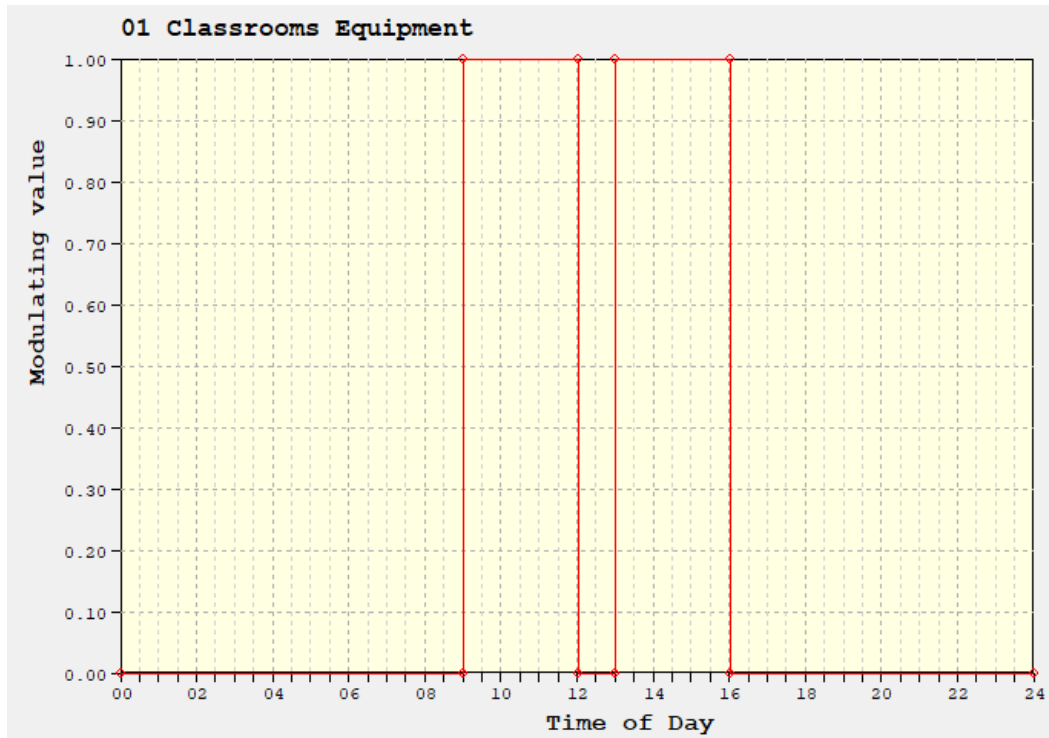


Fig 1.4 Profile [Lighting]

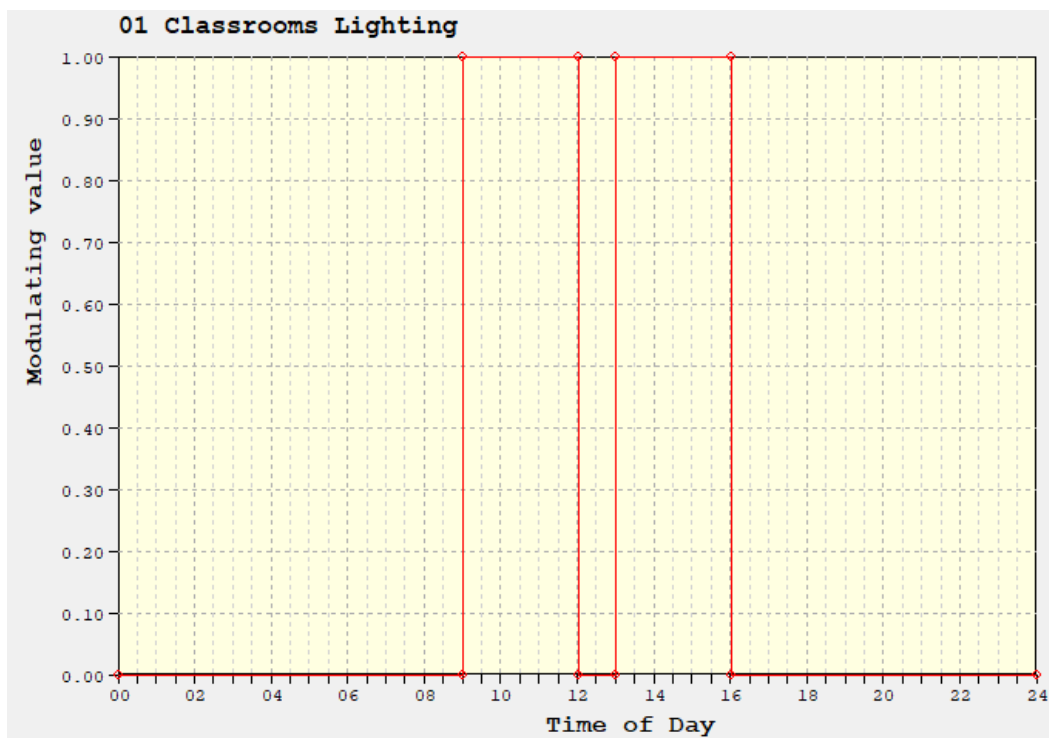


Fig 1.5 Profile [Admin Occupancy and equipment]

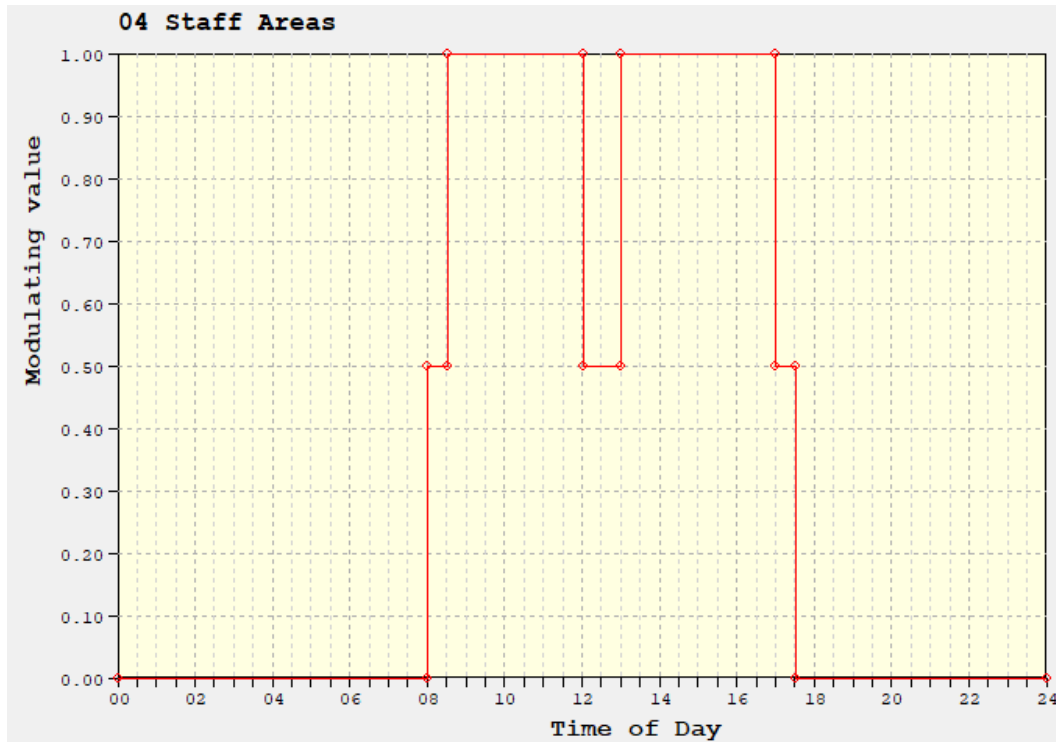


Fig 1.6 Primary Comfort Factors

CIBSE TM52: 2013 Category I (young/infirm) ▼

Fig 1.7 Secondary Comfort Factors

CIBSE TM52: 2013 Category II (new builds.) ▼

Fig 1.8 Nominal and Elevated Air speed settings

Nominal air speed (m/s):

Elevated air speed

Elevated air speed (m/s):

Fig 1.9 Occupancy Assigned in Model [Primary]

Space Name (Real)	Pupil Occupancy	Staff Occupancy
1071 KS1 Group Room 1	2	2
1075 KS1 Group Room 2	2	2
1079 Hygiene Suite	1	2
1143 Primary Hall / Dining C_Access	50	6
1146 KS1 Classroom 1	8	4
1148 KS1 Classroom 2	8	4
1152 KS1 Classroom 3	8	4
1185 KS2 Group Room 1	3	2
1187 Staff Work Room	0	6
1188 Primary Art / Science / Design Tech.	8	3
1189 Primary Food Technology	8	3
1194 KS2 Group Room 2	3	2
1205 Primary Library	8	2
1206 Primary ICT	8	3
1207 Primary SEN Resource	5	3
1239 KS2 Classroom 1	8	4
1241 KS2 Classroom 3	8	4
1244 KS2 Classroom 4	8	4
1247 KS2 Classroom 2	8	4
1250 KS2 Classroom 6	8	4
1254 KS2 Classroom 5	8	4
1301 Head of Primary	0	1
1329 Primary Therapy	3	2
1357 Primary Calm Space	1	2
1358 Primary Staff Social	0	16
1386 Early Years Sensory	1	1
1387 Early Years Group Room	2	2
1391 Recep. Group Room	2	2
1394 Reception Classroom	8	4
1398 Early Years	8	4
1506 Primary Music / Drama	8	4
1527 Intimate Dining C_Access	8	2
1528 Early Years Off / Res.	0	2
1577 Soft Play	3	2
1578 Primary Sensory	3	2

Fig 1.10 Occupancy Assigned in Model [Secondary]

Space Name (Real)	Pupil Occupancy	Staff Occupancy
1056 Medical	1	2
1057 SLT Office	0	4
1095 KS3 Group Room 1	2	1
1113 Secondary Dining C_Access	45	4
1121 Reception / Admin	0	5
1122 Kitchenette	0	1
1124 Head	0	1
1141 Secondary Hall C_Access	45	4
1162 KS3 Classroom 3 (English)	8	3
1164 KS3 Classroom 1 (English)	8	3
1178 Cafe / Bistro C_Access	0	30
1180 KS3/4 Calming Space	1	2
1218 KS4 Group Room 4	2	1
1219 SEN Resource Base	4	2
1221 ICT Room 2	8	3
1229 Group Room	2	1
1230 Group Room	2	1
1233 Post 16 Common Room	8	2
1234 Centr. Staff Room	0	28
1236 Sensory	1	2
1257 KS4 Classroom 4 (Maths)	8	3
1260 KS4 Classroom 2 (Maths)	8	3
1263 KS4 Classroom 1 (Maths)	8	3
1266 KS4 Classroom 3 (MFL)	8	3
1269 ICT Room 1	8	3
1270 Post 16 Class 4	8	2
1273 Post 16 Class 2	8	2
1277 Post 16 Class 3	8	2
1280 Post 16 Class 5	8	2
1283 Post 16 Class 1	8	2
1288 Group Room	2	2
1312 Science Studio	8	3
1315 Science Lab	8	3
1331 KS3/4 Library C_Access	8	3
1351 Art Room 2	8	3

1360 Office Kitchen	0	1
1383 KS3/4 Music / Drama	8	3
1403 Food Technology	8	3
1407 Design Technology	8	3
1453 Parents / Waiting Room	0	8
1458 Meeting Room	0	12
1473 Prem. Off	0	1
1498 Hygiene Suite 2	1	2
1499 KS4 Group Room 5	2	1
1500 KS4 Classroom 5 (MFL)	8	3
1505 KS4 Group Room 6	2	1
1521 KS3/4 Therapy	1	2
1531 Inclusion	2	4
1532 Life Skills	8	3
1534 Sensory	1	2
1535 Immersion	1	2
1536 SSP Group	1	2
1537 SSP Tutor Base	8	3
1538 SSP Group	1	2
1539 SSP Group	1	2
1540 SSP Tutor Base	8	3
1541 SSP Group	1	2
1542 SSP Group	1	2
1544 SSP Tutor Base	8	3
1545 SSP Group	1	2
1550 KS3 Group Room 2	2	1
1555 KS3 Classroom 2 (English)	8	3
1566 KS3 Classroom 4 (Humanities)	8	3
1567 Art Room 1	8	3
1570 KS3 Group Room 3	2	1
1585 SSP Office	0	3
1589 Bursar	0	1
1591 Staff Work Room	0	10
1605 Science Breakout	2	1
1615 SLT Office 1	0	2
1616 Visiting Prof Office	0	1

1.3 Specific Thermal Modelling Approach

To satisfy Criteria 1, the model has been created using IES Virtual Environment 2021.3.0.0 The VE software provides a tested and accredited full dynamic thermal analysis in accordance with CIBSE AM11 - Building Energy and Environmental Modelling.



