NORMAN BROMLEY
PARTNERSHIP

PROJECT REF	**BS 1369**
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ABBEY ROAD – PHASE 2

Overheating Assessment

PREPARED FOR:

Wates Construction
184 Drummond Street
LONDON
London
NW1 3HP

PREPARED BY:

Norman Bromley Partnership LLP
Bridge House
97 – 101 High Street
Tonbridge
Kent TN9 1DR

Telephone No. 01732 773737
E.Mail: mail@normanbromley.co.uk
Website: www.normanbromley.co.uk

PROJECT REVISION SHEET

Revision No.	Date	Details	Changes	Author	Approved
0	*28/05/2020*	*For Comments*	*N/A*	*MR*	*MR*
1	*03/09/2020*			*MR*	*MR*
2	*23/10/2020*		*Revised to incorporate Planner's and BREEAM comments*	*MR*	*MR*
3	*27/11/2020*		*Revised to incorporate BREEAM Assessor comments*	*MR*	*MR*
4	*30/11/2020*		*Revised to incorporate BREEAM Assessor comments*	*MR*	*MR*
5	*16/12/20*		*Revised to planning consultants comments*	*MR*	*MR*

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1.0 Introduction

Norman Bromley Partnership were commissioned by Wates London to provide an Overheating Analysis for the proposed Abbey Road Phase 2, London NW6 4DW

The scheme comprises of a 2 storey building of 1,858.7m^2 GIA with a community centre to the ground floor and a health centre to the first floor.

The Community Centre and Health Centre will replace the ageing facilities currently located on an adjacent site and planned for demolition to permit the construction of the Abbey Road Phase 3 development.

Figure 1 Abbey Centre View

The health centre is being provided with mechanical ventilation and partial cooling for clinical reasons. Heat recovery is being provided and the system can be used for free cooling in the summer. The community centre foyer, resource room and hall are also being provided with heat recovery mechanical ventilation due to the restricted use of opening windows and for acoustic reasons.

The intention for the other rooms to the community centre shall generally be to ventilate via opening windows and doors. This report therefore considers the rooms in the community centre which will be naturally ventilated where possible.

This report also includes information required to satisfy BREEAM credit HEA04, Thermal Comfort.

Thermal modelling has been carried out using software in accordance with CIBSE AM11, Building Energy and Environmental Modelling.

This report describes the process and assumptions to do an overheating assessment utilizing the software IES Virtual Environment which provides a full dynamic thermal analysis.

The objective of this study for the naturally ventilated areas is to study the building performance during the warmer months (01-May to 30-Sep) providing openable areas in order to avoid the overheating risk phenomena in the spaces in study.

The modelling also demonstrates that for the air conditioned health centre, summer and winter operative temperature ranges in occupied spaces are in accordance with criteria set out in CIBSE Guide A , Environmental Design, Table 1.5 and HTM requirements. The PMV (predicted mean vote) and PPD (predicted percentage of dissatisfied) indices based on the modelling have also been indicated.

The thermal modelling analysis has informed the temperature control strategy for the building and details for the proposed heating and cooling controls are included in the report.

The report has also been updated to satisfy Planning Condition 19 as follows:-

Cooling hierarchy study

Prior to first installation of above ground mechanical systems other than site clearance & preparation, a detailed overheating study and suitable proposals - with the aim of maximising the passive cooling options, and minimising carbon emissions and overheating risks - should be submitted to the local planning authority and approved in writing. Details of the proposed measures, alongside a relevant addendum to the Energy and Sustainability Statements, should be submitted to the local authority and approved in writing. The development shall thereafter be constructed in accordance with the approved details.

The Energy and Sustainability Reports have also been updated and submitted to the local authority for approval.

The measures included maximize the passive cooling options and minimize carbon emissions and overheating risk.

2.0 Assessment Criteria

The CIBSE Technical Memorandum 52 “Comfort Analysis” sets out the definition and compliance with limiting overheating.

The standard provides a robust, yet balanced, assessment of the risk of overheating of buildings in the UK and Europe. A room or building that fails any two of the three following criteria is classed as overheating:

Criteria 1 - Hours of Exceedance (He):
The number of hours the predicted operative temperature exceeds the maximum acceptable operative temperature by 1K, or more, must not exceed 3% of the total occupied hours or 40 hours, whichever is the smaller, during the five summer months (May-September).

Criteria 2 - Weighted Exceedance (We):
This criterion measures the severity of overheating within any one day, which is arguably more important than its frequency, and sets a daily limit of acceptability.
The criteria is based on Method B – ‘Degree hours criteria’ in BS EN15251; 2007 and is the time (hours and part hours) during which the operative temperature exceeds the daily Tmax during the occupied hours, weighted by a factor which is a function depending on by how many degrees the range has been exceeded.
To allow for the severity of overheating, the weighted exceedance shall be no greater than 6 in any one day.

Criteria 3 - Threshold/Upper Limit Temperature (Tupp):
Set an absolute maximum temperature of (Tmax+4) °C for a room (Tupp), beyond which level of overheating is unacceptable. Means that the measured/predicted operative temperature cannot exceed the Tmax by 4 °C or more at any time.

