



BREEAM HEA04 Overheating Assessment

in accordance with HTM 03-01 & CIBSE TM52

Endoscopy & Cardiorespiratory
Withington Community Hospital
Manchester
May 2023

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OVERHEATING REPORT OF WITHINGTON HOSPITAL

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Revision Record			
Rev	Date	By	Summary of Changes
01	17.05.23	BDF	

1 EXECUTIVE SUMMARY

This report documents the overheating analysis the proposed Endoscopy & Cardiorespiratory ward at Withington Hospital of the Manchester University Hospital NHS Foundation Trust, located in West Didsbury, Manchester – in order to show compliance with BREEAM 2018 HEA04 Thermal Comfort – evidencing compliance with the following credits:

- Thermal Modelling
- Adaptability - for a projected climate change scenario

The proposed two storey ward will contain numerous consulting, treatment and care rooms, in addition to two 6-bed recovery wards. The remaining building spaces include offices, staff rooms, reception & waiting areas, WC & changing rooms, cleaning and plant facilities.

The development utilises a mixed-mode approach (in line with HTM 03-01) to ventilate the occupied spaces. Air Handling Units (with heat recovery) both supply and extract air to and from all occupied spaces (ventilation rates can be found in section 7), with the exception of a few spaces such as IT, Imaging/Endoscopy spaces which have mechanical/active cooling.

The ventilation strategy outlined in this report finds that through active cooling and mechanical ventilation means, all of the assessed spaces meet the overheating criteria set out in CIBSE TM52 (in accordance with HTM 03-01).

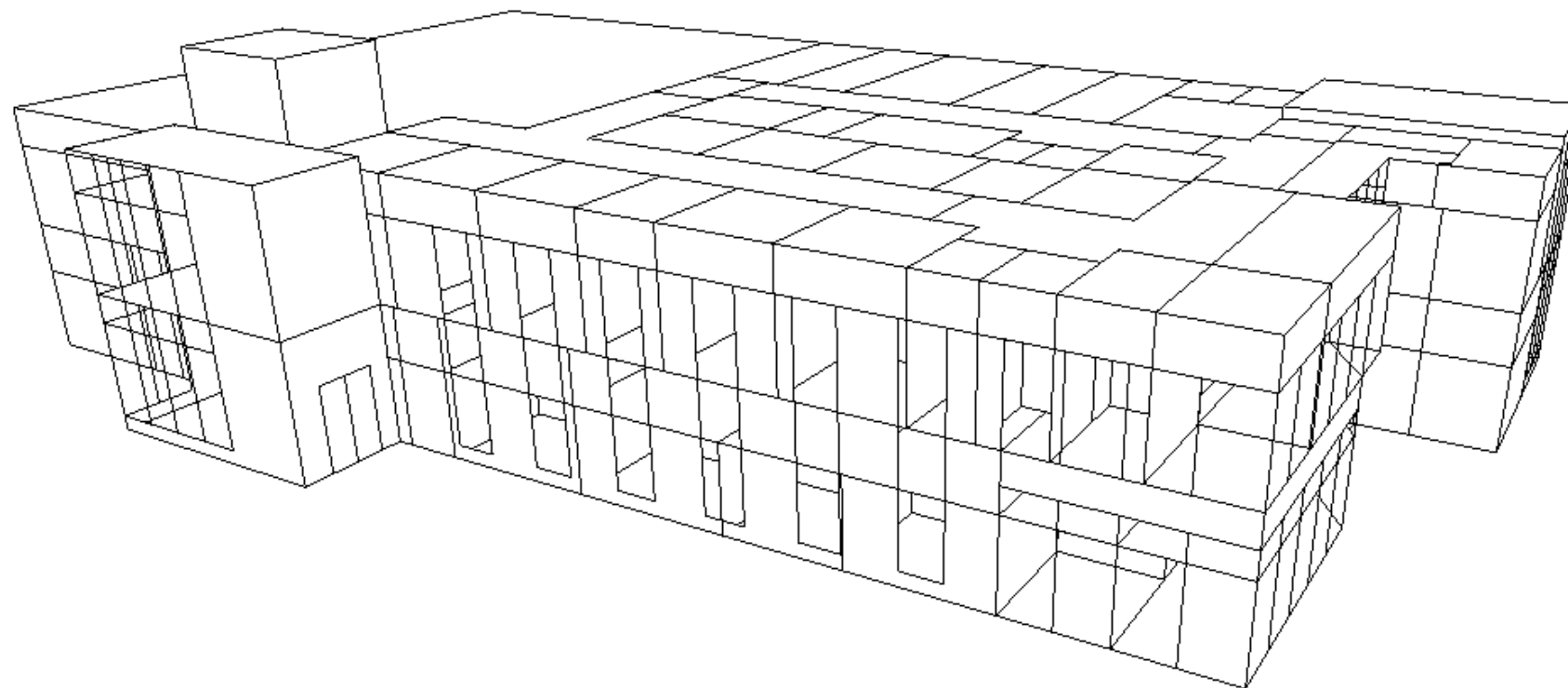


Figure 1. IES Energy Model

2 INTRODUCTION

The layouts are similar throughout the building floorplate. Two circulation corridors run the length on the building effectively splitting the floorplan into three wings whereby access is provided to the various office, consulting, care and treatment areas. Two stairwells and a single lift provide access to the upper floor, which a plantroom takes up a third of the upper-floor space.