**Building Energy and Environmental Modelling;
Checklist for Choosing BEEM Software
(CIBSE Applications Manual AM11, 1998, Appendix B)**

IES Virtual Environment
Apache

This report summarises the predicted thermal comfort conditions based on the recommendations of CIBSE TM52 and BB101 using Dynamic Simulation Software tools [DSM] carried out during the initial and then validated through the detailed design stages of the scheme.

Summertime thermal performance of buildings is generally measured against a benchmark temperature that should not be exceeded for a designated number of hours or a percentage of the annual occupied period. The benchmark value is related to the likelihood of discomfort although other factors (such as health) are also considered.

The IESVE TM52 Adaptive Comfort analysis tool for the Virtual Environment is capable of assessing overheating of buildings based on the criteria outlined in CIBSE Technical Memorandum (TM) 52 – 2013.

This report briefly summarises the predicted thermal comfort conditions for the overheating risks recommendations of CIBSE Technical Memorandum (TM) 52 – 2013 analysis using full thermal analysis Dynamic Simulation Software tools [DSM] carried out during the initial and then validated through the detailed design stages of the scheme.

1.4 Adaptive Comfort Methodology – Overheating CIBSE TM52

The following three criteria, taken together, are used to assess the risk of overheating of buildings in the UK and Europe. A room or building that fails any two of the three criteria is classed as overheating.

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 during the occupied hours of a typical non-heating season (1st May to 30th September).

The second criterion deals with the severity of overheating within any one day, which can be as important as its frequency, the level of which is a function of both temperatures rise and its duration. This criterion sets a daily limit for acceptability.

The third criterion sets an absolute maximum daily temperature for a room, beyond which the level of overheating is unacceptable.

Further information on these criteria can be found in TM52 – 2013, section 6.1.2. These criteria are generally described below:

1.4.1 Hours of Exceedance

The number of hours during which ΔT is greater than or equal to one degree ($^{\circ}K$) during the period May to September inclusive shall not be more than 3% of occupied hours. ΔT is defined as operative temperature less the maximum acceptable temperature. ΔT is rounded to the nearest whole degree.

Daily weighted exceedance

To allow for the severity of overheating, the weighted exceedance shall be less than or equal to 6 in any one day.

1.4.2 Upper Limit Temperature

To set an absolute maximum value for the indoor operative temperature the value of ΔT shall not exceed 4 $^{\circ}K$.

Summer (elevated) air speed (m/s)

This air speed is used to calculate the operative temperature of each space in the assessment. The operative temperature is calculated using the formula:

$$T_{op} = \frac{T_a \sqrt{10 v} + T_r}{1 + \sqrt{10 v}}$$

Equation 1 – Operative Temperature

Where:

T_a = indoor air temperature ($^{\circ}C$)

T_r = mean radiant temperature ($^{\circ}C$)

v = Summer (elevated) air speed (m/s)

1.4.3 Building Category

The building category is used in calculating the maximum acceptable temperature (Tmax).

$$T_{max} = 0.33 T_{rm} + 18.8 + \text{suggested acceptable range}$$

Equation 2 – Maximum Acceptable Temperature

Where:

Trm = exponentially weighted running mean of the daily mean outdoor air temperature

Category	Explanation	Suggested acceptable range (K)
Category I	High level of expectation only used for spaces occupied by very sensitive and fragile persons	2
Category II	Normal expectation (for new buildings and renovations)	3
Category III	A moderate expectation (used for existing buildings)	4

Table 1 – Building Categories

Conditions simulations must be made using design summer years [DSY] as recommended in CIBSE Technical Memorandum (TM) 52 – 2013.

Comfort analysis has been carried out for a whole year using Design Summer Year (DSY) weather data of the nearest appropriate weather file.

1.5 **BB101 Overheating**

[Extracts from BB101 are detailed below]

BB101 requires as a minimum achieving TM52 Criterion 1 - Hours of Exceedance (He) for the overheating risk assessment. For schools, from May to September inclusive, and between 9am and 4pm Monday to Friday this value should be less than 40 Hours [18 hours for sports hall used for exams]

Criterion 2 – Daily Weighted Exceedance (We) and Criterion 3 - Upper Limit Temperature are primarily measures of short-term discomfort and for information reporting only. If a school design fails to meet Criterion 2 or Criterion 3 then designers should consider potential overheating mitigation measures and indicate which are viable for the project.

The use of these three performance criteria together aims to ensure the design is not dictated by a single factor but by a combination of factors that will allow a degree of flexibility in the design.

Criterion 2 should not exceed 6 and Criterion 3 should not exceed a ΔT of 4 Deg [K]

The criteria should be assessed Monday to Friday 09-16h, from 1st May to 30th September, including the summer holiday period as if the school was occupied normally through the summer.

A 12pm to 1pm lunchbreak with no internal heat gains is should be included within assessments profiles use.

Summarising the 3 criteria are:

1. Number of hours for which an adaptive thermal comfort threshold temperature is exceeded (total hours of exceedance).
2. Degree to which the operative temperature exceeds the adaptive thermal comfort threshold temperature (daily weighted exceedance).
3. Maximum temperature experienced at any occupied time (upper limit temperature).

These performance parameters will ensure that the design of future schools is not dictated by a single factor as previously but by a combination of factors that will allow a degree of flexibility in the design of the school. They will also take account of the use of the school, for example in their choice of term dates.

1.6 BB101 Ventilation & Indoor Air Quality

[Extracts from BB101 are detailed below]

In teaching and learning spaces, carbon dioxide is the key indicator of ventilation performance for the control of indoor air quality. There is a range of ventilation strategies available to meet BB101 requirements, ranging from a completely natural system to a completely mechanical system. For classrooms and practical spaces, design constraints typically determine the ventilation strategy used, with current designs the majority of teaching spaces use hybrid or mixed mode systems that employ a mix of MV and NV.

BB101 states where MV is used, or when hybrid systems are operating in mechanical mode, then sufficient outdoor air should be provided during the occupied period to achieve a daily average CO₂ concentration <1000 ppm. The maximum concentration should also not exceed 1500 ppm for more than 20 consecutive minutes each day.

Where natural ventilation is used, or when hybrid systems are operating in natural mode, then sufficient outdoor air should be provided to achieve a daily average CO₂ concentration <1,500 ppm. The maximum concentration should also not exceed 2,000 ppm for more than 20 consecutive minutes each day. The ventilation solution should be designed to achieve a CO₂ concentration for the majority of the time <1,200 ppm for a new building (800 ppm above the outside CO₂, taken as 400 ppm) for the majority of the occupied time during the year.

2.0 Building Form Zoning and Geometry

The following images detail the building model:

Fig 2.1 Front Elevation

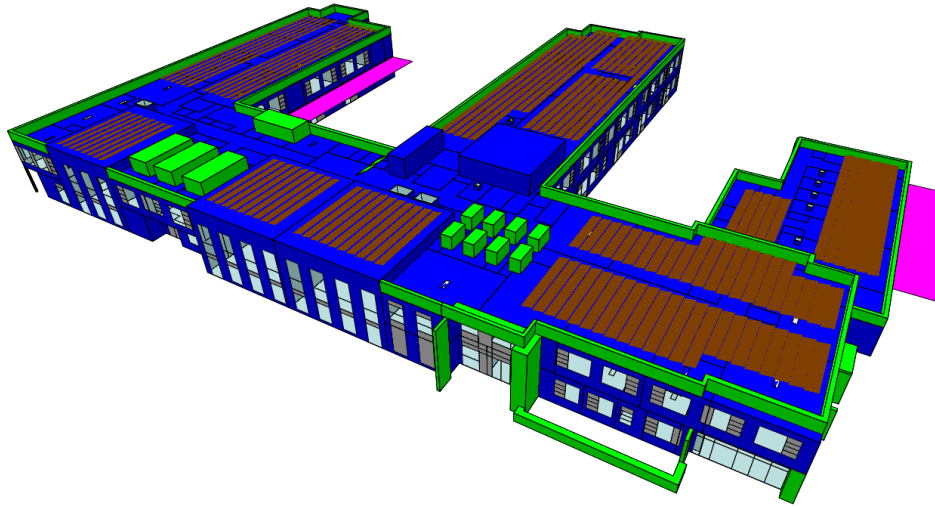
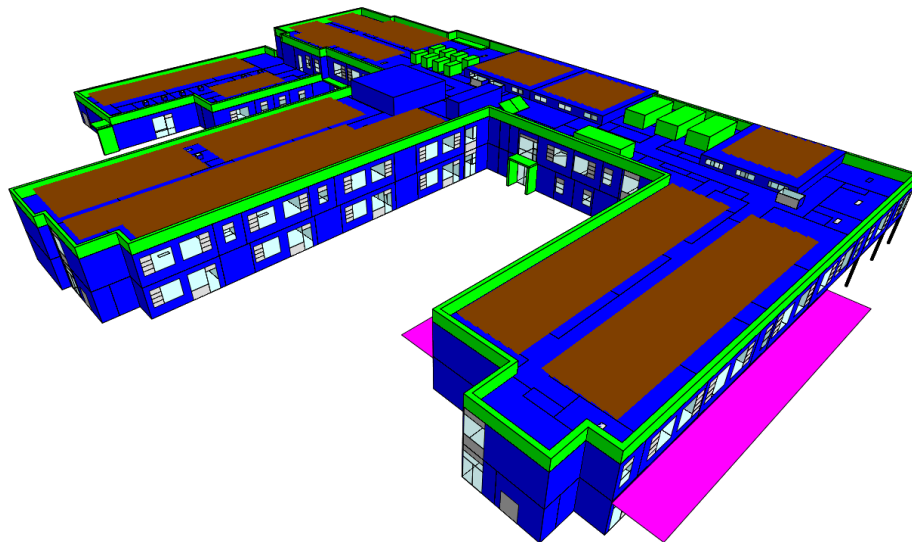


Fig 2.2 Rear Elevation



3.0 Weather Data and Site Orientation

Weather data integrated into the IES software package has been applied to the model. DSY and TRY for BB101 weather data for the location has been used as the nearest simulation weather file available which is detailed below:

Fig 3.1 Simulation Weather data TM52 [Current weather File 2020]

ApacheSim

Simulation Weather File:

Fig 3.2 Simulation Weather data TM52 [Future weather File 2050]