The building will be ‘deemed’ to have overheated if any two of the three criteria are exceeded.

The overheating risk is assessed between 1st of May and the 31st of September.

3.0 Basis for Model

3.1 Geometry

The building has been modelled using IES, Virtual Environmental software. This software creates a dynamic thermal model as shown in pictures below, within which ApacheSim ® can be used to model the effect of Overheating risk.

This IES VE Dynamic Thermal Modelling (DTM) software tracks the thermal state of the building on an hourly basis using real weather data, resulting in a detailed picture of the building's performance.

DTM combines several mechanisms to calculate the building response:
a] Conduction;
b] Convection;
c] Long wave radiation;
d] Short wave radiation – absorbed, reflected and transmitted;
e] Internal conditions – gains from lights, equipment and occupants along with plant operating hours and natural infiltration rates;
f] Ventilation and air movement from internal natural convection.

The accredited software IES Virtual Environment version 2018 was used for this overheating assessment. This software tool is fully compliant with the CIBSE Applications Manual 11: Building Energy and Environment Modelling.

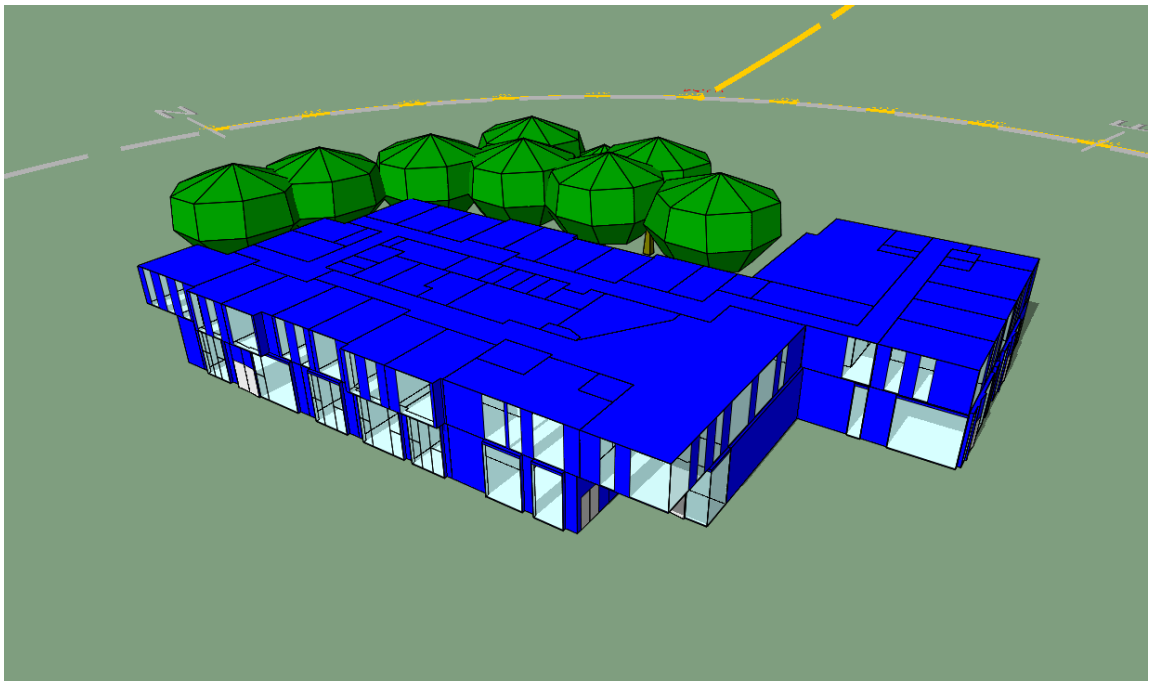

Figure 2 – 3D View of the building modelled in IES VE.