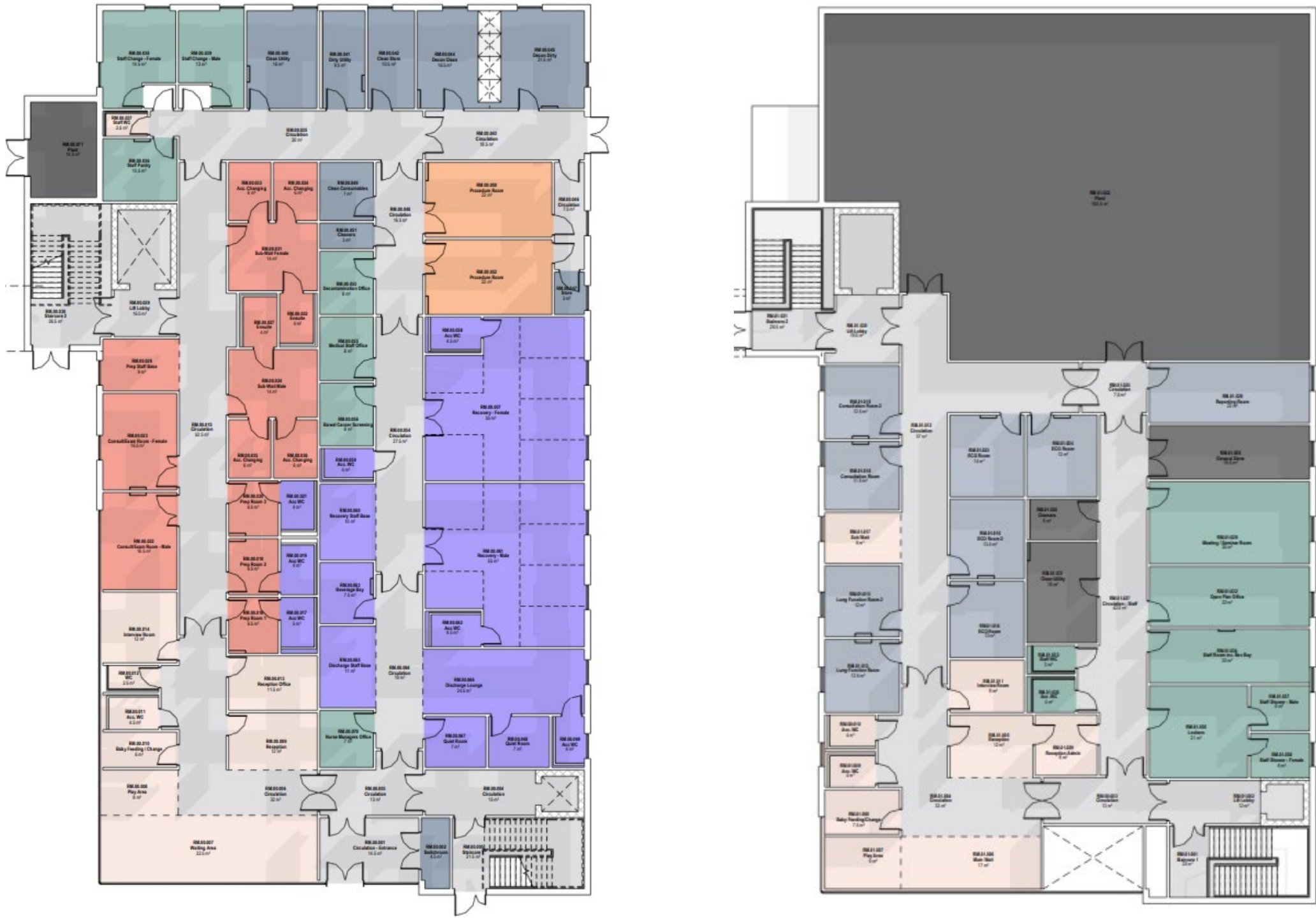


Figure 2. Floor Layouts

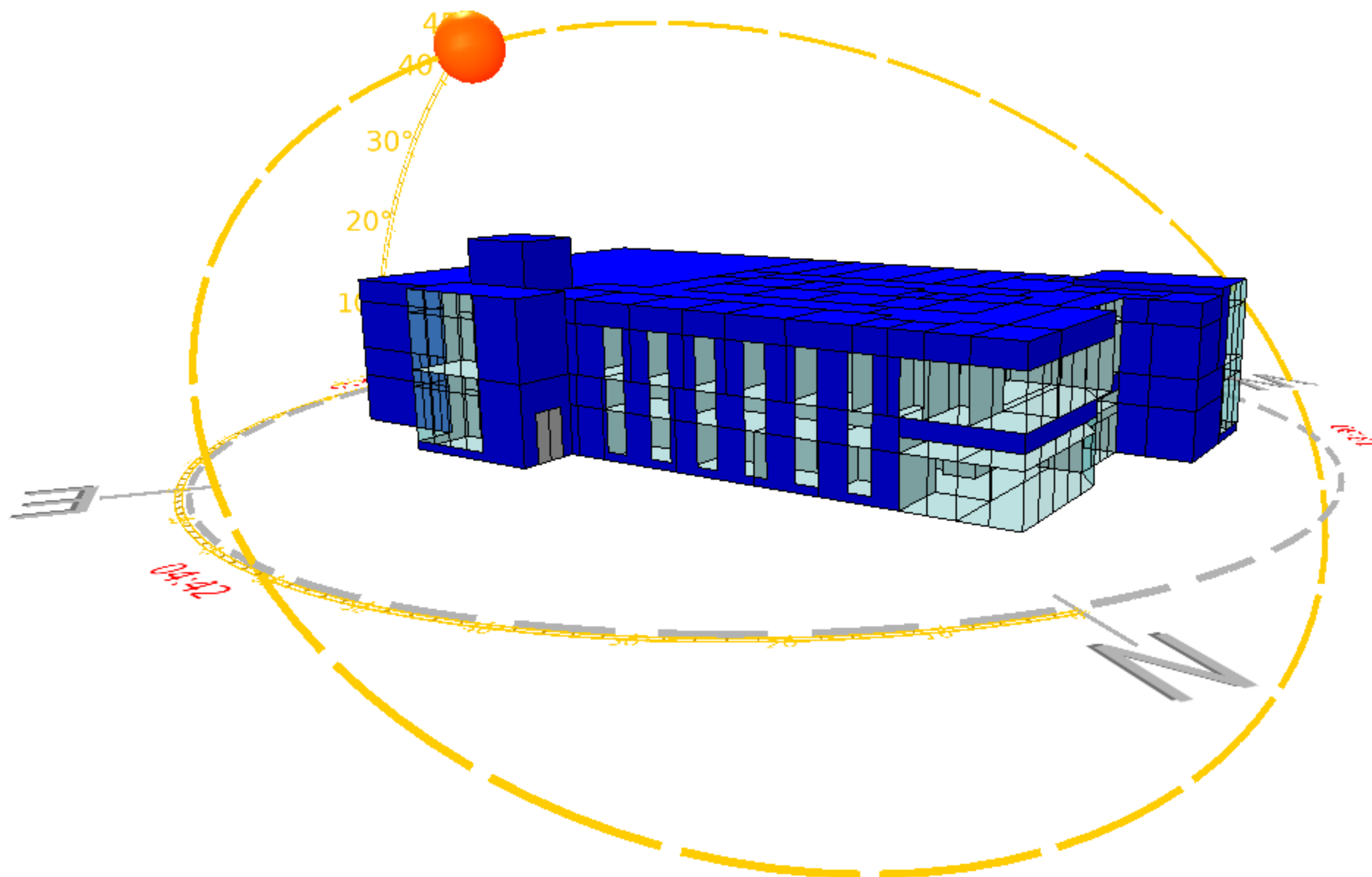


Figure 3. IES Energy Model with sunpath

3 DESIGN PRINCIPLES

The calculations have been carried out in accordance with the requirements of BREEAM UK New Construction non-domestic buildings technical manual 2018.

The dynamic thermal modelling analysis has been carried out using IES VE software (accordance with CIBSE AM11) which allows the building to be modelled against local weather data taking into account the likely internal heat gains, operational profiles, thermal properties of constructions and any ventilation strategies (as per the TM54 Operational Energy Assessment Report) in order to generate results and understand the likely building performance over a designated period.

The heating has been designed in line with winter operative temperature ranges for occupied spaces that are in accordance with the criteria set out in CIBSE Guide A Environmental design table 1.5 shown within this report.

The building has been assessed as naturally ventilated, meaning:

Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental Design Table 1.5; or other appropriate industry standard.

The building should be designed to limit the risk of overheating, in accordance with the adaptive comfort methodology outlined in either of the following standards as appropriate; CIBSE TM52: The Limits of thermal comfort: avoiding overheating in European buildings or CIBSE TM59: Design methodology for the assessment of overheating in homes.

Additionally, assessing 'Healthcare Building Types' under BREEAM 2018 Hea 04 Thermal comfort must include for;

"The appropriate industry standard for healthcare is Health Technical Memorandum 03-01 Specialised ventilation for healthcare premises⁷. Thermal comfort levels in patient and clinical areas must be in accordance with the temperature ranges set out in HTM 03-01, Appendix 2. Furthermore, internal summer temperatures must not exceed 28°C dry bulb for more than 50 hours per year (as defined in HTM 03-01, paragraph 2.15). Other occupied spaces not covered in HTM 03-01 Appendix 2 should be in accordance with CIBSE Guide A Environmental Design".