ApacheSim

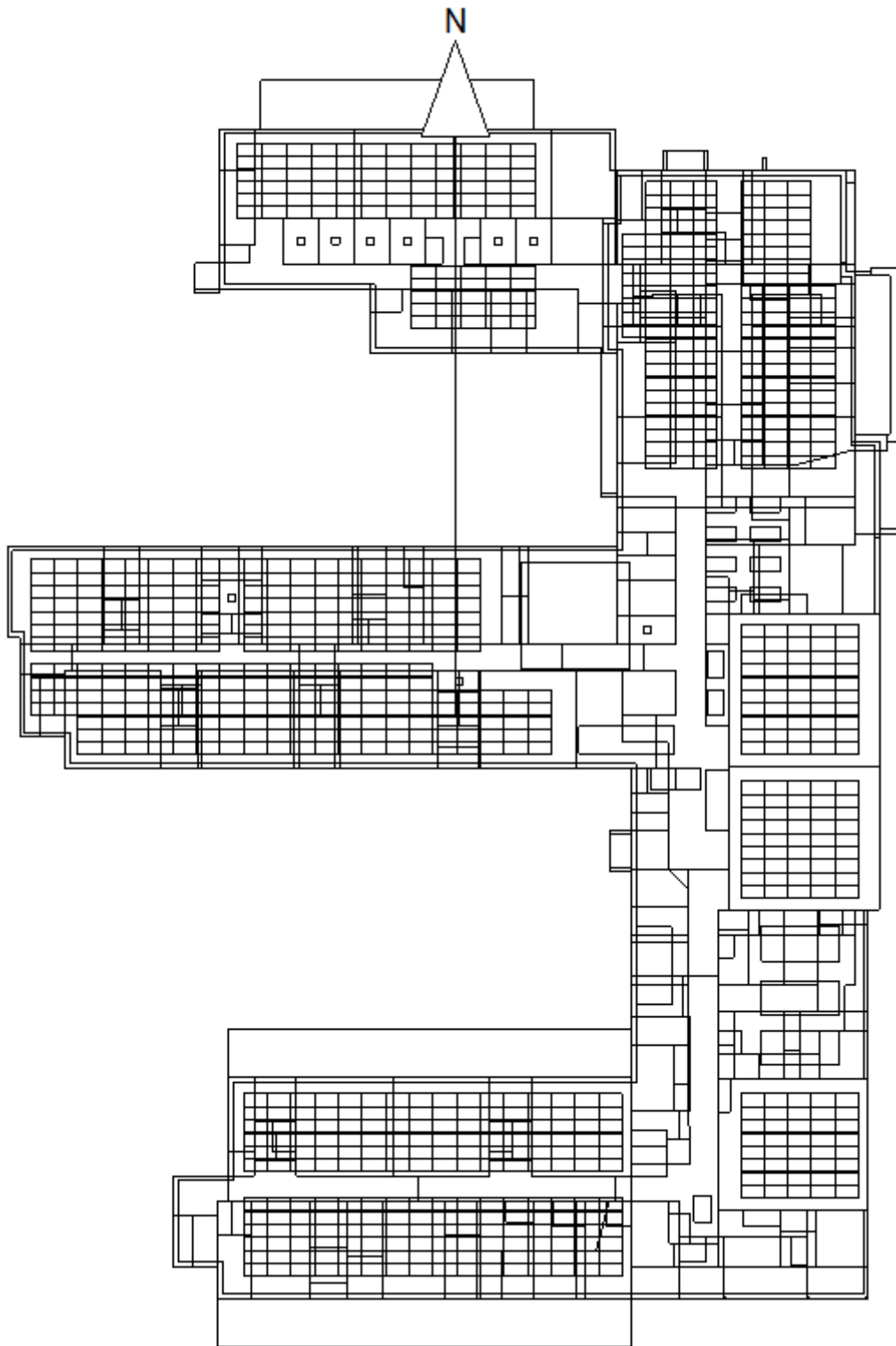
Simulation Weather File:

Fig 3.3 Simulation Weather data TM52 [Future weather File 2080]

ApacheSim

Simulation Weather File:

Fig 3.4 Site Rotation



4.0 Construction Data

The following construction data has been used in the absence of any confirmed data from the design team, use of blinds to reduce glare and mitigate solar gains has been included in the analysis.

Fig 4.1 Opaque Building Elements

Category	Description	Data source	U value (W/m ² K)
Door	YPB Spandrel Panel 1.4	Generic	1.4000
Roof Light	YPB Rooflight 1.2 g=0.3 LT=0.7 No Blinds	Generic	1.2593
Roof Light	YPB Rooflight 1.2 g=0.3 LT=0.7 Blinds	Generic	1.2593
Roof	YPB Roof 0.12	Generic	0.1200
Door	YPB Personnel Door 1.9	Generic	1.9000
Internal Partition	YPB Internal Partition	Generic	0.2980
Internal Ceiling/Floor	YPB Internal Ceiling/Floor	Generic	1.1405
External Window	YPB External Window 1.2 g=0.3 LT=0.7 No Blinds	Generic	1.2071
External Window	YPB External Window 1.2 g=0.3 LT=0.7 Blinds	Generic	1.2071
External Wall	YPB External Wall 0.15	Generic	0.1500
Ground/Exposed Floor	YPB Exposed Floor 0.12	Generic	0.1200

Fig 4.2 Glazing Building Elements

Description: YPB External Window 1.2 g=0.3 LT=0.7 Blinds ID: STD_EXTW External Internal

Performance: EN-ISO

Net U-value (including frame): 1.2071 W/m²K U-value (glass only): 1.0190 W/m²K
 Net R-value: 0.9813 m²K/W g-value (EN 410): 0.3008 Visible light normal transmittance: 0.7

Surfaces Frame Shading Device Regulations UK Dwellings RadanceIES

Percentage: 15.00 Absorptance: 0.7 Outside surface area ratio: 1.00 Type: Aluminium

U-value: 2.2727 W/m²K Resistance: 0.2700 m²K/W Inside surface area ratio: 1.00

LCA Frame Materials: Edit

Construction Layers (Outside to Inside): System Materials... Project Materials...

Material	Thickness mm	Conductivity W/(m·K)	Angular Dependence	Gas	Convection Coefficient W/m ² ·K	Resistance m ² K/W	Transmittance	Outside Reflectance	Inside Reflectance	Refractive Index	Outside Emissivity	Inside Emissivity	Visible Light Specified
[STD_EXW1] Outer Pane	6.0	1.0600	Fresnel	-	-	0.0057	0.300	0.289	0.414	1.526	0.837	0.042	No
Cavity	12.0	-	-	-	-	0.8000	-	-	-	-	-	-	-
[STD_INW] Inner Pane	6.0	1.0600	Fresnel	-	-	0.0057	0.783	0.072	0.072	1.526	0.837	0.837	No

Fig 4.3 Blind Data

Nighttime resistance: 0.000 m²K/W Typically between 0.00 and 2.50

Daytime resistance: 0.000 m²K/W Typically between 0.00 and 2.50

Shading coefficient: 0.6 Typically between 0.2 and 0.95

Short-wave radiant fraction: 0.3 Typically between 0 and 1

4.1 Opening Window Data

The following opening window assignments have been included in the model which are based on the proposed construction information provided by the Main Contractor and Architect.

Fig 4.4 Opening Data

Description	Exposure Type	Opening	Openable Area %	Max Angle Open	Proportions	Coeff. Discharge	Equivalent Office Area (% of Gross)	Crack Flow Co-efficient (l/(s m Pa ^{0.5}))	Crack Length (% of Opening Perimeter)	Opening Threshold (°C)	Degree of Opening
Door Closed	05: 1:1 semi-exposed wall	Window - top hung	0.00	10.000	0.5 =...	-	0.000	0.15	100.000	0.00	off continuously
Door Open Top Hung	05: 1:1 semi-exposed wall	Window - top hung	85.00	10.000	0.5 =...	-	32.903	0.15	100.000	23.00	04 Staff ann
Doors (closed)	00: Internal	Window / door - side hung	80.00	20.000	Lengt...	-	28.390	0.00	0.000	0.00	off continuously
Doors (opening)	00: Internal	Window / door - side hung	80.00	20.000	Lengt...	-	28.387	0.00	0.000	0.00	on continuously
HVR Louvre	05: 1:1 semi-exposed wall	Louvre	100.00	-	-	0.400	63.906	0.15	100.000	0.00	off continuously
HVR® Integrated Louvre	05: 1:1 semi-exposed wall	Louvre	100.00	-	-	0.120	19.355	0.15	0.000	0.00	HVR Exhaust and Intake L...
HVR® Integrated Louvre (2)	05: 1:1 semi-exposed wall	Louvre	100.00	-	-	0.120	19.355	0.15	0.000	0.00	HVR Exhaust and Intake L...
HVR® Integrated Louvre (4)	05: 1:1 semi-exposed wall	Louvre	100.00	-	-	0.120	19.355	0.15	0.000	0.00	HVR Exhaust and Intake L...
HVR® Natural Vent. Louvre	05: 1:1 semi-exposed wall	Louvre	100.00	-	-	0.150	24.194	0.15	0.000	0.00	HVR Exhaust and Intake L...
HVR® Natural Vent. Louvre (4)	05: 1:1 semi-exposed wall	Louvre	100.00	-	-	0.150	24.194	0.15	0.000	15.00	HVR Exhaust and Intake L...
HVR® Natural Vent. Window	05: 1:1 semi-exposed wall	Window - top hung	95.00	20.000	Lengt...	-	79.677	0.15	0.000	0.00	HVR Window
HVR® Natural Vent. Window...	05: 1:1 semi-exposed wall	Window - top hung	95.00	20.000	Lengt...	-	79.677	0.15	0.000	0.00	HVR Window
Internal Door Closed	00: Internal	Window / door - side hung	0.00	90.000	Lengt...	-	0.000	0.15	100.000	0.00	off continuously
Internal Transfer Vent	00: Internal	Grille	80.00	-	-	0.400	51.613	0.15	100.000	23.00	on continuously
Louvres (closed)	00: Internal	Custom / sharp edge orifice	0.00	-	-	-	0.000	0.27	100.000	0.00	off continuously
Louvres (opening)	00: Internal	Louvre	80.00	-	-	0.340	44.391	0.00	0.000	0.00	Nat vent louvres
Stair Nat Vent Louvre	05: 1:1 semi-exposed wall	Louvre	80.00	-	-	0.360	46.452	0.15	0.000	0.00	01 Stair Ventilation
Typical Fixed Windows	05: 1:1 semi-exposed wall	Window - top hung	0.00	30.000	Lengt...	-	0.000	0.15	0.000	0.00	off continuously
Typical Side Hung Doors Wi...	05: 1:1 semi-exposed wall	Window / door - side hung	75.00	30.000	Lengt...	-	43.550	0.15	0.000	15.00	Opening Windows Weekly
Typical Top Hung Restricted...	05: 1:1 semi-exposed wall	Window - top hung	75.00	10.000	Lengt...	-	41.129	0.15	0.000	15.00	Opening Windows Weekly
Typical Top Hung Unrestrict...	05: 1:1 semi-exposed wall	Window - top hung	75.00	30.000	Lengt...	-	72.581	0.15	0.000	15.00	Opening Windows Weekly
Window Closed	05: 1:1 semi-exposed wall	Custom / sharp edge orifice	0.00	-	-	-	0.000	0.15	0.000	0.00	off continuously
Window Open Top Hung	05: 1:1 semi-exposed wall	Window - top hung	85.00	10.000	0.5 =...	-	32.903	0.15	100.000	23.00	01 School Opening
Windows (closed)	00: Internal	Custom / sharp edge orifice	0.00	-	-	-	0.000	0.15	100.000	0.00	off continuously
Windows (opening)	00: Internal	Window / door - side hung	75.00	15.000	Lengt...	-	19.355	0.00	0.000	0.00	Nat vent windows

4.2 Opening Window Assignments

Fig 4.5

Opening Type

- XTRN0000 (Window Closed)
- XTRN0001 (Window Open Top Hung)
- XTRN0003 (Stair Nat Vent Louvre)
- XTRN0006 (Windows (closed))
- XTRN0010 (Doors (closed))
- XTRN0011 (Typical Top Hung Restricted Windows)
- XTRN0015 (HVR® Natural Vent. Window)
- XTRN0017 (HVR® Integrated Louvre)
- XTRN0018 (HVR® Natural Vent. Window (2))
- XTRN0020 (HVR® Integrated Louvre (4))
- XTRN0021 (HVR® Integrated Louvre (2))
- XTRN0022 (HVR® Natural Vent. Louvre)
- XTRN0023 (HVR® Natural Vent. Louvre (4))
- XTRN0034 (Internal Transfer Vent)

