Northwood and Pinner Health Centre

NHS Property Services

Internal Environmental Analysis
Overheating Assessment
(HTM 03-01 & TM52)

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Executive Summary

Purpose of Report

The purpose of the report is to assess the current design proposals and provide recommendations that will allow the proposed Northwood and Pinner Health Centre redevelopment to demonstrate compliance with CIBSE TM52 (2013) 'The limits of thermal comfort: avoiding overheating in European buildings' and the overheating criteria of HTM 03-01 (2007). This report has been produced to reflect the most recent scheme.

Internal Environmental Analysis

Dynamic thermal simulation has been used to carry out the overheating analysis which is a sophisticated form of predictive building performance modelling. To accurately model the dynamic nature of the proposed developments thermal response, hourly recorded weather data was used in the form of the future CIBSE London Design Summer Year (DSY) for the 2020s, high emissions, 50% percentile weather file to carry out the initial CIBSE TM52 (2013) assessment. Additionally, compliance against the summertime overheating criteria of HTM 03-01 (2007) has been assessed using the relevant London CIBSE DSY 2005.

Results

A number of scenarios were assessed for the proposed Health Centre in order to demonstrate compliance with the overheating criteria. The following design considerations are recommended as a combined solution to mitigating overheating in line with the CIBSE and HTM guidance:

- Enhanced glazing g-value of 0.33 to reduce solar gains.
- Lighting gains relaxed and controls enhanced to include occupancy sensing.
- Reduced equipment gains that can be achieved through a management strategy.
- Specific insulation levels for each building element.
- Full fresh air mechanical systems with heat recovery serving all Waiting Areas, Meeting Rooms, Admin and Consultation/Non-clinics Rooms with cooling to Consulting (Treatment) rooms.

When the above scenario is included within the assessed spaces compliance against both the CIBSE TM52 and HTM 03-01 (2007) overheating criteria is achieved in line with the current NHS specification.

Contents

Executive Summary

1 Introduction 5

1.1 General
1.2 Project Description
1.3 Objective
1.4 Methodology

2 Overheating Criteria 8

2.1 London Plans Cooling Hierarchy
2.2 CIBSE TM52 (2013)
2.3 Health Technical Memorandum 03-01 (2007)

3 Modelling Methodology 10

3.1 Dynamic Thermal Simulation Modules
3.2 Thermal Model Generation
3.3 Dynamic Weather Data
3.4 Building Construction
3.5 Room Data Input
3.6 Profiles

4 Overheating Analysis Results 17

4.1 CIBSE TM52 Results
4.2 Summer Internal Temperature Results (HTM 03-1)

5 Summary 28

5.1 Thermal Modeling Results

Appendices

Appendix 1 Operational Profiles

1 Introduction

1.1 General

The purpose of this document is to identify an approach to mitigating overheating in line with HTM 03-01 and TM52 criteria for the proposed Health Centre redevelopment and to support the discharge of condition 27 which amends the previous submission.

The report includes the following:

- Outlines overheating requirements and identifies new energy assessment guidance targets and criteria applicable to the development.
- Assessment of current design proposals.
- Identification of specific zones that are at risk of overheating.
- Recommendations that will allow the design to comply with the relevant overheating criteria.

During post-application design development, the following items were identified as requiring an amendment to the Internal Environmental Analysis submission for the Health Centre:

1) Amending the Health Centre ventilation system and associated plant, which impacts the following:

- Layout of the health centre plans with the incorporation of additional service risers.
- Plant layout at roof level adjusted comprising the rearrangement and increase of size of kit to suit the updated ventilation strategy.
- Vent panels removed from above windows in elevations.
- Calculated thermal comfort results.

1.2 Project Description

The proposed works comprise the refurbishment of the Northwood and Pinner Cottage Hospital in the London Borough of Hillingdon.

Its proposed the existing Health Centre is refurbished while maintaining the majority of the existing structure but renewing and replacing most of the internal arrangement and servicing strategy. The proposed Health Centre building includes two floors and contains a number of consulting and treatment rooms as well a reception area, staff BOH areas and admin areas.

The proposed works also include the construction of two new residential blocks comprising 70 dwellings across four floors adjacent to the existing healthcare building. However, this Energy Statement only focuses on the Health Centre refurbishment element of the scheme.

Figure 1 – Site Location

The site is located within a predominant residential area and within walking distance of local public transport services. Northwood Hills underground station which is served by the Metropolitan line is located within a 600 m walk from the site. Also, the nearest bus stops located on A404 Pinner Road provides services to Harrow, Ealing Hospital, and Mount Vernon Hospital.

1.3 Objective

The objective of this document is to summarise the approach to mitigating overheating risk for the Healthcare Centre element of the development in response to the overheating criteria planning requirements.

This document is to support the discharge of condition 27 and demonstrate how the development will comply with the overheating objectives of Hillingdon's Local Plan (November 2012), London Plan (2021), GLA's Energy Assessment Guidance (April 2020) and BREEAM HEA 04 Thermal Comfort criteria.

1.4 Methodology

The overheating calculations have been carried out using Dynamic Simulation Modelling (DSM) software; IES Version 2021. This detailed form of modelling is approved National Calculation Method (NCM) simulation software.