The BREEAM UK New Construction non-domestic buildings technical manual 2018 requires "the thermal modelling demonstrates that the relevant requirements set out in criterion 3 are achieved for a projected climate change environment". It was found the weather file '2050_Manchester_a1b_50_percentile_DSY.epw' best represents this.

The calculations were carried out and are presented in the results section in the following order;

Hea 04 Credit: Thermal Modelling (using weather file: Manchester DSY1 2020High50 .epw)

- Run 1: Free Running Building with no Cooling or ventilation systems modelled
- Run 2: Winter Operative Heating to 21°C & ventilation strategy to achieve TM52 compliance & HTM 03-01

Hea 04 Credit: Design for Future Comfort (using weather file: 2050 Manchester a1b 50 percentile DSY.epw)

- Run 3: Winter Operative Heating to 21°C & ventilation strategy to achieve TM52 compliance & HTM 03-01

4 DESIGN CRITERIA

The following general criteria have been used throughout the simulation:-

4.1 AIR PERMEABILITY

An air infiltration rate of 0.20ACH has been applied to all external (perimeter) spaces based on Table 4.24 of CIBSE Guide A.

4.2 EXTERNAL ENVELOPE

The following U-values have been used:-

Element	Proposed U-value (W/m ² K)	Part L1A U-value (W/m ² K)
External walls	0.18	0.18
Exposed floor	0.15	0.15
Roof (flat)	0.15	0.15
Glazing (and Rooflights)	1.20	1.40

Building envelope U-values

4.3 GLAZING SPECIFICATION

The glazing is based on a G-value of 0.35 to East/South/West elevations and 0.40 to the North elevation.

4.4 INTERNAL WINDOW BLINDS

Internal blinds have not been modelled. Although, if the sun shines directly into a habitable space, room occupants should consider closing the curtains or blinds to limit solar gains and try and keep rooms as cool as possible.

4.5 WEATHER

The building is to be located in Manchester. Weather file used in the calculation:- **Manchester_DSY1_2020High50_.epw**. The peak summer temperature is 31.5°C.

4.6 SITE & ORIENTATION

The building has been modelled in the orientation represented by the image.