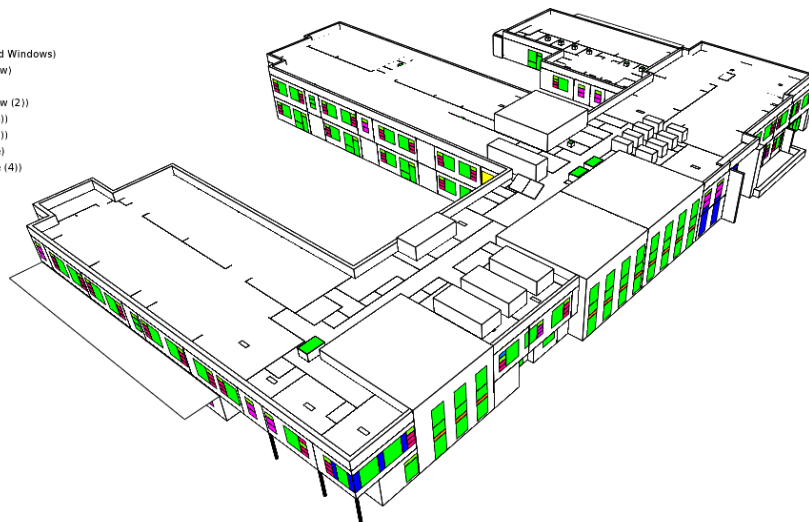


Fig 4.6

- Opening Type
- XTRN0000 (Window Closed)
 - XTRN0001 (Window Open Top Hung)
 - XTRN0003 (Stair Nat Vent Louvre)
 - XTRN0006 (Windows (closed))
 - XTRN0010 (Doors (closed))
 - XTRN0011 (Typical Top Hung Restricted Windows)
 - XTRN0015 (HVR® Natural Vent. Window)
 - XTRN0017 (HVR® Integrated Louvre)
 - XTRN0018 (HVR® Natural Vent. Window (2))
 - XTRN0020 (HVR® Integrated Louvre (4))
 - XTRN0021 (HVR® Integrated Louvre (2))
 - XTRN0022 (HVR® Natural Vent. Louvre)
 - XTRN0023 (HVR® Natural Vent. Louvre (4))
 - XTRN0034 (Internal Transfer Vent)

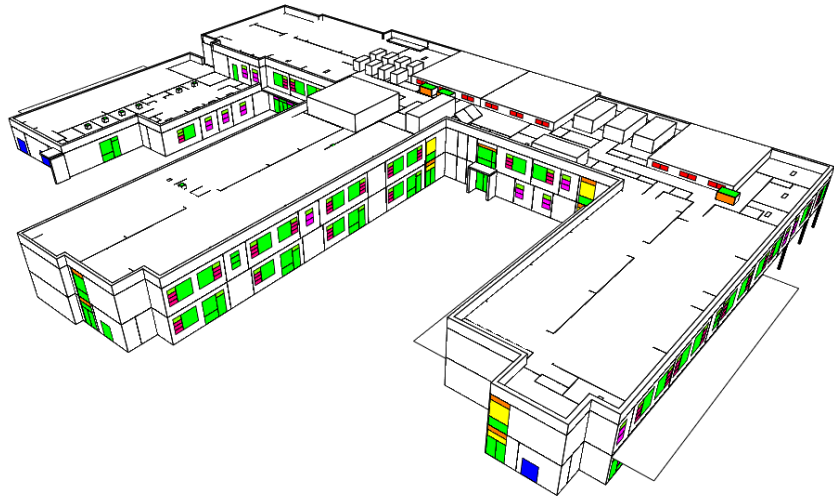
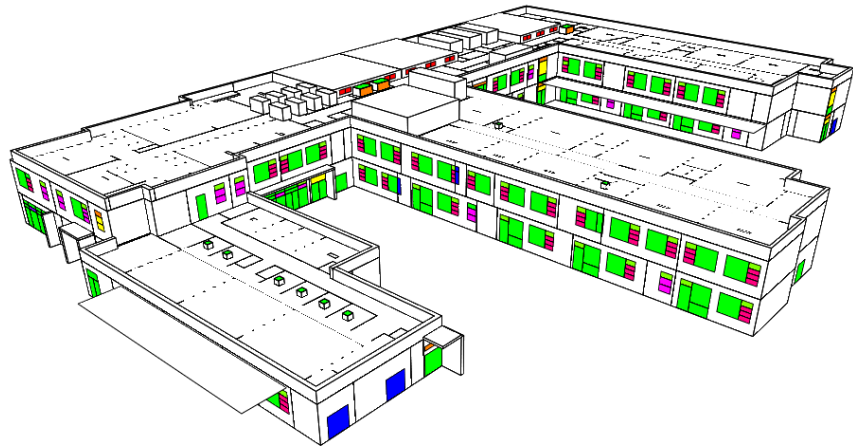


Fig 4.7

- Opening Type
- XTRN0000 (Window Closed)
 - XTRN0001 (Window Open Top Hung)
 - XTRN0003 (Stair Nat Vent Louvre)
 - XTRN0006 (Windows (closed))
 - XTRN0010 (Doors (closed))
 - XTRN0011 (Typical Top Hung Restricted Windows)
 - XTRN0015 (HVR® Natural Vent. Window)
 - XTRN0017 (HVR® Integrated Louvre)
 - XTRN0018 (HVR® Natural Vent. Window (2))
 - XTRN0020 (HVR® Integrated Louvre (4))
 - XTRN0021 (HVR® Integrated Louvre (2))
 - XTRN0022 (HVR® Natural Vent. Louvre)
 - XTRN0023 (HVR® Natural Vent. Louvre (4))
 - XTRN0034 (Internal Transfer Vent)



4.3 HVAC Services Included

The following systems have been included in the analysis:

4.3.1 General Teaching areas

Natural Ventilation heat recovery units as detailed below; some spaces have 2 NVHR

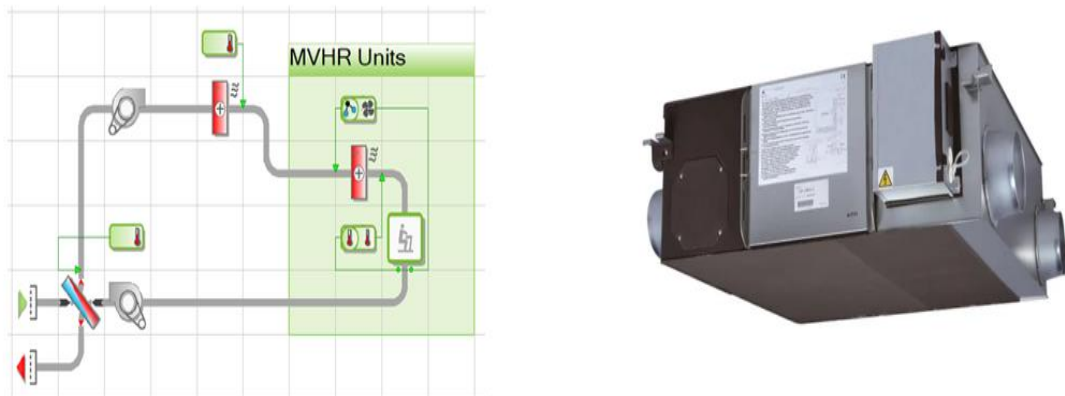
Fig 4.8



4.3.2 Internal Areas

Mechanical Ventilation with heat recovery as detailed below

Fig 4.9



4.3.3 Specialist Areas

Mechanical Ventilation with heat recovery and Local ASHP heating and Cooling Units as detailed below

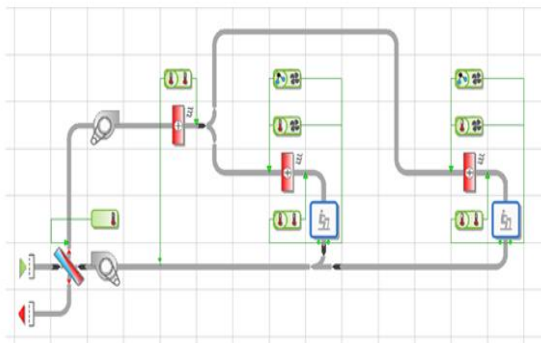
Fig 4.10



4.3.4 Main Hall Areas

Mechanical Ventilation with heat recovery and onboard ASHP heating and Cooling Coils as detailed below

Fig 4.11



The systems have been modelled using APACHE-HVAC as indicated in the following images:

Fig 4.12 Mechanical Ventilation with heat Recovery with ASHP Areas

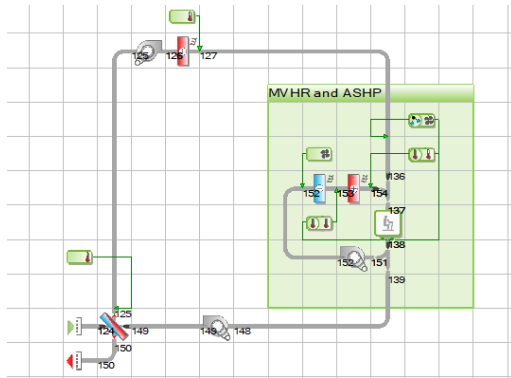


Fig 4.13 Mechanical Ventilation with heat Recovery Areas

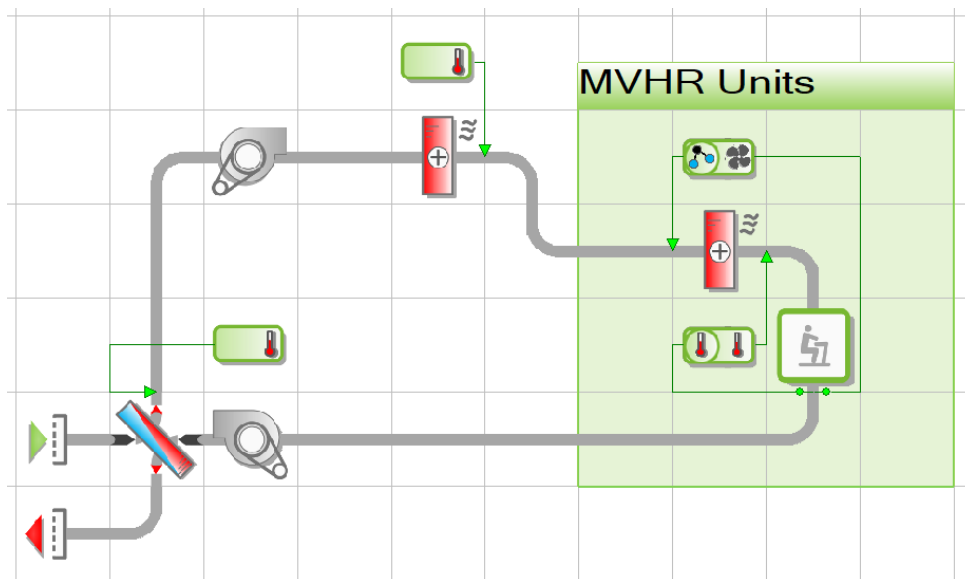


Fig 4.14 Main Hall [Primary]

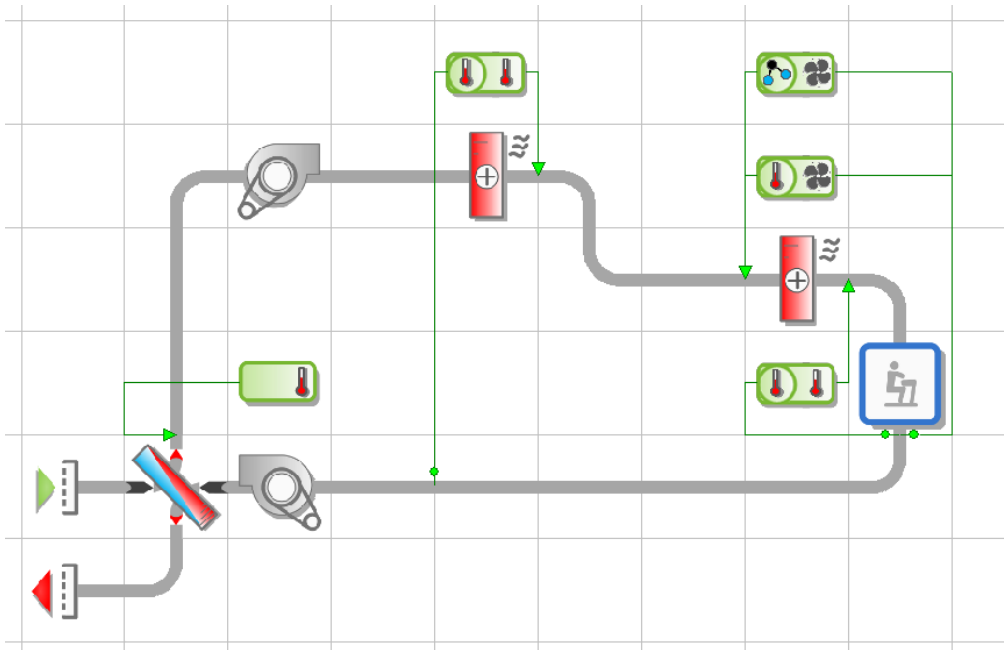


Fig 4.15 Main Hall [Secondary]