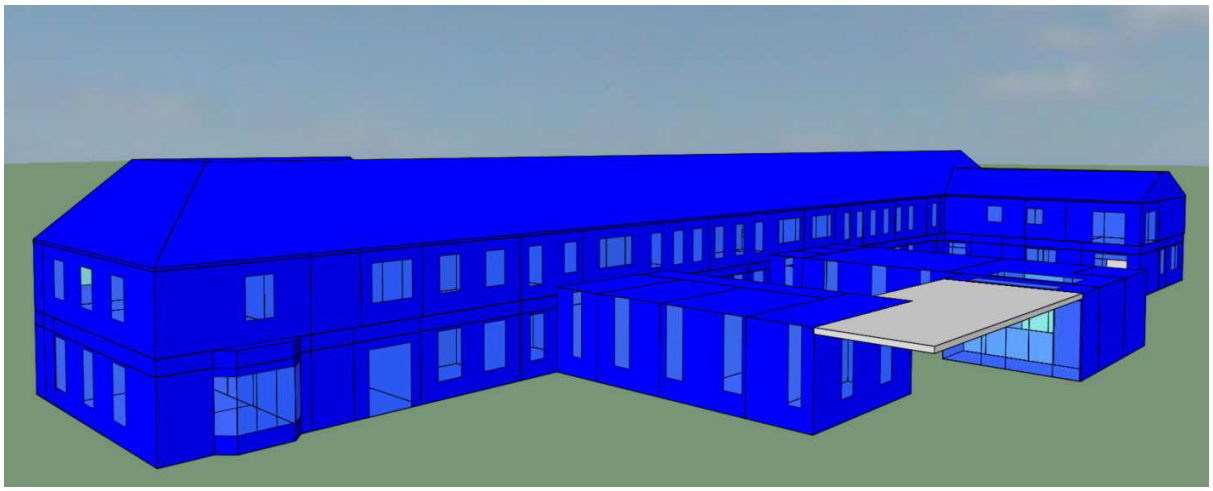

Figure 2 – IES Model

The above image is a screenshot of the thermal model built with IES Virtual Environment software which is capable of carrying out performance calculations upon incremental time steps as low as 1 minutes.

This allows realistic variations in fabric thermal storage (thermal mass effects), occupancy, weather conditions, solar and other internal gains to be taken into account and their impact upon building/plant operation to be modelled effectively.

The dynamic thermal simulation uses zone specific operational profiles (occupancy, lighting, ventilation and DHW demand) and HVAC plant performance data to effectively model and predict the energy performance of a building. This comprehensive calculation tool is considered best practice for assessing building energy consumption and has been carried out in accordance with CIBSE AM11 Building Energy and Environmental Modelling.

2 Overheating Criteria

This Section describes the Overheating Guidance Targets applicable to the proposed Northwood and Pinner Healthcare development.

2.1 London Plans Cooling Hierarchy

An initial overheating analysis has been conducted on the proposed development based on the London Plans cooling hierarchy in Policy SI 4 Managing heat risk. Proposed schemes should adopt measures that reduce the demand for artificial cooling as follows:

- Minimising internal heat generation through energy efficient design.
- Reducing the amount of heat entering the building during the summer.
- Use the thermal mass and high ceiling to manage the heat within the building.
- Use passive ventilation.
- Use mechanical ventilation.

The following sections details the CIBSE TM52 and HTM 03-01 methodology used in assessing the overheating potential of the scheme, identifies potential overheating risk areas and identifies possible design strategies for overheating reduction.

2.2 CIBSE TM52 (2013)

CIBSE Guide TM52, entitled 'The Limits of Thermal Comfort: Avoiding Overheating in European Buildings' sets three criterion which all consider the difference between the actual operative temperature of an occupied room at any time and the maximum acceptable temperature. The three criteria are described below:

- Hours of Exceedance – The number of hours during which the difference between the actual operative temperature and the maximum acceptable temperature, during the period May to September shall not be more than 3% of occupied hours.

- Daily Weighted Exceedance - This criterion assesses the severity of overheating which includes large short-term exceedance and short-term exceedance. The weighted exceedance is required to be less than or equal to 6 degree-hours in any one day.

- Upper Limit Temperature – This criterion sets an absolute maximum value for the indoor operative temperature. This maximum temperature is required to not exceed a temperature difference between the actual operative temperature and the maximum acceptable temperature by 4°C.

To demonstrate compliance with TM52 at least two out of three of the criteria must be met in all habitable rooms. The GLA Energy Assessment Guidance (October 2018) recommends the DSY1 (Design Summer Year) for the 2020s, high emissions, 50% percentile scenario weather files are used in this assessment.

For all spaces that include cooling the PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) indices based on the above modelling are reported to ensure compliance with BREEAM HEA04.

2.3 Health Technical Memorandum 03-01 (2007)

The Department of Health published a series of documents, known collectively as Health Technical Memorandums (HTM's). These provide comprehensive, practical guidance on the planning and design of health care buildings.

HTM 03-01 (Part A 2007), relates to the design and installation of specialised ventilation for healthcare premises. The guidance contained in HTM 03-01 applies to new developments and major refurbishments of existing developments.

A limiting criterion is included within this guidance to indicate when overheating is likely to be problematic within naturally ventilated healthcare premises.

This criterion is summarised as follows;

"Fdofxodwlrqv dqg wkhup dop rghodqj vkrxog eh xqghuwdnhq wr hqvxuh wkdw/gxulqj vxp p huwp h/ lqwuqdowhp shudwxuhv lq sdwhqwduhdv gr qrwh{fhhg 5; ºF -gu| exœ,irup ruh wkdq 83 krxuv shu |hdu"

In showing that the proposed Northwood and Pinner Healthcare Centre will not suffer overheating the following interpretation and parameters will be used within the assessment as follows;

- Assessment period ("summertime") taken as May to September.
- Number of hours assessed as "occupied" hours only.
- CIBSE 'Design Summer Year' (DSY) weather file for London will be used.
- Internal Air Temperature (°C) used to summarise results.

Transient areas including WC's, corridors & stairwells, Patient Social Areas, Utility rooms will be excluded from the results.

3 Modelling Methodology

This Section describes the thermal modelling analysis carried out to assess the overheating risk of the proposed Healthcare Centre development against both TM52 and HTM 03-01 criteria.

3.1 Dynamic Thermal Simulation Modules

To complete the dynamic thermal simulations required to assess the overheating risk, "Virtual Environment" software suite from Integrated Environmental Solutions Ltd (version 2021) was used. This software uses an integrated suite of application modules based around a 3D geometrical model.