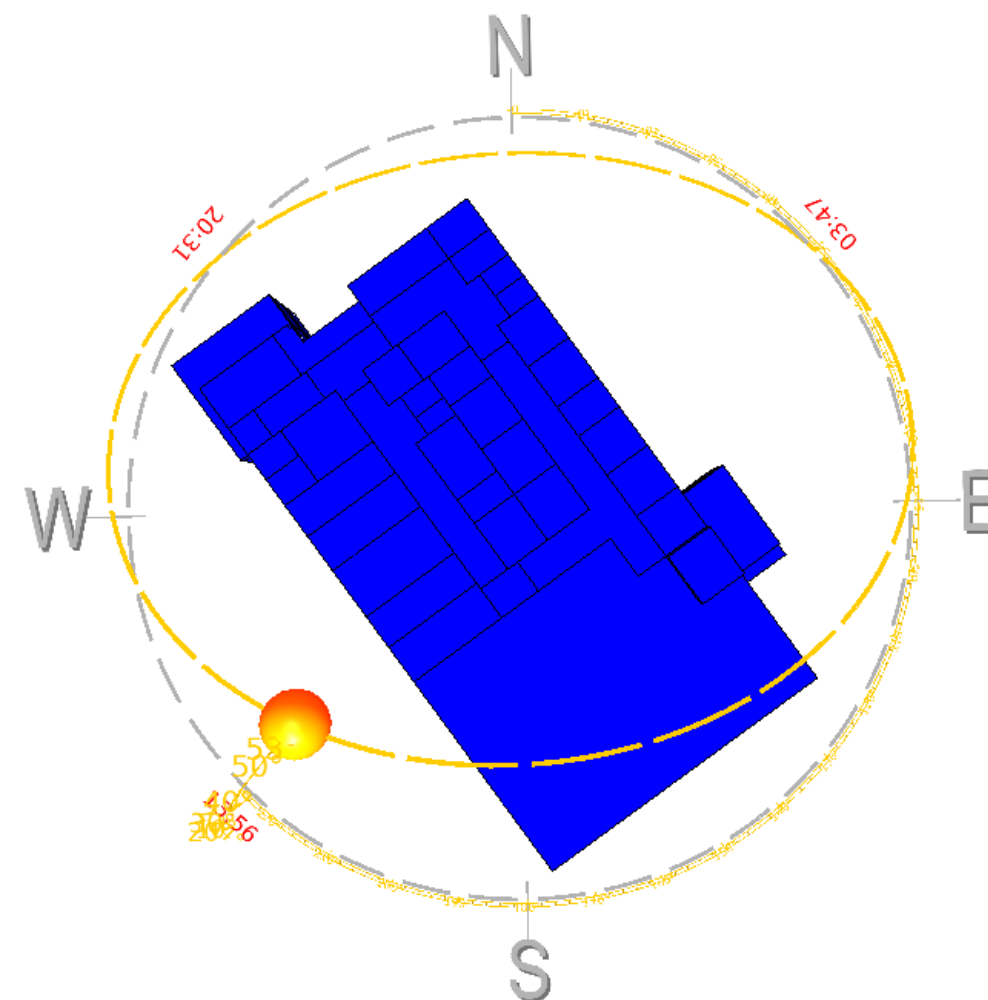


Figure 4. Orientation of the proposed site

5 SOFTWARE USED FOR BUILDING ENERGY MODELLING

The simulation tool used for this investigation is IES Virtual Environment, Version 2022.4.0.0

The calculation methodology adopted was full Dynamic Thermal Simulation over a period of 365 days with a 20-day pre-conditioning period.

The ApacheSim calculation engine was used, and a full SunCast solar shading analysis was performed to ensure the local shading devices and overhangs were accurately reflected in the simulation.

ApacheSim is comprised of the following tools:

- Apache
- ApacheEngine
- Vista & VistaPro
- ApacheView
- ApachePro
- ApacheLocate
- Constructions Database

Calculations are based on first-principles models of heat transfer process and are driven by real weather data.

Data Entry Options

- Extensive database of global weather
- Data detailing layer-by-layer thermo-physical properties of building elements
- Comprehensive data on glazing systems including angle-dependent transmissivity and absorptivity.
- Sensible and latent gains from lights, equipment, and occupants
- Natural ventilation, mechanical ventilation, and infiltration
- Plant operation profiles
- Plant efficiency and fuel characteristics
- Facilities for assigning and editing time-varying room data such as plant, casual gains and air exchanges.
- Database of constructions
- Time-series profiles
- Tabular Edit feature for Building Template Manager & NCM (for UK Part L)
- Tabular Edit interface for entering properties of thermal templates, room thermal properties, HVAC systems and constructions. Gives ability to quickly enter data, review inputs and includes option to export and import *.csv files (e.g., Excel)
- Faster project setup using Master Template and Design Options features. The Master Templates feature delivers bulk data copying & rapid automatic seeding of data into a project while the Design Option feature provides a means to make specific and targeted changes to specified data in a project



Analysis options

- User-controlled time steps down to 1 minute
- Idealised or detailed HVAC plant modeling
- Options for natural and mechanical ventilation; specify flows in advance or calculate using MacroFlo and ApacheHVAC
- Choice of models for internal and external convection

RadianceIES – Day Lighting and Electric Lighting Simulation

RADIANCE is a computer software package developed by the Lighting Systems Research Group at Lawrence Berkley Laboratory in California, USA. It was developed as a research tool to accurately calculate and predict the visible radiation within a space. Radiance is internationally recognised as one of the leading lighting simulation tools available. Using a 3-dimensional geometrical model of the physical environment Radiance produces a map of spectral radiance values in a photo-realistic image.

Radiance can be categorised as a “ray-tracing” algorithm, which tracks rays of light backwards from the “eye” to the “focus” of the scene. This contrasts with the “radiosity” technique where the exchange of energy between surface matches is matched.

SunCast – Solar Shading Analysis

SunCast is used to perform shading and solar insolation studies. It can be used to investigate:

- External obstruction and self-shading of a building.
- Solar mapping through windows and openings.
- The effects of changing orientation of building.

SunCast generates shadows and internal solar insolation from any sun position defined by date, time, orientation, site latitude and longitude. This shadow information can be stored for subsequent analysis by:

- Viewing shadows from any eye position.
- Animating the solar analyses by generating a sequence of images and creating an *.avi movie.
- Making opaque surfaces "transparent" to permit the user to better view the solar insolation on internal surfaces e.g., “removing” roofs or surfaces to identify internal solar insolation paths.
- Displaying solar surface shading/insolation statistics.
- Output data for thermal simulation.

SunCast can be used in a variety of studies including passive solar design and is essential at the planning stage to visualize the effect of the building on surrounding buildings. SunCast has also been used to study problems such as grass growth in sports stadia and ‘right of light’ issues.

MacroFlo – Multi Zone Air Movement

MacroFlo uses a multi-zone thermo-fluid solver to simulate bulk air flow driven by wind pressure and buoyancy forces. It allows analysis of problems involving infiltration, natural ventilation, and mechanical ventilation. Typical applications include:

- Evaluation of natural ventilation solutions (including Advanced Natural Ventilation and Mixed-mode systems).
- Evaluation of ventilation control strategies.
- An understanding of the performance of double-skin façades.
- Analysis of room temperature statistics in naturally ventilated buildings (simulation of overheating risk).
- Predictions of air velocities through openings.
- Analysis of HVAC systems where the building is used as a return air pathway.