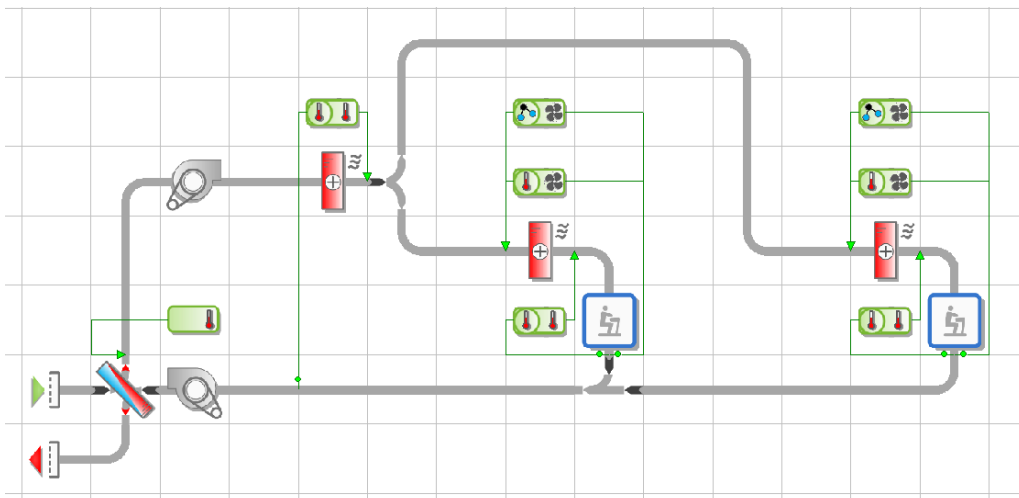
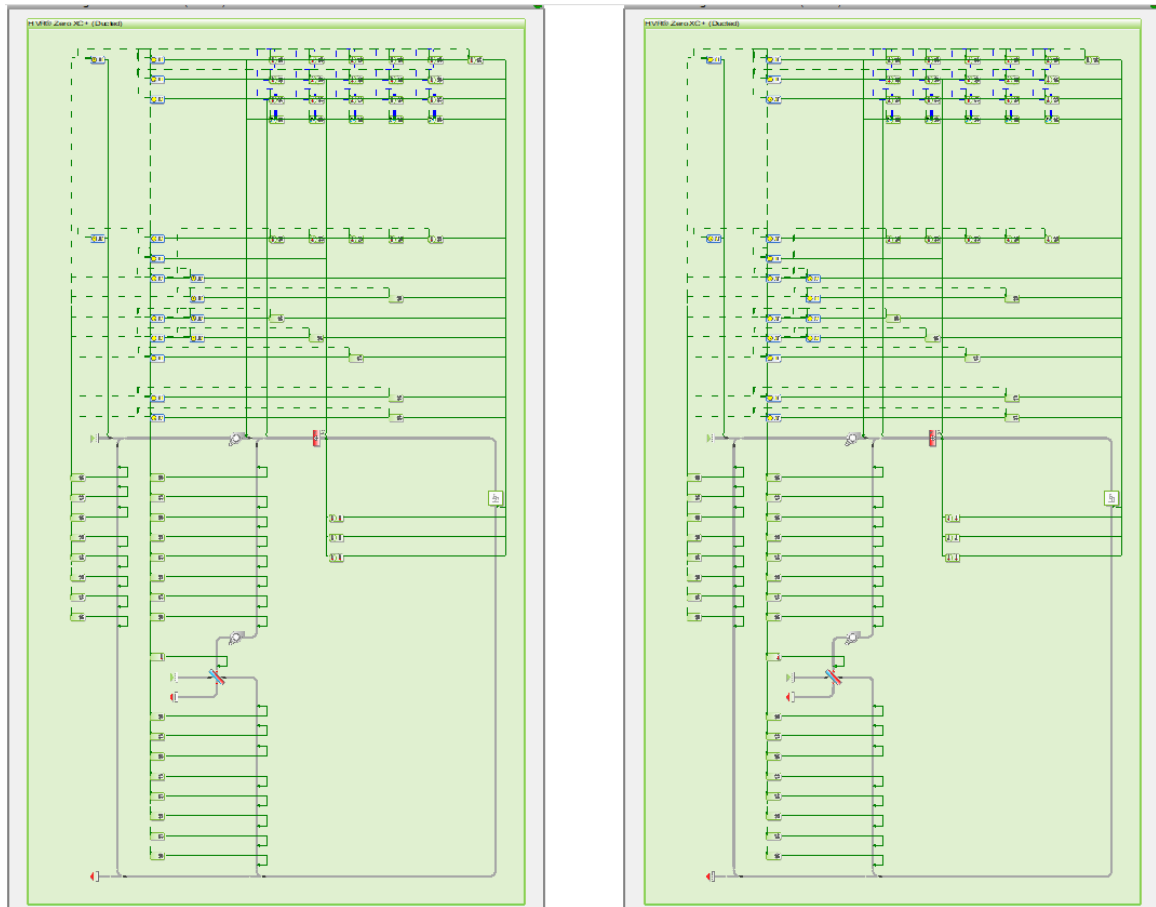


Fig 4.16 Natural ventilation Heat recovery spaces



5.0 Thermal Comfort Results

5.1 BB101 Overheating [2020 Weather File]

The thermal comfort results based on Manchester DSY1 weather files for occupied areas are presented as follows:

Fig 5.1 Primary areas Criterion 1

File	Location	Criterion 1 [2020]
		Degrees > Max. adaptive temp. (TM 52 criterion 1) (°C) - hours in range > 0.00
220515 YPB Model 11 Stage 3 2020.aps	1071 KS1 Group Room 1	1
220515 YPB Model 11 Stage 3 2020.aps	1075 KS1 Group Room 2	0
220515 YPB Model 11 Stage 3 2020.aps	1079 Hygiene Suite	0
220515 YPB Model 11 Stage 3 2020.aps	1143 Primary Hall / Dining C_Access	0
220515 YPB Model 11 Stage 3 2020.aps	1146 KS1 Classroom 1	0
220515 YPB Model 11 Stage 3 2020.aps	1148 KS1 Classroom 2	0
220515 YPB Model 11 Stage 3 2020.aps	1152 KS1 Classroom 3	0
220515 YPB Model 11 Stage 3 2020.aps	1185 KS2 Group Room 1	0
220515 YPB Model 11 Stage 3 2020.aps	1187 Staff Work Room	0.5
220515 YPB Model 11 Stage 3 2020.aps	1188 Primary Art / Science / Design Tech.	0
220515 YPB Model 11 Stage 3 2020.aps	1189 Primary Food Technology	19.5
220515 YPB Model 11 Stage 3 2020.aps	1194 KS2 Group Room 2	0
220515 YPB Model 11 Stage 3 2020.aps	1205 Primary Library	0
220515 YPB Model 11 Stage 3 2020.aps	1206 Primary ICT	1.5
220515 YPB Model 11 Stage 3 2020.aps	1207 Primary SEN Resource	0
220515 YPB Model 11 Stage 3 2020.aps	1239 KS2 Classroom 1	0
220515 YPB Model 11 Stage 3 2020.aps	1241 KS2 Classroom 3	0
220515 YPB Model 11 Stage 3 2020.aps	1244 KS2 Classroom 4	0
220515 YPB Model 11 Stage 3 2020.aps	1247 KS2 Classroom 2	0
220515 YPB Model 11 Stage 3 2020.aps	1250 KS2 Classroom 6	0
220515 YPB Model 11 Stage 3 2020.aps	1254 KS2 Classroom 5	0
220515 YPB Model 11 Stage 3 2020.aps	1301 Head of Primary	0
220515 YPB Model 11 Stage 3 2020.aps	1329 Primary Therapy	0
220515 YPB Model 11 Stage 3 2020.aps	1357 Primary Calm Space	0
220515 YPB Model 11 Stage 3 2020.aps	1358 Primary Staff Social	53.5
220515 YPB Model 11 Stage 3 2020.aps	1386 Early Years Sensory	0
220515 YPB Model 11 Stage 3 2020.aps	1387 Early Years Group Room	0
220515 YPB Model 11 Stage 3 2020.aps	1391 Recep. Group Room	0
220515 YPB Model 11 Stage 3 2020.aps	1394 Reception Classroom	0
220515 YPB Model 11 Stage 3 2020.aps	1398 Early Years	0
220515 YPB Model 11 Stage 3 2020.aps	1429 Laundry	0
220515 YPB Model 11 Stage 3 2020.aps	1506 Primary Music / Drama	0
220515 YPB Model 11 Stage 3 2020.aps	1527 Intimate Dining C_Access	0
220515 YPB Model 11 Stage 3 2020.aps	1528 Early Years Off / Res.	1
220515 YPB Model 11 Stage 3 2020.aps	1577 Soft Play	2.5
220515 YPB Model 11 Stage 3 2020.aps	1578 Primary Sensory	0