The modules used for the proposed Northwood and Pinner development include;

- ModelIT – This generates the 3D geometry as a single integrated data model which is shared by all the application models.
- SunCast – This module generates shadows and internal solar insolation from the 3D geometry from any sun position. This can be defined by date, time, orientation, site latitude and longitude. The shading information is stored in a database and used to consider the impact of shading from local shading e.g. brise soleil, and surrounding buildings and landscape features in subsequent thermal simulation calculations. This data is used to increase the accuracy of the thermal simulations and prediction of temperatures, energy consumption and carbon emissions.
- Apache-Sim – The dynamic thermal simulation program based on first-principles mathematical modelling of the heat transfer processes occurring within and around a building and is driven by real weather data. This allows the assessment of building thermal performance, including; annual energy consumption, carbon emissions and room surface temperatures. ApacheSIM is based on first principles models of heat transfer processes.
- Macroflo – This air flow simulation module allows the analysis of designs involving natural ventilation. It simulates airflow driven by stack effect, wind pressure and buoyancy forces to allow the study of façade proposes for natural ventilation.

3.2 Thermal Model Generation

The three-dimensional thermal model of the proposed Healthcare Centre in Northwood and Pinner was built based on the following floor plans and elevations produced by Allies and Morrison Architects:

- Proposed Floorplans: 17115_05_HC_06_100_10, 17115_05_HC_06_101_10,, 17115_05_HC_01_102_P8
- Proposed Elevations: 17115_05_HC_26_201_P1, 17115_05_HC_26_200_P1
- Proposed Sections: 17115_05_HC_27_100_P1

The above drawings were used to create the 3D geometric thermal model to represent its physical form and internal spaces. The following building fabric, occupancy profiles, internal heat gains and ventilation strategy were inputted for each zone assessed. This detailed overheating study assessed all rooms within the Healthcare Centre.

3.3 Dynamic Weather data

To model the dynamic nature of the proposed buildings thermal response, hourly recorded weather data is used in dynamic thermal simulations. This weather data contains records of radiation, temperature, sunshine duration humidity and wind speed / direction.

The TM52 overheating criterion was assessed using the future CIBSE London Design Summer Year (DSY) for the 2020s, high emissions, 50% percentile weather file. This file contains predicted weather data from the 1st April to the 30th September to represent an extreme sequence of hourly data for summer design. Future Prometheus weather files have been used to assess compliance against BREEAM Hea 04 Thermal comfort projected climate change weather data.

Additionally, compliance against the summertime overheating criteria of HTM 03-01 (2007) has been assessed using the relevant London CIBSE DSY 2005 weather file.

3.4 Building Construction

The following building parameters were applied to the thermal model in order to carry out the overheating study:

Element	Performance
Ground Floor	Existing 0.70 W/m^{2}K New: 0.25 W/m^{2}K
External Walls	Improved Existing 0.50 W/m^{2}K New: 0.24 W/m^{2}K
Glazing	1.6 W/m^{2}K, G-value 0.33
Doors	1.80 W/m^{2}K
Roof	0.18 W/m^{2}K
Air Permeability	10 m^3/h/m^2@50 Pa

Table 1 – Fabric Specification

3.5 Room Data Input

The following inputs were included within each assessed zone using templates containing the operational data required to simulate their performance. The below tables set out the internal heat gains, infiltration, ventilation and heating / cooling system inputs assumed within the model.

Room	Ventilation	Lighting	People	Hours of Operation	Equipment
00 00.03 GP Consult 6	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.07 GP Consulting 3	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.06 GP Consult 2	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.10 GP Consult 1	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.14 GP Consult 7	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.18 GP Consult 4	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.19 GP Consult 5	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.29 MH Clinic 2	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00,30 MH Clinic 1	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.34 Clinic 3 | Consulting)	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.35 Clinic 3 (Consulting)	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.37 Clinic 4	6 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
01 01. 23 Talking Therapy	10 l/s/p	7.2 W/m^2	4	8:00 am – 18:00 pm	6
01 01.24 Talking Therapy	10 l/s/p	7.2 W/m^2	4	8:00 am – 18:00 pm	6

0212 Northwood and Pinner Health Centre

Internal Environmental Analysis Overheating Assessment (HTM 03-01 & TM52)

Room	Ventilation	Lighting	People	Hours of Operation	Equipment
01 01.23 Talking, Therapy	10 l/s/p	7.2 W/m^2	4	8:00 am – 18:00 pm	6
01 01.26 Talking Therapy	10 l/s/p	7.2 W/m^2	4	8:00 am – 18:00 pm	6
00 00.04 GP Treatment 2	10 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.09 GP Treatment 1	10 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.11 PCN Treatment	10 ac/hr	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.12 PCN Treatment	10 l/s/p	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.26 Clinic 6 (Treatment)	10 l/s/p	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.39 Clinic 1 (Treatment)	10 l/s/p	7.2 W/m^2	2	8:00 am – 18:00 pm	3
00 00.41 Clinic 2 (Treatment)	10 l/s/p	7.2 W/m^2	2	8:00 am – 18:00 pm	3
01 01.06 Meeting Room 1	10 l/s/p	7 W/m^2	6	8:00 am – 18:00 pm	6
01 01.07 Meeting Room 2	10 l/s/p	7 W/m^2	6	8:00 am – 18:00 pm	6
01 01.026 GP Admin 1	12 l/s/p	7 W/m^2	2	8:00 am – 18:00 pm	12
01 01.02d GP Admin 2	18 l/s/p	7 W/m^2	2	8:00 am – 18:00 pm	12
01 01.02 GP Admin 1	12 l/s/p	7 W/m^2	8	8:00 am – 18:00 pm	15
01 01.02c GP Admin 2	12 l/s/p	7 W/m^2	10	8:00 am – 18:00 pm	15
01 01.14 Admin 5	12 l/s/p	7 W/m^2	4	8:00 am – 18:00 pm	15
01 01.17 Admin 3	12 l/s/p	7 W/m^2	10	8:00 am – 18:00 pm	15