6 INTERNAL GAINS

The internal gains used throughout the simulations are detailed below. Anticipated building operation is between the hours of 08:00 and 18:00 weekdays, with no building operation at weekends.

Room Reference	Occupancy			Lighting	Equipment	Gains Schedule
	W/person Sensible	W/person Latent	People	W/m²	W/m²	
Ground Floor						
RM.00.Lift 2	-	-	-	-	-	-
RM.00.Lift 1	-	-	-	-	-	-
RM.00.070 Nurse Managers Office	75	55	2	10	15	08:00 – 18:00
RM.00.069 Acc WC			-	10	-	08:00 – 18:00
RM.00.068 Quiet Room	75	55	3	10	3	08:00 – 18:00
RM.00.067 Quiet Room	75	55	3	10	3	08:00 – 18:00
RM.00.064 Circulation	-	-	-	10	-	08:00 – 18:00
RM.00.063 Beverage Bay	-	-	-	10	-	08:00 – 18:00
RM.00.062 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.00.061 Recovery -Male	75	55	6	10	3	08:00 – 18:00
RM.00.060 Recovery Staff Base	75	55	2	10	15	08:00 – 18:00
RM.00.059 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.00.058 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.00.057 Recovery - Female	75	55	6	10	3	08:00 – 18:00
RM.00.056 Bowel Cancer Screen	75	55	2	10	3	08:00 – 18:00
RM.00.055 Medical Staff Office	75	55	2	10	15	08:00 – 18:00
RM.00.054 Circulation	-	-	-	10	-	08:00 – 18:00
RM.00.053 Decontamination Office	75	55	2	10	15	08:00 – 18:00
RM.00.052 Procedure Room	75	55	2	10	3	08:00 – 18:00
RM.00.051 Cleaners	-	-	-	10	-	08:00 – 18:00
RM.00.050 Procedure Room	75	55	2	10	3	08:00 – 18:00
RM.00.049 Clean Consumables	-	-	-	10	-	08:00 – 18:00
RM.00.048 Circulation	-	-	-	10	-	08:00 – 18:00
RM.00.047 Store	-	-	-	10	-	08:00 – 18:00
RM.00.046 Circulation	-	-	-	10	-	08:00 – 18:00
RM.00.045 Decon Dirty	-	-	-	10	-	08:00 – 18:00

Room Reference	Occupancy			Lighting	Equipment	Gains Schedule
	W/person Sensible	W/person Latent	People	W/m ²	W/m ²	
RM.00.044 Decon Clean	-	-	-	10	-	08:00 – 18:00
RM.00.043 Circultion	-	-	-	10	-	08:00 – 18:00
RM.00.042 Clean Utility	-	-	-	10	-	08:00 – 18:00
RM.00.041 Dirty Utility	-	-	-	10	-	08:00 – 18:00
RM.00.040 Clean Utility	-	-	-	10	-	08:00 – 18:00
RM.00.039 Staff Change -Male	-	-	-	10	-	08:00 – 18:00
RM.00.038 Staff Change - Female	-	-	-	10	-	08:00 – 18:00
RM.00.037 Staff WC	-	-	-	10	-	08:00 – 18:00
RM.00.036 Staff Pantry	-	-	-	10	-	08:00 – 18:00
RM.00.034 Acc Changing	-	-	-	10	-	08:00 – 18:00
RM.00.033 Acc Changing	-	-	-	10	-	08:00 – 18:00
RM.00.032 Ensuite	-	-	-	10	-	08:00 – 18:00
RM.00.031 Sub-Wait Female	75	55	6	10	0	08:00 – 18:00
RM.00.030 Staircore 2	-	-	-	-	-	08:00 – 18:00
RM.00.029 Lift Lobby	-	-	-	10	-	08:00 – 18:00
RM.00.028 Staff Base	75	55	2	10	15	08:00 – 18:00
RM.00.027 Ensuite	-	-	-	10	-	08:00 – 18:00
RM.00.026 Acc Changing	-	-	-	10	-	08:00 – 18:00
RM.00.025 Acc Changing	-	-	-	10	-	08:00 – 18:00
RM.00.024 Sub-Wait Male	75	55	6	10	0	08:00 – 18:00
RM.00.023 Consult/Exam Room - Female	75	55	2	10	3	08:00 – 18:00
RM.00.022 Consult/Exam Room - Male	75	55	2	10	3	08:00 – 18:00
RM.00.021 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.00.020 Prep Room 3	75	55	2	10	3	08:00 – 18:00
RM.00.019 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.00.018 Prep Room 2	75	55	2	10	3	08:00 – 18:00
RM.00.017 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.00.016 Prep Room 1	75	55	2	10	3	08:00 – 18:00
RM.00.015 Circulation	-	-	-	10	-	08:00 – 18:00
RM.00.014 Interview Room	75	55	2	10	3	08:00 – 18:00
RM.00.013 Reception Office	75	55	2	10	15	08:00 – 18:00