Fig 5.2 Secondary areas Criterion 1

File	Location	Criterion 1 [2020]
		Degrees > Max. adaptive temp. (TM 52 > 0.00)
220515 YPB Model 11 Stage 3 2020.aps	1056 Medical	0
220515 YPB Model 11 Stage 3 2020.aps	1057 SLT Office	0
220515 YPB Model 11 Stage 3 2020.aps	1095 KS3 Group Room 1	0
220515 YPB Model 11 Stage 3 2020.aps	1113 Secondary Dining C_Access	0
220515 YPB Model 11 Stage 3 2020.aps	1121 Reception / Admin	0
220515 YPB Model 11 Stage 3 2020.aps	1122 Kitchenette	0
220515 YPB Model 11 Stage 3 2020.aps	1124 Head	0
220515 YPB Model 11 Stage 3 2020.aps	1141 Secondary Hall C_Access	0
220515 YPB Model 11 Stage 3 2020.aps	1162 KS3 Classroom 3 (English)	0
220515 YPB Model 11 Stage 3 2020.aps	1164 KS3 Classroom 1 (English)	0
220515 YPB Model 11 Stage 3 2020.aps	1180 KS3/4 Calming Space	0
220515 YPB Model 11 Stage 3 2020.aps	1218 KS4 Group Room 4	0
220515 YPB Model 11 Stage 3 2020.aps	1219 SEN Resource Base	8
220515 YPB Model 11 Stage 3 2020.aps	1221 ICT Room 2	0
220515 YPB Model 11 Stage 3 2020.aps	1229 Group Room	0
220515 YPB Model 11 Stage 3 2020.aps	1230 Group Room	0
220515 YPB Model 11 Stage 3 2020.aps	1233 Post 16 Common Room	0.5
220515 YPB Model 11 Stage 3 2020.aps	1234 Centr. Staff Room	7
220515 YPB Model 11 Stage 3 2020.aps	1236 Sensory	0
220515 YPB Model 11 Stage 3 2020.aps	1257 KS4 Classroom 4 (Maths)	0
220515 YPB Model 11 Stage 3 2020.aps	1260 KS4 Classroom 2 (Maths)	0
220515 YPB Model 11 Stage 3 2020.aps	1263 KS4 Classroom 1 (Maths)	0
220515 YPB Model 11 Stage 3 2020.aps	1266 KS4 Classroom 3 (MFL)	0
220515 YPB Model 11 Stage 3 2020.aps	1269 ICT Room 1	0
220515 YPB Model 11 Stage 3 2020.aps	1270 Post 16 Class 4	0
220515 YPB Model 11 Stage 3 2020.aps	1273 Post 16 Class 2	0
220515 YPB Model 11 Stage 3 2020.aps	1277 Post 16 Class 3	0
220515 YPB Model 11 Stage 3 2020.aps	1280 Post 16 Class 5	0
220515 YPB Model 11 Stage 3 2020.aps	1283 Post 16 Class 1	0
220515 YPB Model 11 Stage 3 2020.aps	1288 Group Room	0
220515 YPB Model 11 Stage 3 2020.aps	1312 Science Studio	0
220515 YPB Model 11 Stage 3 2020.aps	1315 Science Lab	0
220515 YPB Model 11 Stage 3 2020.aps	1331 KS3/4 Library C_Access	0
220515 YPB Model 11 Stage 3 2020.aps	1351 Art Room 2	0.5
220515 YPB Model 11 Stage 3 2020.aps	1383 KS3/4 Music / Drama	0
220515 YPB Model 11 Stage 3 2020.aps	1403 Food Technology	0
220515 YPB Model 11 Stage 3 2020.aps	1453 Parents / Waiting Room	4
220515 YPB Model 11 Stage 3 2020.aps	1458 Meeting Room	12
220515 YPB Model 11 Stage 3 2020.aps	1473 Prem. Off	12.5
220515 YPB Model 11 Stage 3 2020.aps	1498 Hygiene Suite 2	0
220515 YPB Model 11 Stage 3 2020.aps	1499 KS4 Group Room 5	0
220515 YPB Model 11 Stage 3 2020.aps	1500 KS4 Classroom 5 (MFL)	0
220515 YPB Model 11 Stage 3 2020.aps	1505 KS4 Group Room 6	0
220515 YPB Model 11 Stage 3 2020.aps	1521 KS3/4 Therapy	0.5
220515 YPB Model 11 Stage 3 2020.aps	1531 Inclusion	0
220515 YPB Model 11 Stage 3 2020.aps	1532 Life Skills	0
220515 YPB Model 11 Stage 3 2020.aps	1534 Sensory	0
220515 YPB Model 11 Stage 3 2020.aps	1535 Immersion	0
220515 YPB Model 11 Stage 3 2020.aps	1536 SSP Group	0
220515 YPB Model 11 Stage 3 2020.aps	1537 SSP Tutor Base	0
220515 YPB Model 11 Stage 3 2020.aps	1538 SSP Group	0
220515 YPB Model 11 Stage 3 2020.aps	1539 SSP Group	0
220515 YPB Model 11 Stage 3 2020.aps	1540 SSP Tutor Base	0
220515 YPB Model 11 Stage 3 2020.aps	1541 SSP Group	0
220515 YPB Model 11 Stage 3 2020.aps	1542 SSP Group	0
220515 YPB Model 11 Stage 3 2020.aps	1544 SSP Tutor Base	0
220515 YPB Model 11 Stage 3 2020.aps	1545 SSP Group	0
220515 YPB Model 11 Stage 3 2020.aps	1550 KS3 Group Room 2	0
220515 YPB Model 11 Stage 3 2020.aps	1555 KS3 Classroom 2 (English)	0
220515 YPB Model 11 Stage 3 2020.aps	1566 KS3 Classroom 4 (Humanities)	0
220515 YPB Model 11 Stage 3 2020.aps	1567 Art Room 1	0.5
220515 YPB Model 11 Stage 3 2020.aps	1570 KS3 Group Room 3	0
220515 YPB Model 11 Stage 3 2020.aps	1585 SSP Office	0
220515 YPB Model 11 Stage 3 2020.aps	1589 Bursar	0
220515 YPB Model 11 Stage 3 2020.aps	1591 Staff Work Room	5.5
220515 YPB Model 11 Stage 3 2020.aps	1605 Science Breakout	59.5
220515 YPB Model 11 Stage 3 2020.aps	1615 SLT Office 1	0
220515 YPB Model 11 Stage 3 2020.aps	1616 Visiting Prof Office	0

Fig 5.3 Primary areas Criterion 2 and 3

Overall	For Reporting Only
Passed:	32 rooms:
Failed:	3 rooms:

Data:			
Building category:	Category I (young/infirm)		
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	

Room Name	Room ID	Criteria 2 (Max. Daily)	Criteria 3 (Max. Daily)	Criteria failing
1071 KS1 Group Room 1	KS00003B	3.5	2	-
1075 KS1 Group Room 2	SH00008C	0.5	1	-
1079 Hygiene Suite	SH00008A	0	0	-
1143 Primary Hall / Dining C_Access	PR000041	0	0	-
1146 KS1 Classroom 1	SH00008F	0	0	-
1148 KS1 Classroom 2	KS000038	0	0	-
1152 KS1 Classroom 3	KS00003A	0	0	-
1185 KS2 Group Room 1	KS00003C	0	0	-
1187 Staff Work Room	40000005	7	2	2
1188 Primary Art / Science / Design Tech.	PR000038	2	1	-
1194 KS2 Group Room 2	SH0000F2	0	0	-
1205 Primary Library	30000000	0.5	1	-
1207 Primary SEN Resource	PR00003E	1	1	-
1239 KS2 Classroom 1	SH0000F4	0	0	-
1241 KS2 Classroom 3	SH0000F1	0	0	-
1244 KS2 Classroom 4	SH0000E0	0	0	-
1247 KS2 Classroom 2	SH0000E6	0	0	-
1250 KS2 Classroom 6	SH0000DF	0	0	-
1254 KS2 Classroom 5	SH0000F0	0	0	-
1301 Head of Primary	40000000	3	1	-
1329 Primary Therapy	PR00003F	1.5	1	-
1357 Primary Calm Space	NW000000	0	0	-
1386 Early Years Sensory	SH000026	0	0	-
1387 Early Years Group Room	RL000005	0.5	1	-
1391 Recep. Group Room	SH000027	0	0	-
1394 Reception Classroom	SH000028	0	0	-
1398 Early Years	SH000025	0	0	-
1506 Primary Music / Drama	10000001	1	1	-
1527 Intimate Dining C_Access	SH000020	0	0	-
1528 Early Years Off / Res.	SH00002B	7.5	2	2
1577 Soft Play	SH000022	4.5	2	-
1578 Primary Sensory	30000002	0	0	-

Room Name	Room ID	Criteria 2 (Max. Daily)	Criteria 3 (Max. Daily)	Criteria failing
1189 Primary Food Technology	SH000101	9	3	2
1206 Primary ICT	PR000039	6.5	2	2
1358 Primary Staff Social	40000006	26.5	5	2 & 3

Fig 5.4 Secondary areas Criterion 2 and 3

Overall	For Reporting Only
Passed:	68 rooms:
Failed:	1 rooms:

Data:			
Building category:	Category I (young/infirm)		
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	

Room Name	Room ID	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing
1056 Medical	SH000049	0	0	-
1057 SLT Office	SH00004C	0	0	-
1095 KS3 Group Room 1	SH00005D	0	0	-
1113 Secondary Dining C. Access	SC000006	0	0	-
1121 Reception / Admin	RC000002	0	0	-
1122 Kitchenette	KT000000	0	0	-
1124 Head	SH000051	0	0	-
1141 Secondary Hall C. Access	SC000001	0	0	-
1162 KS3 Classroom 3 (English)	KS00003D	0	0	-
1164 KS3 Classroom 1 (English)	SH00005E	0	0	-
1180 KS3/4 Calming Space	11000000	0	0	-
1218 KS4 Group Room 4	SH0000BB	0	0	-
1219 SEN Resource Base	12000002	2.5	1	-
1221 ICT Room 2	SH0000A7	0	0	-
1229 Group Room	GR000008	0	0	-
1230 Group Room	GR00000A	0	0	-
1233 Post 16 Common Room	PS000016	0.5	1	-
1234 Centr. Staff Room	CN000000	11	3	2
1236 Sensory	SN000005	0	0	-
1257 KS4 Classroom 4 (Maths)	SH0000B7	0	0	-
1260 KS4 Classroom 2 (Maths)	SH0000B9	0	0	-
1263 KS4 Classroom 1 (Maths)	SH0000AE	0	0	-
1266 KS4 Classroom 3 (MFL)	SH0000AD	0	0	-
1269 ICT Room 1	SH0000A8	0	0	-
1270 Post 16 Class 4	PS000012	0	0	-
1273 Post 16 Class 2	SH0000CA	0	0	-
1277 Post 16 Class 3	PS000011	0	0	-
1280 Post 16 Class 5	PS000013	0	0	-
1283 Post 16 Class 1	PS000014	0	0	-
1288 Group Room	12000004	0	0	-
1312 Science Studio	SH0000B4	0	0	-
1315 Science Lab	SH0000B6	0	0	-
1331 KS3/4 Library C. Access	SH000034	0	0	-
1351 Art Room 2	SH000066	0.5	1	-
1383 KS3/4 Music / Drama	KS000040	0	0	-
1403 Food Technology	SH000056	0	0	-
1407 Design Technology	DS000001	1	1	-
1453 Parents / Waiting Room	PR000012	6	2	-
1458 Meeting Room	SH000044	8.5	2	2
1473 Prem. Off	PR000034	8.5	2	2
1498 Hygiene Suite 2	HY000001	0.5	1	-
1499 KS4 Group Room 5	KS000041	0	0	-
1500 KS4 Classroom 5 (MFL)	SH0000AB	0	0	-
1505 KS4 Group Room 6	15000003	0	0	-
1521 KS3/4 Therapy	SH000081	0.5	1	-
1531 Inclusion	SH000013	0	0	-
1532 Life Skills	10000000	0	0	-
1534 Sensory	30000001	0	0	-
1535 Immersion	SH000007	0	0	-
1536 SSP Group	1500000D	0	0	-
1537 SSP Tutor Base	SH000006	0	0	-
1538 SSP Group	1500000B	0	0	-
1539 SSP Group	15000007	0	0	-
1540 SSP Tutor Base	SH00000A	0	0	-
1541 SSP Group	15000009	0	0	-
1542 SSP Group	15000005	0	0	-
1544 SSP Tutor Base	SH000012	0	0	-
1545 SSP Group	15000000	0	0	-
1550 KS3 Group Room 2	SH000071	0	0	-
1555 KS3 Classroom 2 (English)	SH00006F	0	0	-
1566 KS3 Classroom 4 (Humanities)	SH000062	0	0	-
1567 Art Room 1	SH000069	0.5	1	-
1570 KS3 Group Room 3	KS00003E	0	0	-
1585 SSP Office	40000001	0	0	-
1589 Bursar	SH000050	0	0	-
1591 Staff Work Room	40000002	7	2	2
1615 SLT Office 1	VS000002	0	0	-
1616 Visiting Prof Office	SL000008	0	0	-

Failed:	1 rooms:			
Room Name	Room ID	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing
1605 Science Breakout	16000000	23	4	2

5.2 BB101 Air Quality

**Fig 5.5 Primary CO2 prediction showing percentage of occupied hours above 1500 ppm
100% Occupancy**

File	Location	Room CO2 concentration (ppm) - hours in range <= 1000.00	Room CO2 concentration (ppm) - hours in range >1000.00 to <=1200.00	Room CO2 concentration (ppm) - hours in range > 1200.00	Room CO2 concentration (ppm) - hours in range > 1500.00
220515 YPB Model 11 Stage 3 2020.aps	1071 KS1 Group Room 1	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1075 KS1 Group Room 2	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1079 Hygiene Suite	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1143 Primary Hall / Dining C_Acc	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1146 KS1 Classroom 1	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1148 KS1 Classroom 2	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1152 KS1 Classroom 3	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1185 KS2 Group Room 1	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1187 Staff Work Room	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1188 Primary Art / Science / Desi	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1189 Primary Food Technology	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1194 KS2 Group Room 2	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1205 Primary Library	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1206 Primary ICT	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1207 Primary SEN Resource	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1239 KS2 Classroom 1	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1241 KS2 Classroom 3	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1244 KS2 Classroom 4	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1247 KS2 Classroom 2	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1250 KS2 Classroom 6	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1254 KS2 Classroom 5	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1301 Head of Primary	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1329 Primary Therapy	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1357 Primary Calm Space	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1358 Primary Staff Social	682.5	80.5	0	0
220515 YPB Model 11 Stage 3 2020.aps	1386 Early Years Sensory	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1387 Early Years Group Room	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1391 Recep. Group Room	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1394 Reception Classroom	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1398 Early Years	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1429 Laundry	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1506 Primary Music / Drama	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1527 Intimate Dining C_Access	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1528 Early Years Off / Res.	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1577 Soft Play	763	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1578 Primary Sensory	763	0	0	0