Room	Ventilation	Lighting	People	Hours of Operation	Equipment
01 01.13 Admin 4	12 l/s/p	7 W/m^2	4	8:00 am – 18:00 pm	15
00 00.21 Reception 1	10 l/s/p	5 W/m^2	4	8:00 am – 18:00 pm	15
00 00.23 Reception 2	10 l/s/p	5 W/m^2	4	8:00 am – 18:00 pm	15
01 01.01 GP Staff rest room	10 l/s/p	5 W/m^2	6	8:00 am – 18:00 pm	3
01 01.13 Staff rest room	10 l/s/p	5 W/m^2	6	8:00 am – 18:00 pm	3
00 00.22 General Waiting	10 l/s/p	7 W/m^2	31	8:00 am – 18:00 pm	2

Table 2 – Thermal Modelling Inputs

The assumptions in the above table have been made in accordance with appropriate lighting calculations, information provided by the Client, CIBSE Guide A, TM52 and BREEAM HEA 04 benchmark criteria.

The following table summarises the proposed HVAC systems for the proposed Health Centre.

HVAC System Type	Performance
Space Heating ASHP	Radiators COP: 3.20
DHW ASHP	SCOP: 3.43 Storage: 1500 litre / 100mm Factory
ADU DX Heat Pumps – Heating / Cooling	COP/EER (nominal): 3.54 / 3.25
Treatment Room DX Split Heating & Cooling	SCOP: 4.8 / SEER: 6.2
Ventilation	Central A.H.U.'s / H.R.U.'s: 0.85 W/ls Heat recovery: 74% Local Extract: 0.4 W/l/s Zonal Extract 0.5 W/l/s

Table 3 – Health Centre HVAC System Inputs

3.6 Profiles

Specific profiles were set-up within the thermal model to control when the heating, cooling, occupation, lighting and ventilation systems operate in order to assess compliance against TM52 and HTM 03-01 overheating criteria. The following graph illustrates the occupation periods of the assessed consultation rooms:

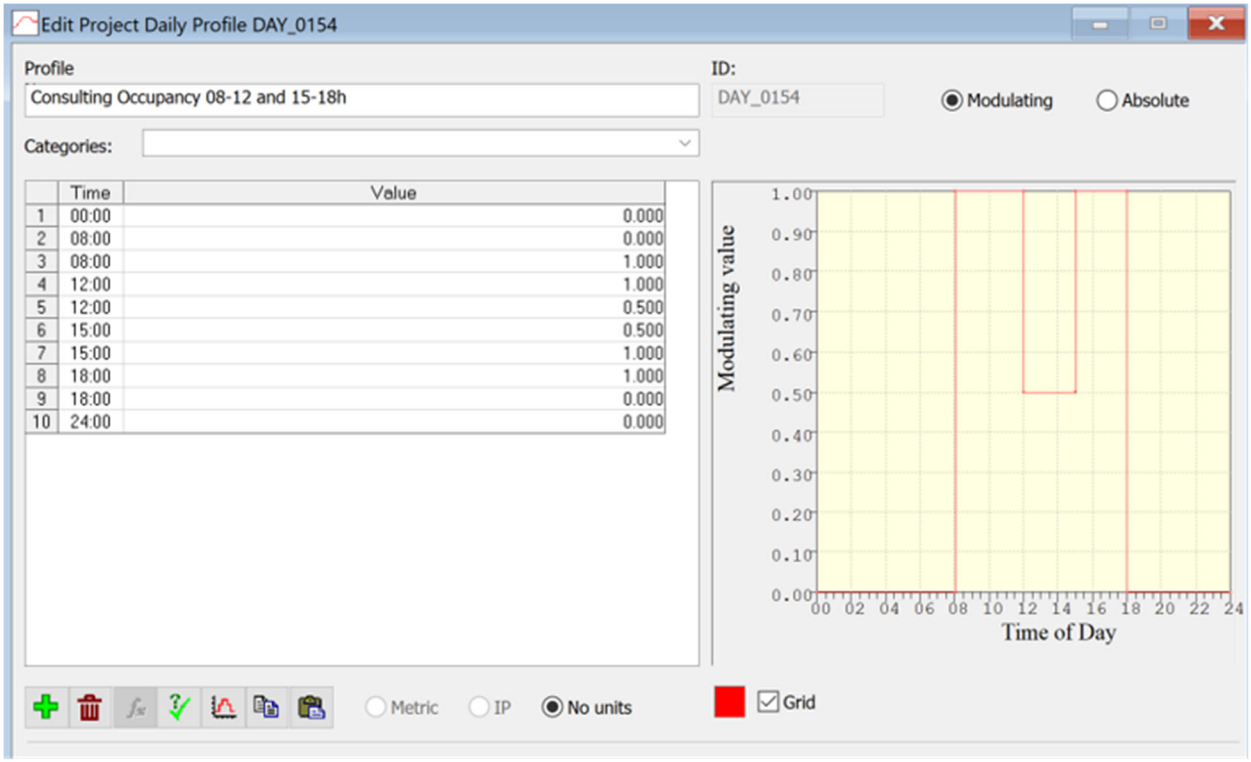

Figure 3 – Consultation Occupation Profile

The above graph shows this space is occupied daily at varying levels between 08:00 am – 18:00 pm. A summary of all the operation profiles used within the thermal model can be found in Appendix 1.

4 Overheating Analysis Results

This Section includes the results from the initial assessment of overheating risk against both CIBSE TM52 and HTM 03-01 criteria.