Room Reference	Occupancy			Lighting	Equipment	Gains Schedule
	W/person Sensible	W/person Latent	People	W/m²	W/m²	
First Floor						
RM.01.001 Staircore 1	-	-	-	-	-	-
RM.01.003 Circulation	-	-	-	10	-	08:00 – 18:00
RM.01.004 Circulation	-	-	-	10	-	08:00 – 18:00
RM.01.005 Reception	75	55	2	10	15	08:00 – 18:00
RM.01.006 Main Wait	75	55	9	10	-	08:00 – 18:00
RM.01.007 Play Area	75	55	2	10	-	08:00 – 18:00
RM.01.008 Baby Feeding/Changing	-	-	-	10	-	08:00 – 18:00
RM.01.009 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.01.010 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.01.011 Interview Room	75	55	2	10	3	08:00 – 18:00
RM.01.012 Circulation	-	-	-	10	-	08:00 – 18:00
RM.01.013 Lung Function Room	75	55	2	10	200	08:00 – 18:00
RM.01.014 ECO Room	75	55	2	10	200	08:00 – 18:00
RM.01.015 Lung Function Room 2	75	55	2	10	200	08:00 – 18:00
RM.01.016 ECO Room 2	75	55	2	10	200	08:00 – 18:00
RM.01.017 Sub Wait	75	55	5	10	-	08:00 – 18:00
RM.01.018 Consultation Room	75	55	2	10	3	08:00 – 18:00
RM.01.019 Consultation Room 2	75	55	2	10	3	08:00 – 18:00
RM.01.020 Lift Lobby	-	-	-	10	-	08:00 – 18:00
RM.01.021 Staircore 2	-	-	-	-	-	-
RM.01.022 Plant	-	-	-	-	-	-
RM.01.023 ECG Room	75	55	2	10	200	08:00 – 18:00
RM.01.024 ECG Room	75	55	2	10	200	08:00 – 18:00
RM.01.025 Circulation	-	-	-	10	-	08:00 – 18:00
RM.01.026 Reporting Room	75	55	4	10	15	08:00 – 18:00
RM.01.027 Circulation - Staff	-	-	-	10	-	08:00 – 18:00
RM.01.028 General Store	-	-	-	10	-	08:00 – 18:00
RM.01.029 Meeting/Seminar Room	75	55	6	10	3	08:00 – 18:00
RM.01.030 Cleaners	-	-	-	10	-	08:00 – 18:00
RM.01.031 Clean Utility	-	-	-	10	-	08:00 – 18:00
RM.01.032 Open Plan Office	75	55	4	10	15	08:00 – 18:00

Room Reference	Occupancy			Lighting	Equipment	Gains Schedule
	W/person Sensible	W/person Latent	People	W/m²	W/m²	
RM.01.033 Staff WC	-	-	-	10	-	08:00 – 18:00
RM.01.034 Staff Room inc Bev Bay	75	55	11	10	15	08:00 – 18:00
RM.01.035 Acc WC	-	-	-	10	-	08:00 – 18:00
RM.01.036 Lockers	-	-	-	10	-	08:00 – 18:00
RM.01.037 Staff Shower - Male	-	-	-	10	-	08:00 – 18:00
RM.01.038 Staff Shower - Female	-	-	-	10	-	08:00 – 18:00
RM.01.039 Reception Admin	75	55	1	10	15	08:00 – 18:00
RM.01.Lift 1	-	-	-	-	-	-
RM.01.Lift 2	-	-	-	-	-	-
RM.01.Lift Lobby	-	-	-	10	-	08:00 – 18:00
RM.01.Void	-	-	-	-	-	-

7 SERVICING STRATEGY

7.1 VENTILATION SUMMARY

Supply and Extract Ventilation with Heat Recovery (70% efficiency) is provided locally at a rate of 10l/s/person to most occupied spaces. Ventilation assumed to run out of occupied hours until room setback temperatures are met.

WC, Shower and changing areas have extract only ventilation at a rate of 6ACH with makeup air being supplied from adjacent zones.

Room Name / Reference	Ventilation Strategy
Consultation	MVHR 10L/s/person
Treatment	MVHR 10L/s/person
Office	MVHR 10L/s/person
Reception / Waiting	MVHR 10L/s/person
WC/Changing	6ACH Extract

7.2 HEATING AND COOLING SYSTEMS

The Air Source Heat Pumps provide the heating to the building, with occupied spaces generally having a heating setpoint of 21°C. Circulation, WC and transient spaces are heating to 18°C. A weekend and nighttime setback temperature of 18°C has been modelled whereas a preheat period of 1 hour has been assumed prior to occupied periods.

Cooling via air conditioning to 23°C is present in the conference room, imaging rooms, endoscopy procedure spaces, recovery ward and IT room only.

All system efficiencies have been based on the stage 3 Part L compliance model.

8 RESULTS

8.1 RUN 1 - FREE RUNNING BUILDING WITHOUT VENTILATION STRATEGY – MANCHESTER_DSY1_2020HIGH50_.EPW

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failing	HTM 03-01 (Annual number of hours where space air temperature 28°C >)	Result
RM.00.007 Waiting Area	70.4%	276	20	1 & 2 & 3	2970	FAIL
RM.00.009 Reception	74.6%	246	16	1 & 2 & 3	2845	FAIL
RM.00.013 Reception Office	75.5%	197	12	1 & 2 & 3	2571	FAIL
RM.00.014 Interview Room	62.8%	149	10	1 & 2 & 3	2120	FAIL
RM.00.016 Prep Room 1	78.6%	148	9	1 & 2 & 3	2603	FAIL
RM.00.018 Prep Room 2	71.4%	127	8	1 & 2 & 3	2329	FAIL
RM.00.020 Prep Room 3	68.6%	123	8	1 & 2 & 3	2236	FAIL
RM.00.022 Consult/Exam Room - Male	49.1%	119	8	1 & 2 & 3	1652	FAIL
RM.00.023 Consult/Exam Room - Female	43.7%	110	8	1 & 2 & 3	1484	FAIL
RM.00.024 Sub-Wait Male	74.8%	158	10	1 & 2 & 3	2596	FAIL
RM.00.028 Staff Base	38.1%	101	8	1 & 2 & 3	1365	FAIL
RM.00.031 Sub-Wait Female	67.6%	146	9	1 & 2 & 3	2293	FAIL
RM.00.050 Procedure Room	54.5%	129	8	1 & 2 & 3	1749	FAIL
RM.00.052 Procedure Room	65.6%	150	9	1 & 2 & 3	2105	FAIL
RM.00.053 Decontamination Office	75.6%	170	11	1 & 2 & 3	2651	FAIL
RM.00.055 Medical Staff Office	81.4%	179	11	1 & 2 & 3	2970	FAIL
RM.00.056 Bowel Cancer Screen	80.3%	151	9	1 & 2 & 3	2656	FAIL
RM.00.057 Recovery - Female	68.5%	178	13	1 & 2 & 3	2318	FAIL
RM.00.060 Recovery Staff Base	82.3%	164	10	1 & 2 & 3	2863	FAIL
RM.00.061 Recovery -Male	72.1%	183	13	1 & 2 & 3	2441	FAIL
RM.00.067 Quiet Room	74.1%	209	16	1 & 2 & 3	2673	FAIL
RM.00.068 Quiet Room	79.2%	191	12	1 & 2 & 3	2725	FAIL
RM.00.070 Nurse Managers Office	76.3%	158	10	1 & 2 & 3	2532	FAIL