**Fig 5.6 Secondary CO2 prediction showing percentage of occupied hours above 1500 ppm
100% Occupancy**

File	Location	Room CO2 concentration (ppm) - hours in range <= 1000.00	Room CO2 concentration (ppm) - hours in range >1000.00 to <=1200.00	Room CO2 concentration (ppm) - hours in range > 1200.00	Room CO2 concentration (ppm) - hours in range > 1500.00
220515 YPB Model 11 Stage 3 2020.aps	1056 Medical	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1057 SLT Office	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1095 KS3 Group Room 1	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1113 Secondary Dining C. Access	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1121 Reception / Admin	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1122 Kitchenette	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1124 Head	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1141 Secondary Hall C. Access	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1162 KS3 Classroom 3 (English)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1164 KS3 Classroom 1 (English)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1180 KS3/4 Calming Space	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1218 KS4 Group Room 4	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1219 SEN Resource Base	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1221 ICT Room 2	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1229 Group Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1230 Group Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1233 Post 16 Common Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1234 Centr. Staff Room	3504	168	0	0
220515 YPB Model 11 Stage 3 2020.aps	1236 Sensory	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1257 KS4 Classroom 4 (Maths)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1260 KS4 Classroom 2 (Maths)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1263 KS4 Classroom 1 (Maths)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1266 KS4 Classroom 3 (MFL)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1269 ICT Room 1	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1270 Post 16 Class 4	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1273 Post 16 Class 2	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1277 Post 16 Class 3	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1280 Post 16 Class 5	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1283 Post 16 Class 1	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1288 Group Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1312 Science Studio	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1315 Science Lab	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1331 KS3/4 Library C. Access	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1351 Art Room 2	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1383 KS3/4 Music / Drama	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1403 Food Technology	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1453 Parents / Waiting Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1458 Meeting Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1473 Prem. Off	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1498 Hygiene Suite 2	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1499 KS4 Group Room 5	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1500 KS4 Classroom 5 (MFL)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1505 KS4 Group Room 6	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1521 KS3/4 Therapy	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1531 Inclusion	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1532 Life Skills	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1534 Sensory	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1535 Immersion	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1536 SSP Group	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1537 SSP Tutor Base	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1538 SSP Group	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1539 SSP Group	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1540 SSP Tutor Base	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1541 SSP Group	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1542 SSP Group	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1544 SSP Tutor Base	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1545 SSP Group	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1550 KS3 Group Room 2	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1555 KS3 Classroom 2 (English)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1566 KS3 Classroom 4 (Humanities)	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1567 Art Room 1	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1570 KS3 Group Room 3	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1585 SSP Office	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1589 Bursar	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1591 Staff Work Room	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1605 Science Breakout	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1615 SLT Office 1	3672	0	0	0
220515 YPB Model 11 Stage 3 2020.aps	1616 Visiting Prof Office	3672	0	0	0

5.3 **BB101 Overheating [2050 Weather File]**

The thermal comfort results based on Manchester DSY weather files for occupied areas are presented as follows:

Fig 5.7 Primary areas Criterion 1

File	Location	Criterion 1 [2050]
		Degrees > Max. adaptive temp. (TM 52 criterion 1) (°C) - hours in range
		> 0.00
220515 YPB Model 11 Stage 3 2050.aps	1071 KS1 Group Room 1	5
220515 YPB Model 11 Stage 3 2050.aps	1075 KS1 Group Room 2	0
220515 YPB Model 11 Stage 3 2050.aps	1079 Hygiene Suite	0
220515 YPB Model 11 Stage 3 2050.aps	1143 Primary Hall / Dining C_Access	0
220515 YPB Model 11 Stage 3 2050.aps	1146 KS1 Classroom 1	0
220515 YPB Model 11 Stage 3 2050.aps	1148 KS1 Classroom 2	0
220515 YPB Model 11 Stage 3 2050.aps	1152 KS1 Classroom 3	0
220515 YPB Model 11 Stage 3 2050.aps	1185 KS2 Group Room 1	0
220515 YPB Model 11 Stage 3 2050.aps	1187 Staff Work Room	4.5
220515 YPB Model 11 Stage 3 2050.aps	1188 Primary Art / Science / Design Tech.	3.5
220515 YPB Model 11 Stage 3 2050.aps	1189 Primary Food Technology	35
220515 YPB Model 11 Stage 3 2050.aps	1194 KS2 Group Room 2	0
220515 YPB Model 11 Stage 3 2050.aps	1205 Primary Library	0
220515 YPB Model 11 Stage 3 2050.aps	1206 Primary ICT	0
220515 YPB Model 11 Stage 3 2050.aps	1207 Primary SEN Resource	0.5
220515 YPB Model 11 Stage 3 2050.aps	1239 KS2 Classroom 1	0
220515 YPB Model 11 Stage 3 2050.aps	1241 KS2 Classroom 3	0
220515 YPB Model 11 Stage 3 2050.aps	1244 KS2 Classroom 4	0
220515 YPB Model 11 Stage 3 2050.aps	1247 KS2 Classroom 2	0
220515 YPB Model 11 Stage 3 2050.aps	1250 KS2 Classroom 6	0
220515 YPB Model 11 Stage 3 2050.aps	1254 KS2 Classroom 5	0
220515 YPB Model 11 Stage 3 2050.aps	1301 Head of Primary	0.5
220515 YPB Model 11 Stage 3 2050.aps	1329 Primary Therapy	1
220515 YPB Model 11 Stage 3 2050.aps	1357 Primary Calm Space	0
220515 YPB Model 11 Stage 3 2050.aps	1358 Primary Staff Social	82.5
220515 YPB Model 11 Stage 3 2050.aps	1386 Early Years Sensory	0
220515 YPB Model 11 Stage 3 2050.aps	1387 Early Years Group Room	0.5
220515 YPB Model 11 Stage 3 2050.aps	1391 Recep. Group Room	0
220515 YPB Model 11 Stage 3 2050.aps	1394 Reception Classroom	0
220515 YPB Model 11 Stage 3 2050.aps	1398 Early Years	0
220515 YPB Model 11 Stage 3 2050.aps	1429 Laundry	0.5
220515 YPB Model 11 Stage 3 2050.aps	1506 Primary Music / Drama	0.5
220515 YPB Model 11 Stage 3 2050.aps	1527 Intimate Dining C_Access	0
220515 YPB Model 11 Stage 3 2050.aps	1528 Early Years Off / Res.	4.5
220515 YPB Model 11 Stage 3 2050.aps	1577 Soft Play	8.5
220515 YPB Model 11 Stage 3 2050.aps	1578 Primary Sensory	0

Fig 5.8 Secondary areas Criterion 1

File	Location	Criterion 1 [2050]
		Degrees > Max. adaptive temp. (TM 52 > 0.00)
220515 YPB Model 11 Stage 3 2050.aps	1056 Medical	0.5
220515 YPB Model 11 Stage 3 2050.aps	1057 SLT Office	1
220515 YPB Model 11 Stage 3 2050.aps	1095 KS3 Group Room 1	0.5
220515 YPB Model 11 Stage 3 2050.aps	1113 Secondary Dining C. Access	0
220515 YPB Model 11 Stage 3 2050.aps	1121 Reception / Admin	0
220515 YPB Model 11 Stage 3 2050.aps	1122 Kitchenette	1.5
220515 YPB Model 11 Stage 3 2050.aps	1124 Head	0
220515 YPB Model 11 Stage 3 2050.aps	1141 Secondary Hall C. Access	0
220515 YPB Model 11 Stage 3 2050.aps	1162 KS3 Classroom 3 (English)	0
220515 YPB Model 11 Stage 3 2050.aps	1164 KS3 Classroom 1 (English)	0
220515 YPB Model 11 Stage 3 2050.aps	1180 KS3/4 Calming Space	0
220515 YPB Model 11 Stage 3 2050.aps	1218 KS4 Group Room 4	0
220515 YPB Model 11 Stage 3 2050.aps	1219 SEN Resource Base	17
220515 YPB Model 11 Stage 3 2050.aps	1221 ICT Room 2	0
220515 YPB Model 11 Stage 3 2050.aps	1229 Group Room	2.5
220515 YPB Model 11 Stage 3 2050.aps	1230 Group Room	0
220515 YPB Model 11 Stage 3 2050.aps	1233 Post 16 Common Room	5.5
220515 YPB Model 11 Stage 3 2050.aps	1234 Centr. Staff Room	20.5
220515 YPB Model 11 Stage 3 2050.aps	1236 Sensory	0
220515 YPB Model 11 Stage 3 2050.aps	1257 KS4 Classroom 4 (Maths)	0
220515 YPB Model 11 Stage 3 2050.aps	1260 KS4 Classroom 2 (Maths)	0
220515 YPB Model 11 Stage 3 2050.aps	1263 KS4 Classroom 1 (Maths)	0
220515 YPB Model 11 Stage 3 2050.aps	1266 KS4 Classroom 3 (MFL)	0
220515 YPB Model 11 Stage 3 2050.aps	1269 ICT Room 1	2.5
220515 YPB Model 11 Stage 3 2050.aps	1270 Post 16 Class 4	0
220515 YPB Model 11 Stage 3 2050.aps	1273 Post 16 Class 2	0
220515 YPB Model 11 Stage 3 2050.aps	1277 Post 16 Class 3	0
220515 YPB Model 11 Stage 3 2050.aps	1280 Post 16 Class 5	0
220515 YPB Model 11 Stage 3 2050.aps	1283 Post 16 Class 1	0
220515 YPB Model 11 Stage 3 2050.aps	1288 Group Room	0
220515 YPB Model 11 Stage 3 2050.aps	1312 Science Studio	0
220515 YPB Model 11 Stage 3 2050.aps	1315 Science Lab	0
220515 YPB Model 11 Stage 3 2050.aps	1331 KS3/4 Library C. Access	0
220515 YPB Model 11 Stage 3 2050.aps	1351 Art Room 2	5.5
220515 YPB Model 11 Stage 3 2050.aps	1383 KS3/4 Music / Drama	1.5
220515 YPB Model 11 Stage 3 2050.aps	1403 Food Technology	0
220515 YPB Model 11 Stage 3 2050.aps	1453 Parents / Waiting Room	11
220515 YPB Model 11 Stage 3 2050.aps	1458 Meeting Room	30.5
220515 YPB Model 11 Stage 3 2050.aps	1473 Prem. Off	31
220515 YPB Model 11 Stage 3 2050.aps	1498 Hygiene Suite 2	5
220515 YPB Model 11 Stage 3 2050.aps	1499 KS4 Group Room 5	0
220515 YPB Model 11 Stage 3 2050.aps	1500 KS4 Classroom 5 (MFL)	0
220515 YPB Model 11 Stage 3 2050.aps	1505 KS4 Group Room 6	0
220515 YPB Model 11 Stage 3 2050.aps	1521 KS3/4 Therapy	4
220515 YPB Model 11 Stage 3 2050.aps	1531 Inclusion	0
220515 YPB Model 11 Stage 3 2050.aps	1532 Life Skills	0
220515 YPB Model 11 Stage 3 2050.aps	1534 Sensory	0
220515 YPB Model 11 Stage 3 2050.aps	1535 Immersion	0
220515 YPB Model 11 Stage 3 2050.aps	1536 SSP Group	0
220515 YPB Model 11 Stage 3 2050.aps	1537 SSP Tutor Base	0
220515 YPB Model 11 Stage 3 2050.aps	1538 SSP Group	0
220515 YPB Model 11 Stage 3 2050.aps	1539 SSP Group	0
220515 YPB Model 11 Stage 3 2050.aps	1540 SSP Tutor Base	0
220515 YPB Model 11 Stage 3 2050.aps	1541 SSP Group	0
220515 YPB Model 11 Stage 3 2050.aps	1542 SSP Group	0
220515 YPB Model 11 Stage 3 2050.aps	1544 SSP Tutor Base	0.5
220515 YPB Model 11 Stage 3 2050.aps	1545 SSP Group	0
220515 YPB Model 11 Stage 3 2050.aps	1550 KS3 Group Room 2	0
220515 YPB Model 11 Stage 3 2050.aps	1555 KS3 Classroom 2 (English)	0
220515 YPB Model 11 Stage 3 2050.aps	1566 KS3 Classroom 4 (Humanities)	0
220515 YPB Model 11 Stage 3 2050.aps	1567 Art Room 1	5.5
220515 YPB Model 11 Stage 3 2050.aps	1570 KS3 Group Room 3	0
220515 YPB Model 11 Stage 3 2050.aps	1585 SSP Office	0
220515 YPB Model 11 Stage 3 2050.aps	1589 Bursar	0
220515 YPB Model 11 Stage 3 2050.aps	1591 Staff Work Room	15.5
220515 YPB Model 11 Stage 3 2050.aps	1605 Science Breakout	86.5
220515 YPB Model 11 Stage 3 2050.aps	1615 SLT Office 1	0.5
220515 YPB Model 11 Stage 3 2050.aps	1616 Visiting Prof Office	0