4.1 CIBSE TM52 Results

The below table highlights the results of the assessed spaces based on the outline design construction and services information described within the previous Sections of this report against the DSY1 weather file:

Room	Criteria 1 (% hrs Top – Tmax ≥1K)	Criteria 2 Max Daily Degrees (Hrs)	Criteria 3 (Max ΔT)	Failing Criteria	Overall TM52 Result
00_00.04 GP Treatment 2	-	-	-	-	N/A
00_00.09 GP Treatment 1	-	-	-	-	N/A
00_00.11 PCN Treatment	-	-	-	-	N/A
00_00.12 PCN Treatment	-	-	-	-	N/A
00_00.26 Clinic 6 (Treatment)	-	-	-	-	N/A
00_00.39 Clinic 1 (Treatment)	-	-	-	-	N/A
00_00.41 Clinic 2 (Treatment)	-	-	-	-	N/A
00_00.03 GP Consult 6	0.0	0.0	0.0	-	PASS
00_00.07 GP Consulting 3	0.0	0.0	0.0	-	PASS
00_00.08 GP Consult 2	0.0	0.0	0.0	-	PASS
00_00.10 GP Consult 1	0.0	0.0	0.0	-	PASS
00_00.14 GP Consult 7	0.0	0.0	0.0	-	PASS
00_00.18 GP Consult 4	0.0	0.0	0.0	-	PASS
00_00.19 GP Consult 5	0.0	0.0	0.0	-	PASS
00_00.21 Reception 1	0.0	0.0	0.0	-	PASS

Room	Criteria 1 (% hrs Top – Tmax ≥1K)	Criteria 2 Max Daily Degrees (Hrs)	Criteria 3 (Max ΔT)	Failing Criteria	Overall TM52 Result
00_00.22 General Waiting	0.0	0.0	0.0	-	PASS
00_00.22a General Waiting	0.2	1.0	1.0	-	PASS
00_00.25 Reception 2	0.0	0.0	0.0	-	PASS
00_00.28 MH Waiting	0.0	0.0	0.0	-	PASS
00_00.29 MH Clinic 2	0.0	0.0	0.0	-	PASS
00_00.30 MH Clinic 1	0.0	0.0	0.0	-	PASS
00_00.34 Clinic 5	0.0	0.0	0.0	-	PASS
00_00.35 Clinic 3	0.0	0.0	0.0	-	PASS
00_00.37 Clinic 4	0.0	0.0	0.0	-	PASS
01_01.01 GP staff rest	0.0	0.0	0.0	-	PASS
01_01.02 GP Admin 1	0.6	2.0	1.0	-	PASS
01_01.02b GP Admin 1	0.2	1.5	1.0	-	PASS
01_01.02c GP Admin 2	0.6	2.0	1.0	-	PASS
01_01.02d GP Admin 2	1.3	3.0	1.0	-	PASS
01_01.06 Meeting Room 1	0.0	0.0	0.0	-	PASS
01_01.07 Meeting Room 2	0.0	0.0	0.0	-	PASS
01_01.13 Staff rest room	0.0	0.0	0.0	-	PASS
01_01.14 Admin 5	0.2	2.0	1.0	-	PASS
01_01.17 Admin 3	2.4	3.0	1.0	-	PASS
01_01.18 Admin 4	2.0	4.0	2.0	-	PASS
01_01.23 Talking Therapy	0.0	0.0	0.0	-	PASS
01_01.24 Talking Therapy	0.0	0.0	0.0	-	PASS
01_01.25 Talking Therapy	0.0	0.0	0.0	-	PASS
01_01.26 Talking Therapy	0.0	0.0	0.0	-	PASS

Table 4 – TM52 DSY1 Overheating Results

The above results confirm the proposed design considerations and passive design measures demonstrate compliance with the CIBSE TM52 (2013) overheating criteria for all the assessed spaces against the DSY1 weather file.

In line with CIBSE and BREEAM HEA04 criteria the below rooms which include comfort cooling have been assessed against CIBSE Guide A, Table 1.5 PMV and compliance PPD thresholds.

Room	% hours <=-0.50	% hours >-0.50 to <=0.50	% hours > 0.50	Overall PMV Result
00_00.04 GP Treatment 2	0.4	99.6	0.0	PASS
00_00.09 GP Treatment 1	0.3	99.7	0.0	PASS
00_00.11 PCN Treatment	0.0	100.0	0.0	PASS
00_00.12 PCN Treatment	0.0	100.0	0.0	PASS
00_00.26 Clinic 6 (Treatment)	0.1	99.9	0.0	PASS
00_00.39 Clinic 1 (Treatment)	0.7	99.3	0.0	PASS
00_00.41 Clinic 2 (Treatment)	0.1	99.9	0.0	PASS

Table 5 – TM52 DSY1 PMV Overheating Results

Room	% hours <=-0.50	% hours >-0.50 to <=0.50	% hours > 0.50	Overall PPD Result
00_00.04 GP Treatment 2	0.0	99.4	0.6	PASS
00_00.09 GP Treatment 1	0.0	99.5	0.5	PASS
00_00.11 PCN Treatment	0.0	100.0	0.0	PASS
00_00.12 PCN Treatment	0.0	100.0	0.0	PASS
00_00.26 Clinic 6 (Treatment)	0.0	99.9	0.1	PASS
00_00.39 Clinic 1 (Treatment)	0.0	99.2	0.8	PASS
00_00.41 Clinic 2 (Treatment)	0.0	99.8	0.2	PASS

Table 6 – TM52 DSY1 PPD Overheating Results

It's clear each of the assessed rooms above comply with the minimum PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) thresholds.