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failing	HTM 03-01 (Annual number of hours where space air temperature 28°C >)	Result
RM.01.005 Reception	74.5%	138	10	1 & 2 & 3	2531	FAIL
RM.01.006 Main Wait	61.6%	193	15	1 & 2 & 3	2304	FAIL
RM.01.011 Interview Room	44.4%	69	6	1 & 2 & 3	1637	FAIL
RM.01.013 Lung Function Room	81.4%	179	11	1 & 2 & 3	2970	FAIL
RM.01.014 ECO Room	80.3%	151	9	1 & 2 & 3	2656	FAIL
RM.01.015 Lung Function Room 2	68.5%	178	13	1 & 2 & 3	2318	FAIL
RM.01.016 ECO Room 2	82.3%	164	10	1 & 2 & 3	2863	FAIL
RM.01.017 Sub Wait	34.3%	76	7	1 & 2 & 3	1281	FAIL
RM.01.018 Consultation Room	31.1%	67	6	1 & 2 & 3	1024	FAIL
RM.01.019 Consultation Room 2	21.8%	51	5	1 & 2 & 3	723	FAIL
RM.01.023 ECG Room	81.4%	179	11	1 & 2 & 3	2531	FAIL
RM.01.024 ECG Room	80.3%	151	9	1 & 2 & 3	2304	FAIL
RM.01.026 Reporting Room	43.6%	123	11	1 & 2 & 3	1551	FAIL
RM.01.029 Meeting/Seminar Room	66.1%	163	12	1 & 2 & 3	2290	FAIL
RM.01.032 Open Plan Office	73.6%	201	15	1 & 2 & 3	2819	FAIL
RM.01.034 Staff Room inc Bev Bay	74.1%	223	17	1 & 2 & 3	3265	FAIL
RM.01.039 Reception Admin	62.2%	116	8	1 & 2 & 3	2052	FAIL

8.2 RUN 2 - BUILDING WITH PROPOSED VENTILATION STRATEGY – MANCHESTER_DSY1_2020HIGH50_.EPW

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failing	HTM 03-01 (Annual number of hours where space air temperature 28°C >)	Result
RM.00.007 Waiting Area	5.7%	27	5	1 & 2 & 3	142	FAIL
RM.00.009 Reception	7.2%	37	5	1 & 2 & 3	221	FAIL
RM.00.013 Reception Office	2.3%	18	3	2	41	PASS
RM.00.014 Interview Room	1.2%	11	2	2	38	PASS
RM.00.016 Prep Room 1	0.2%	3	1	-	15	PASS
RM.00.018 Prep Room 2	0.1%	2	1	-	10	PASS
RM.00.020 Prep Room 3	0.0%	1	1	-	8	PASS
RM.00.022 Consult/Exam Room - Male	0.4%	8	2	2	35	PASS
RM.00.023 Consult/Exam Room - Female	0.5%	8	2	2	34	PASS
RM.00.024 Sub-Wait Male	0.2%	3	1	-	15	PASS
RM.00.028 Staff Base	0.3%	5	2	-	23	PASS
RM.00.031 Sub-Wait Female	0.2%	3	1	-	14	PASS
RM.00.050 Procedure Room	0.2%	5	2	-	28	PASS
RM.00.052 Procedure Room	0.2%	5	2	-	31	PASS
RM.00.053 Decontamination Office	0.3%	5	2	-	23	PASS
RM.00.055 Medical Staff Office	0.4%	6	2	-	26	PASS
RM.00.056 Bowel Cancer Screen	0.0%	1	1	-	8	PASS
RM.00.057 Recovery - Female	1.6%	19	4	2	38	PASS
RM.00.060 Recovery Staff Base	0.2%	4	2	-	18	PASS
RM.00.061 Recovery -Male	1.2%	12	3	2	32	PASS
RM.00.067 Quiet Room	2.6%	19	4	2	43	PASS
RM.00.068 Quiet Room	0.6%	7	2	2	27	PASS
RM.00.070 Nurse Managers Office	0.4%	6	2	-	28	PASS
RM.01.005 Reception	0.9%	10	2	2	34	PASS
RM.01.006 Main Wait	5.2%	25	4	1 & 2	140	FAIL

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failing	HTM 03-01 (Annual number of hours where space air temperature 28°C >)	Result
RM.01.011 Interview Room	0.1%	2	1	-	13	PASS
RM.01.013 Lung Function Room	0.0%	0	0	-	0	PASS
RM.01.014 ECO Room	0.0%	0	0	-	0	PASS
RM.01.015 Lung Function Room 2	0.0%	0	0	-	0	PASS
RM.01.016 ECO Room 2	0.0%	0	0	-	0	PASS
RM.01.017 Sub Wait	0.8%	7	2	2	28	PASS
RM.01.018 Consultation Room	0.3%	4	1	-	27	PASS
RM.01.019 Consultation Room 2	0.1%	2	1	-	14	PASS
RM.01.023 ECG Room	0.0%	0	0	-	0	PASS
RM.01.024 ECG Room	0.0%	0	0	-	0	PASS
RM.01.026 Reporting Room	1.7%	17	4	2	34	PASS
RM.01.029 Meeting/Seminar Room	0.9%	12	3	2	42	PASS
RM.01.032 Open Plan Office	2.4%	20	4	2	33	PASS
RM.01.034 Staff Room inc Bev Bay	2.5%	20	4	2	35	PASS
RM.01.039 Reception Admin	0.2%	5	2	-	32	PASS