5.4 BB101 Overheating [2080 Weather File]

The thermal comfort results based on Manchester DSY weather files for occupied areas are presented as follows:

Fig 5.9 Primary areas Criterion 1

File	Location	Criterion 1 [2080]
		Degrees > Max. adaptive temp. (TM 52 criterion 1) (°C) - hours in range
		> 0.00
220515 YPB Model 11 Stage 3 2080.aps	1071 KS1 Group Room 1	19
220515 YPB Model 11 Stage 3 2080.aps	1075 KS1 Group Room 2	3.5
220515 YPB Model 11 Stage 3 2080.aps	1079 Hygiene Suite	1.5
220515 YPB Model 11 Stage 3 2080.aps	1143 Primary Hall / Dining C_Access	1.5
220515 YPB Model 11 Stage 3 2080.aps	1146 KS1 Classroom 1	0.5
220515 YPB Model 11 Stage 3 2080.aps	1148 KS1 Classroom 2	0.5
220515 YPB Model 11 Stage 3 2080.aps	1152 KS1 Classroom 3	2.5
220515 YPB Model 11 Stage 3 2080.aps	1185 KS2 Group Room 1	3.5
220515 YPB Model 11 Stage 3 2080.aps	1187 Staff Work Room	18
220515 YPB Model 11 Stage 3 2080.aps	1188 Primary Art / Science / Design Tech.	16
220515 YPB Model 11 Stage 3 2080.aps	1189 Primary Food Technology	61
220515 YPB Model 11 Stage 3 2080.aps	1194 KS2 Group Room 2	1
220515 YPB Model 11 Stage 3 2080.aps	1205 Primary Library	5.5
220515 YPB Model 11 Stage 3 2080.aps	1206 Primary ICT	0
220515 YPB Model 11 Stage 3 2080.aps	1207 Primary SEN Resource	6
220515 YPB Model 11 Stage 3 2080.aps	1239 KS2 Classroom 1	0
220515 YPB Model 11 Stage 3 2080.aps	1241 KS2 Classroom 3	0
220515 YPB Model 11 Stage 3 2080.aps	1244 KS2 Classroom 4	0
220515 YPB Model 11 Stage 3 2080.aps	1247 KS2 Classroom 2	0
220515 YPB Model 11 Stage 3 2080.aps	1250 KS2 Classroom 6	0
220515 YPB Model 11 Stage 3 2080.aps	1254 KS2 Classroom 5	4.5
220515 YPB Model 11 Stage 3 2080.aps	1301 Head of Primary	5.5
220515 YPB Model 11 Stage 3 2080.aps	1329 Primary Therapy	9
220515 YPB Model 11 Stage 3 2080.aps	1357 Primary Calm Space	0
220515 YPB Model 11 Stage 3 2080.aps	1358 Primary Staff Social	128.5
220515 YPB Model 11 Stage 3 2080.aps	1386 Early Years Sensory	0
220515 YPB Model 11 Stage 3 2080.aps	1387 Early Years Group Room	4.5
220515 YPB Model 11 Stage 3 2080.aps	1391 Recep. Group Room	2.5
220515 YPB Model 11 Stage 3 2080.aps	1394 Reception Classroom	2.5
220515 YPB Model 11 Stage 3 2080.aps	1398 Early Years	2.5
220515 YPB Model 11 Stage 3 2080.aps	1429 Laundry	32.5
220515 YPB Model 11 Stage 3 2080.aps	1506 Primary Music / Drama	9.5
220515 YPB Model 11 Stage 3 2080.aps	1527 Intimate Dining C_Access	3
220515 YPB Model 11 Stage 3 2080.aps	1528 Early Years Off / Res.	17.5
220515 YPB Model 11 Stage 3 2080.aps	1577 Soft Play	25
220515 YPB Model 11 Stage 3 2080.aps	1578 Primary Sensory	0

Fig 5.10 Secondary areas Criterion 1

File	Location	Criterion 1 [2080]
		Degrees > Max. adaptive temp. (TM 52 > 0.00)
220515 YPB Model 11 Stage 3 2080.aps	1056 Medical	7
220515 YPB Model 11 Stage 3 2080.aps	1057 SLT Office	9.5
220515 YPB Model 11 Stage 3 2080.aps	1095 KS3 Group Room 1	4
220515 YPB Model 11 Stage 3 2080.aps	1113 Secondary Dining C. Access	5.5
220515 YPB Model 11 Stage 3 2080.aps	1121 Reception / Admin	3.5
220515 YPB Model 11 Stage 3 2080.aps	1122 Kitchenette	19
220515 YPB Model 11 Stage 3 2080.aps	1124 Head	2
220515 YPB Model 11 Stage 3 2080.aps	1141 Secondary Hall C. Access	3
220515 YPB Model 11 Stage 3 2080.aps	1162 KS3 Classroom 3 (English)	2.5
220515 YPB Model 11 Stage 3 2080.aps	1164 KS3 Classroom 1 (English)	2.5
220515 YPB Model 11 Stage 3 2080.aps	1180 KS3/4 Calming Space	0
220515 YPB Model 11 Stage 3 2080.aps	1218 KS4 Group Room 4	7
220515 YPB Model 11 Stage 3 2080.aps	1219 SEN Resource Base	47
220515 YPB Model 11 Stage 3 2080.aps	1221 ICT Room 2	4.5
220515 YPB Model 11 Stage 3 2080.aps	1229 Group Room	12.5
220515 YPB Model 11 Stage 3 2080.aps	1230 Group Room	1.5
220515 YPB Model 11 Stage 3 2080.aps	1233 Post 16 Common Room	20
220515 YPB Model 11 Stage 3 2080.aps	1234 Centr. Staff Room	50
220515 YPB Model 11 Stage 3 2080.aps	1236 Sensory	0
220515 YPB Model 11 Stage 3 2080.aps	1257 KS4 Classroom 4 (Maths)	0
220515 YPB Model 11 Stage 3 2080.aps	1260 KS4 Classroom 2 (Maths)	0
220515 YPB Model 11 Stage 3 2080.aps	1263 KS4 Classroom 1 (Maths)	0
220515 YPB Model 11 Stage 3 2080.aps	1266 KS4 Classroom 3 (MFL)	0
220515 YPB Model 11 Stage 3 2080.aps	1269 ICT Room 1	14
220515 YPB Model 11 Stage 3 2080.aps	1270 Post 16 Class 4	0.5
220515 YPB Model 11 Stage 3 2080.aps	1273 Post 16 Class 2	7
220515 YPB Model 11 Stage 3 2080.aps	1277 Post 16 Class 3	0.5
220515 YPB Model 11 Stage 3 2080.aps	1280 Post 16 Class 5	3.5
220515 YPB Model 11 Stage 3 2080.aps	1283 Post 16 Class 1	3.5
220515 YPB Model 11 Stage 3 2080.aps	1288 Group Room	4.5
220515 YPB Model 11 Stage 3 2080.aps	1312 Science Studio	7.5
220515 YPB Model 11 Stage 3 2080.aps	1315 Science Lab	6.5
220515 YPB Model 11 Stage 3 2080.aps	1331 KS3/4 Library C. Access	3.5
220515 YPB Model 11 Stage 3 2080.aps	1351 Art Room 2	18.5
220515 YPB Model 11 Stage 3 2080.aps	1383 KS3/4 Music / Drama	10
220515 YPB Model 11 Stage 3 2080.aps	1403 Food Technology	5
220515 YPB Model 11 Stage 3 2080.aps	1453 Parents / Waiting Room	29.5
220515 YPB Model 11 Stage 3 2080.aps	1458 Meeting Room	75.5
220515 YPB Model 11 Stage 3 2080.aps	1473 Prem. Off	75.5
220515 YPB Model 11 Stage 3 2080.aps	1498 Hygiene Suite 2	19.5
220515 YPB Model 11 Stage 3 2080.aps	1499 KS4 Group Room 5	1
220515 YPB Model 11 Stage 3 2080.aps	1500 KS4 Classroom 5 (MFL)	0.5
220515 YPB Model 11 Stage 3 2080.aps	1505 KS4 Group Room 6	0.5
220515 YPB Model 11 Stage 3 2080.aps	1521 KS3/4 Therapy	15.5
220515 YPB Model 11 Stage 3 2080.aps	1531 Inclusion	1
220515 YPB Model 11 Stage 3 2080.aps	1532 Life Skills	3
220515 YPB Model 11 Stage 3 2080.aps	1534 Sensory	0
220515 YPB Model 11 Stage 3 2080.aps	1535 Immersion	0
220515 YPB Model 11 Stage 3 2080.aps	1536 SSP Group	2.5
220515 YPB Model 11 Stage 3 2080.aps	1537 SSP Tutor Base	1.5
220515 YPB Model 11 Stage 3 2080.aps	1538 SSP Group	4
220515 YPB Model 11 Stage 3 2080.aps	1539 SSP Group	5
220515 YPB Model 11 Stage 3 2080.aps	1540 SSP Tutor Base	1.5
220515 YPB Model 11 Stage 3 2080.aps	1541 SSP Group	5
220515 YPB Model 11 Stage 3 2080.aps	1542 SSP Group	6
220515 YPB Model 11 Stage 3 2080.aps	1544 SSP Tutor Base	5.5
220515 YPB Model 11 Stage 3 2080.aps	1545 SSP Group	5
220515 YPB Model 11 Stage 3 2080.aps	1550 KS3 Group Room 2	2.5
220515 YPB Model 11 Stage 3 2080.aps	1555 KS3 Classroom 2 (English)	4.5
220515 YPB Model 11 Stage 3 2080.aps	1566 KS3 Classroom 4 (Humanities)	4
220515 YPB Model 11 Stage 3 2080.aps	1567 Art Room 1	18
220515 YPB Model 11 Stage 3 2080.aps	1570 KS3 Group Room 3	1
220515 YPB Model 11 Stage 3 2080.aps	1585 SSP Office	3.5
220515 YPB Model 11 Stage 3 2080.aps	1589 Bursar	3.5
220515 YPB Model 11 Stage 3 2080.aps	1591 Staff Work Room	41.5
220515 YPB Model 11 Stage 3 2080.aps	1605 Science Breakout	127.5
220515 YPB Model 11 Stage 3 2080.aps	1615 SLT Office 1	6.5
220515 YPB Model 11 Stage 3 2080.aps	1616 Visiting Prof Office	3.5

6.0 Summary of Results

All teaching satisfy BB101 2018 Criterion 1 in that the teaching areas Hours of exceedance (minimum standard) ΔT (Deg K) = Top - T_{max} ΔT are not greater or equal to 1 Deg K From May – Sept between 9am and 4 pm Mon - Fri for more than 40 hours as detailed in the results section of this report.

Future climate analysis [2050 and 2080 weather data] shows that the design is capable of satisfying the BB101 Criterion 1 with only a few none teaching areas exceeding the 40hours criterion.

None of the assembly hall areas are used for examinations so the 18hour criterion for these areas has not been used in the design and analysis.

TM52 Criterion 2 and 3 have also been included in the analysis for reporting purposes.

The only areas exceeding the BB101 criterion are generally the non-teaching staff and admin areas. However, these have been modelled with 100% occupancy and the school have confirmed that maximum occupancy in these areas will only be for short periods for staff briefing e etc and as such normalised occupancy is expected to be less than 25% of the maximum occupancy detailed in the occupancy schedules.