The below table highlights the results of the assessed spaces based against the future Prometheus weather file to assess compliance against BREEAM Hea 04 Thermal Comfort projected climate change criteria:

Room	Criteria 1 (% hrs Top – Tmax ≥1K)	Criteria 2 Max Daily Degrees (Hrs)	Criteria 3 (Max ΔT)	Failing Criteria	Overall TM52 Result
00_00.04 GP Treatment 2	-	-	-	-	N/A
00_00.09 GP Treatment 1	-	-	-	-	N/A
00_00.11 PCN Treatment	-	-	-	-	N/A
00_00.12 PCN Treatment	-	-	-	-	N/A
00_00.26 Clinic 6 (Treatment)	-	-	-	-	N/A
00_00.39 Clinic 1 (Treatment)	-	-	-	-	N/A
00_00.41 Clinic 2 (Treatment)	-	-	-	-	N/A
00_00.03 GP Consult 6	0.0	0.0	0.0	-	PASS
00_00.07 GP Consulting 3	0.0	0.0	0.0	-	PASS
00_00.08 GP Consult 2	0.0	0.0	0.0	-	PASS
00_00.10 GP Consult 1	0.0	0.0	0.0	-	PASS
00_00.14 GP Consult 7	0.0	0.0	0.0	-	PASS
00_00.18 GP Consult 4	0.0	0.0	0.0	-	PASS
00_00.19 GP Consult 5	0.0	0.0	0.0	-	PASS
00_00.21 Reception 1	0.0	0.0	0.0	-	PASS
00_00.22 General Waiting	0.0	0.0	0.0	-	PASS
00_00.22a General Waiting	0.0	0.0	0.0	-	PASS
00_00.25 Reception 2	0.0	0.0	0.0	-	PASS
00_00.28 MH Waiting	0.0	0.0	0.0	-	PASS
00_00.29 MH Clinic 2	0.0	0.0	0.0	-	PASS

Room	Criteria 1 (% hrs Top – Tmax ≥1K)	Criteria 2 Max Daily Degrees (Hrs)	Criteria 3 (Max ΔT)	Failing Criteria	Overall TM52 Result
00_00.30 MH Clinic 1	0.0	0.0	0.0	-	PASS
00_00.34 Clinic 5	0.0	0.0	0.0	-	PASS
00_00.35 Clinic 3	0.0	0.0	0.0	-	PASS
00_00.37 Clinic 4	0.0	0.0	0.0	-	PASS
01_01.01 GP staff rest	0.0	0.0	0.0	-	PASS
01_01.02 GP Admin 1	0.0	0.5	1.0	-	PASS
01_01.02b GP Admin 1	0.0	0.0	0.0	-	PASS
01_01.02c GP Admin 2	0.0	0.5	1.0	-	PASS
01_01.02d GP Admin 2	0.6	4.5	1.0	-	PASS
01_01.06 Meeting Room 1	0.0	0.0	0.0	-	PASS
01_01.07 Meeting Room 2	0.0	0.0	0.0	-	PASS
01_01.13 Staff rest room	0.0	0.0	0.0	-	PASS
01_01.14 Admin 5	0.0	0.0	0.0	-	PASS
01_01.17 Admin 3	0.9	3.0	1.0	-	PASS
01_01.18 Admin 4	0.6	2.0	1.0	-	PASS
01_01.23 Talking Therapy	0.0	0.0	0.0	-	PASS
01_01.24 Talking Therapy	0.0	0.0	0.0	-	PASS
01_01.25 Talking Therapy	0.0	0.0	0.0	-	PASS
01_01.26 Talking Therapy	0.0	0.0	0.0	-	PASS

Table 7 – Future Weather Datat Overheating Results

The above results confirm all the assessed spaces comply with the TM52 overheating criteria when assessed against the future weather file.

In line with CIBSE and BREEAM HEA04 criteria the below rooms which include comfort cooling have been assessed against CIBSE Guide A , Table 1.5 PMV and compliance PPD thresholds.

Room	% hours <=-0.50	% hours >-0.50 to <=0.50	% hours > 0.50	Overall PMV Result
00_00.04 GP Treatment 2	1.6	98.4	0.0	PASS
00_00.09 GP Treatment 1	1.4	98.6	0.0	PASS
00_00.11 PCN Treatment	0.5	99.5	0.0	PASS
00_00.12 PCN Treatment	0.6	99.4	0.0	PASS
00_00.26 Clinic 6 (Treatment)	1.1	98.9	0.0	PASS
00_00.39 Clinic 1 (Treatment)	2.4	97.6	0.0	PASS
00_00.41 Clinic 2 (Treatment)	0.7	99.3	0.0	PASS

Table 8 – TM52 DSY2 PMV Overheating Results

Room	% hours <=-0.50	% hours >-0.50 to <=0.50	% hours > 0.50	Overall PPD Result
00_00.04 GP Treatment 2	0.0	98.0	2.0	PASS
00_00.09 GP Treatment 1	0.0	98.1	1.9	PASS
00_00.11 PCN Treatment	0.0	99.4	0.6	PASS
00_00.12 PCN Treatment	0.0	99.3	0.7	PASS
00_00.26 Clinic 6 (Treatment)	0.0	98.8	1.2	PASS
00_00.39 Clinic 1 (Treatment)	0.0	97.0	3.0	PASS
00_00.41 Clinic 2 (Treatment)	0.0	99.2	0.8	PASS

Table 9 – TM52 DSY2 PPD Overheating Results

It's clear all of the assessed rooms above comply with the minimum PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) thresholds when assessed against the future weather file.

4.2 Summer Internal Temperature Results (HTM 03-01)

The table below highlights the results obtained from the thermal modelling analysis to demonstrate compliance with the summertime overheating criteria of HTM 03-01.