8.3 RUN 3 - BUILDING WITH PROPOSED VENTILATION STRATEGY – 2050_MANCHESTER_A1B_50_PERCENTILE_DSY.EPW

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failing	HTM 03-01 (Annual number of hours where space air temperature 28°C >)	Result
RM.00.007 Waiting Area	8.3%	41	6	1 & 2 & 3	160	FAIL
RM.00.009 Reception	9.9%	46	6	1 & 2 & 3	234	FAIL
RM.00.013 Reception Office	2.7%	22	4	2	46	PASS
RM.00.014 Interview Room	1.7%	17	3	2	43	PASS
RM.00.016 Prep Room 1	0.3%	7	2	2	19	PASS
RM.00.018 Prep Room 2	0.2%	3	1	-	11	PASS
RM.00.020 Prep Room 3	0.2%	3	1	-	10	PASS
RM.00.022 Consult/Exam Room - Male	0.6%	9	2	2	42	PASS
RM.00.023 Consult/Exam Room - Female	0.7%	10	2	2	45	PASS
RM.00.024 Sub-Wait Male	0.5%	8	2	2	18	PASS
RM.00.028 Staff Base	0.4%	8	2	2	26	PASS
RM.00.031 Sub-Wait Female	0.5%	8	2	2	18	PASS
RM.00.050 Procedure Room	0.3%	3	1	-	34	PASS
RM.00.052 Procedure Room	0.4%	5	2	-	38	PASS
RM.00.053 Decontamination Office	0.5%	8	2	2	28	PASS
RM.00.055 Medical Staff Office	0.6%	8	2	2	31	PASS
RM.00.056 Bowel Cancer Screen	0.1%	2	1	-	10	PASS
RM.00.057 Recovery - Female	2.6%	18	4	2	45	PASS
RM.00.060 Recovery Staff Base	0.4%	7	2	2	21	PASS
RM.00.061 Recovery -Male	1.6%	12	3	2	39	PASS
RM.00.067 Quiet Room	2.8%	22	4	2	48	PASS
RM.00.068 Quiet Room	0.9%	13	3	2	38	PASS
RM.00.070 Nurse Managers Office	0.4%	8	2	2	32	PASS
RM.01.005 Reception	1.5%	12	3	2	44	PASS
RM.01.006 Main Wait	7.6%	38	6	1 & 2 & 3	251	FAIL

Location	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria Failing	HTM 03-01 (Annual number of hours where space air temperature 28°C >)	Result
RM.01.011 Interview Room	0.3%	4	1	-	14	PASS
RM.01.013 Lung Function Room	0.0%	0	0	-	0	PASS
RM.01.014 ECO Room	0.0%	0	0	-	0	PASS
RM.01.015 Lung Function Room 2	0.0%	0	0	-	0	PASS
RM.01.016 ECO Room 2	0.0%	0	0	-	0	PASS
RM.01.017 Sub Wait	1.2%	15	3	2	45	PASS
RM.01.018 Consultation Room	0.5%	9	2	2	31	PASS
RM.01.019 Consultation Room 2	0.3%	4	1	-	18	PASS
RM.01.023 ECG Room	0.0%	0	0	-	0	PASS
RM.01.024 ECG Room	0.0%	0	0	-	0	PASS
RM.01.026 Reporting Room	3.0%	17	4	2	41	PASS
RM.01.029 Meeting/Seminar Room	1.5%	14	3	2	49	PASS
RM.01.032 Open Plan Office	2.7%	23	4	2	39	PASS
RM.01.034 Staff Room inc Bev Bay	2.8%	27	4	2	40	PASS
RM.01.039 Reception Admin	0.4%	5	2	-	39	PASS

9 SUMMARY OF RESULTS

9.1 ONE CREDIT – THERMAL MODELLING

Hea 04 (1)

The thermal modelling has been carried out using IES software that which is in accordance with CIBSE AM11 Building Energy and Environmental Modelling.

Hea 04 (2)

The software used to carry out the simulation at the detailed design stage provides full dynamic thermal analysis.

Hea 04 (3a)

Not applicable

Hea 04 (3bi)

Winter Operative temperature ranges in occupied spaces are in accordance with the below table (CIBSE Guide A Environmental Design, Table 1.5)

Hea 04 (3bii)

The building is designed to limit risk of overheating, in accordance with the adaptive comfort methodology in CIBSE TM52: The limits of thermal comfort: avoiding overheating in European buildings – for all occupied areas.

Hea 04.3

This building will be air conditioned, therefore the summer and winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental design Table 1.5 – Recommended comfort criteria for specific applications.

Hea 04.4

Not applicable

9.2 ONE CREDIT – DESIGN FOR FUTURE THERMAL COMFORT

Hea 04 (5)

Criteria (1)-(4) are achieved.

Hea 04 (6)

The thermal modelling demonstrates that achieves compliance with the overheating criteria against a projected climate change environment weather file(s) for naturally ventilated buildings which:

- Time Period: 2050s
- Emission Scenario: Medium (A1B)
- 50th percentile DSY 2 & DSY 3.

Hea 04 (7)

No changes to future design required as existing building design is demonstrated achieve compliance against projected climate change environment weather file as stipulated in Hea 04 (6).

9.3 ADDITIONAL INFORMATION – HEALTHCARE BUILDING TYPES

The appropriate industry standard for healthcare is Health Technical Memorandum 03-01 Specialised ventilation for healthcare premises⁷. Thermal comfort levels in patient and clinical areas must be in accordance with the temperature ranges set out in HTM 03-01, Appendix 2.

Not applicable as no room types match the described roomy types listed in *HTM 03-01 - Appendix 2: Summary of design conditions*.

Furthermore, internal summer temperatures must not exceed 28 °C dry bulb for more than 50 hours per year (as defined in HTM 03-01, paragraph 2.15). Other occupied spaces not covered in HTM 03-01 Appendix 2 should be in accordance with CIBSE Guide A Environmental Design.

Model demonstrates for both credits that patient areas do not exceed 28°C dry bulb for more than 50 hours annually.