Room	No. Hours >28 C	Overall HTM 03-01 Result
00_00.04 GP Treatment 2	0	PASS
00_00.09 GP Treatment 1	0	PASS
00_00.11 PCN Treatment	0	PASS
00_00.12 PCN Treatment	0	PASS
00_00.26 Clinic 6 (Treatment)	0	PASS
00_00.39 Clinic 1 (Treatment)	0	PASS
00_00.41 Clinic 2 (Treatment)	0	PASS
00_00.03 GP Consult 6	0	PASS
00_00.07 GP Consulting 3	0	PASS
00_00.08 GP Consult 2	0	PASS
00_00.10 GP Consult 1	0	PASS
00_00.14 GP Consult 7	0	PASS
00_00.18 GP Consult 4	0	PASS
00_00.19 GP Consult 5	0	PASS
00_00.21 Reception 1	0	PASS
00_00.22 General Waiting	4	PASS
00_00.22a General Waiting	7	PASS
00_00.25 Reception 2	0	PASS
00_00.28 MH Waiting	3	PASS
00_00.29 MH Clinic 2	0	PASS
00_00.30 MH Clinic 1	0	PASS
00_00.34 Clinic 5 (Consulting)	0	PASS

Room	No. Hours >28 C	Overall HTM 03-01 Result
00_00.35 Clinic 3 (Consulting)	0	PASS
00_00.37 Clinic 4	0	PASS
01_01.01 GP staff rest room	0	PASS
01_01.02 GP Admin 1	25	PASS
01_01.02b GP Admin 1	16	PASS
01_01.02c GP Admin 2	21	PASS
01_01.02d GP Admin 2	28	PASS
01_01.06 Meeting Room 1	0	PASS
01_01.07 Meeting Room 2	0	PASS
01_01.13 Staff rest room	0	PASS
01_01.14 Admin 5	23	PASS
01_01.17 Admin 3	44	PASS
01_01.18 Admin 4	49	PASS
01_01.23 Talking Therapy	5	PASS
01_01.24 Talking Therapy	7	PASS
01_01.25 Talking Therapy	8	PASS
01_01.26 Talking Therapy	4	PASS

Table 13 – TM52 overheating results

The above results confirm all assessed spaces comply with the HTM 03-01 criteria when the proposed overheating mitigation measures are applied.

5 Summary

This Section summarises the findings of the initial assessment of overheating risk against both CIBSE TM52 and HTM 03-01 criteria.

5.1 Thermal Modelling Results

Results obtained from the thermal modelling analysis for the proposed Healthcare Centre in Northwood and Pinner demonstrate compliance against both the summertime overheating criteria of HTM 03-01 (2007), CIBSE TM52 (2013) and BREEAM HEA04. However, to demonstrate compliance, the following design considerations are recommended as a combined solution to mitigating overheating risk:

- Enhanced glazing g-value of 0.33 to reduce solar gains.
- Lighting gains relaxed and controls enhanced to include occupancy sensing.
- Reduced equipment gains that can be achieved through a management strategy.
- Specific insulation levels for each building element.
- Full fresh air mechanical systems with heat recovery serving all Waiting Areas, Meeting Rooms, Admin and Consultation/Non-clinics Rooms with cooling to Consulting (Treatment) rooms.

When the above scenario is included within the assessed spaces, compliance with both the CIBSE TM52 and HTM 03-01 (2007) overheating criteria is achieved.

Appendices

Appendix 1 Occupancy Profiles

Appendix 1

Occupancy Profiles

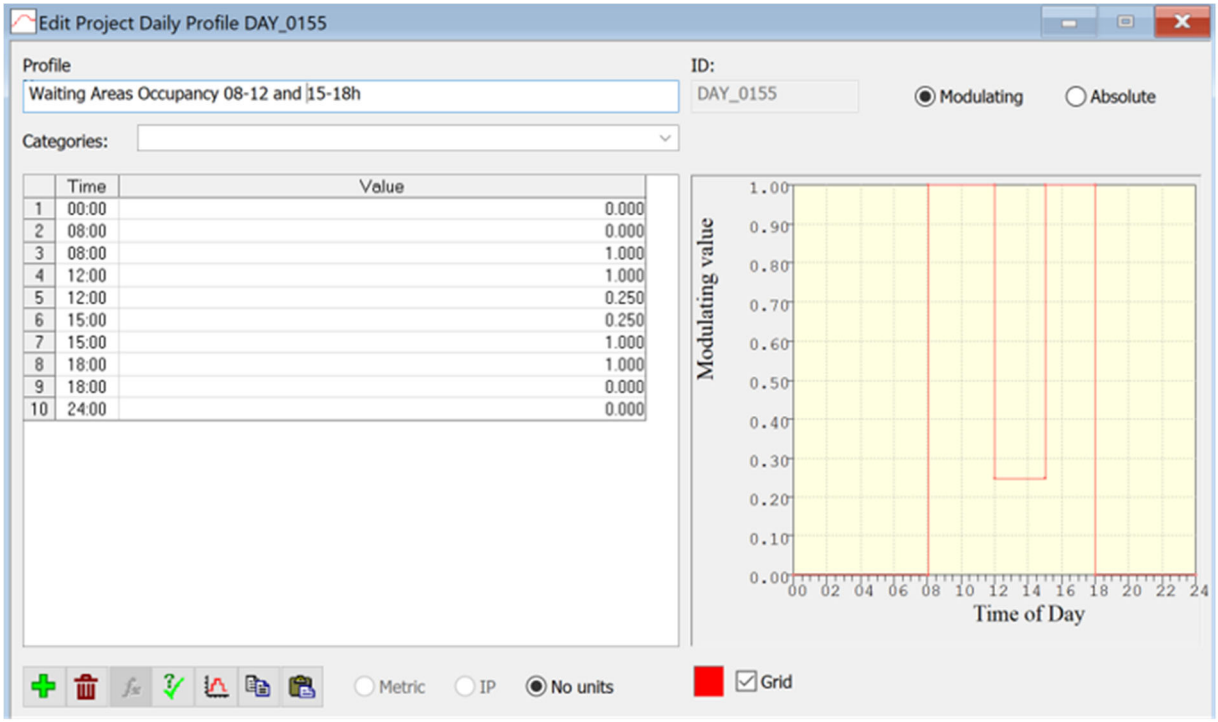

Figure 4 – Meeting Rooms, Groups Rooms, Interview Rooms, Counselling Rooms and Admin Occupany Profile

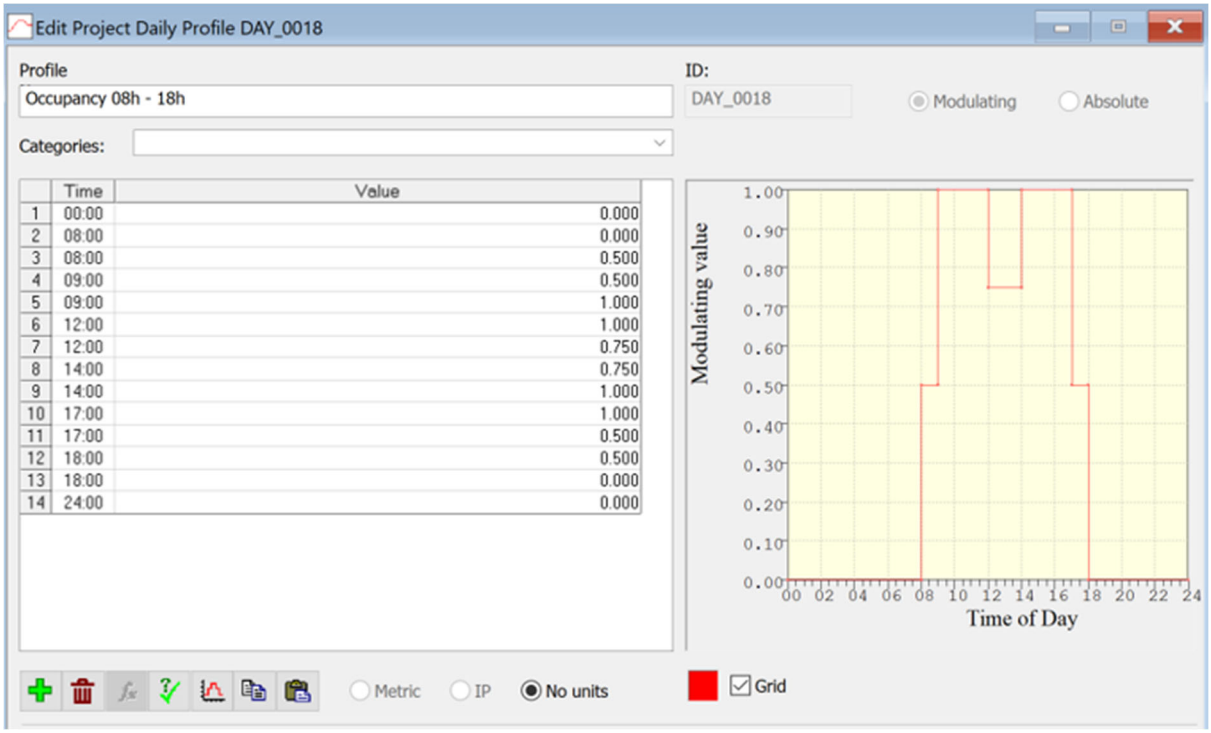

Figure 5 – Meeting Rooms, Groups Rooms, Interview Rooms, Counselling Rooms and Admin Occupany Profile

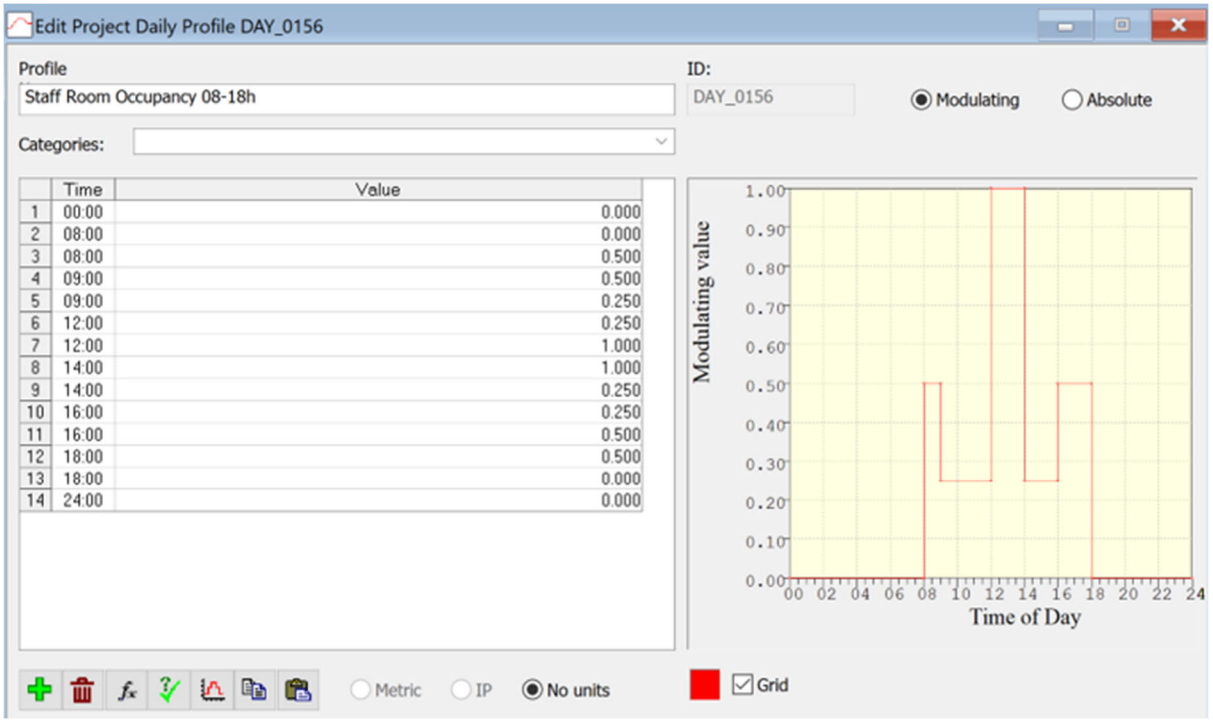

Figure 6 – Staff Room Occupany Profile

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