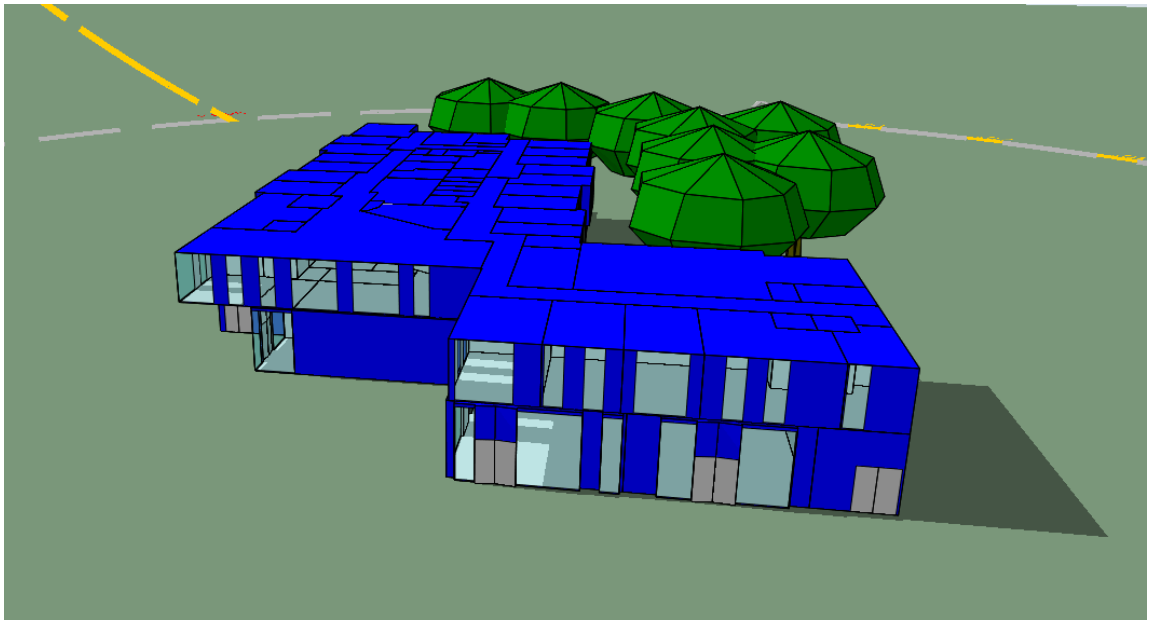

Figure 3: Axonometric South view of IES Model

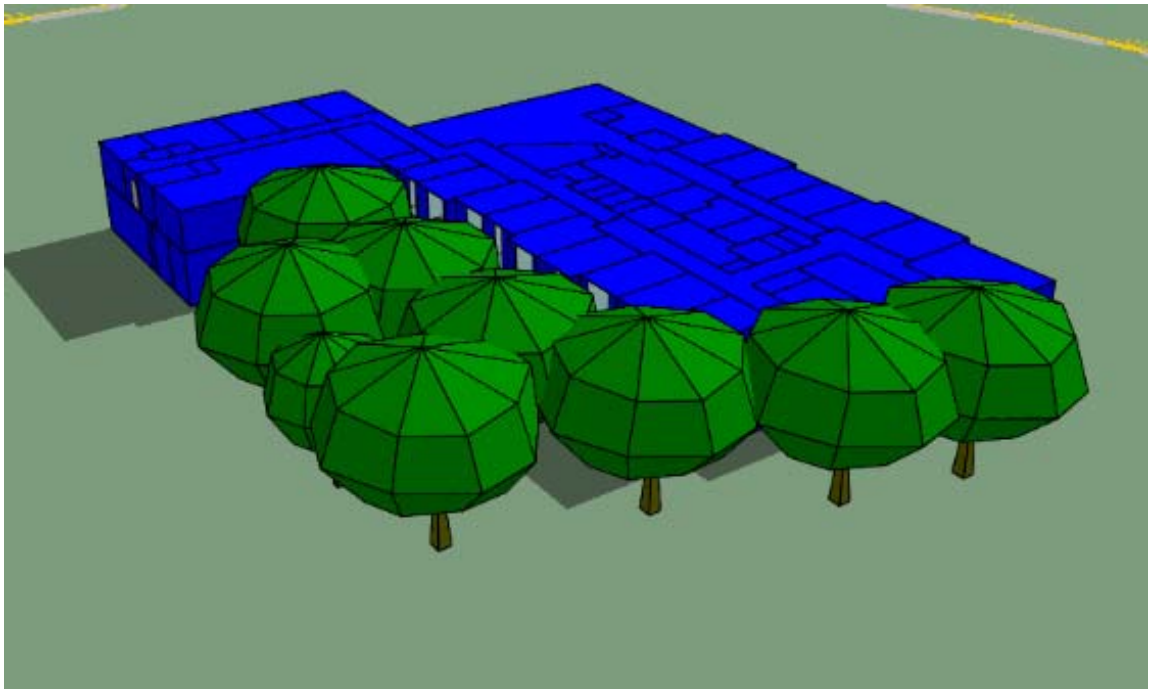

Figure 4: Axonometric North view of IES Model

3.2 Building Elements & Fabric Performance

The Table below provides the U and G values of the thermal elements used in IES VE building model.

Building Element	Proposed Fabric U-Values [W/m²K]
Ground/Exposed Floor	0.15
Internal Floor/Ceiling	1.087
External Wall	0.16
Internal Partition	1.789
External Glazing	1.41
Door	1.8
Roof	0.17

Table 1 - Building Envelope Specification - Modelling & Data Inputs

The glazing G-value was modelled as 40% and blinds were provided to all windows. The solar transmission factor of the blinds was modelled as 0.4. The air permeability was assumed as 5.0m3/s.m2 @ 50Pa.

3.3 Weather Data

The London DSY (Design Summer Year) weather has been used for this study due to it being closest weather file available under the CIBSE DSY weather database which represents a typical year weather conditions with implemented recommendations comply with TM52 criteria.

3.4 Occupancy Patterns and Behavior

In order to provide fresh air to improve the air quality and avoid overheating risk in the main spaces of the Community Centre the use of windows were used in the dynamic thermal model, as well as the numbers as dictated in the occupancy schedule. The internal heat gains of the occupants are based on the values recommended in CIBSE Guide A 2019 Table 6.3.

The objective of this study is to avoid the overheating risk with the use of natural ventilation although sometimes it is not possible to find a balance between the window and openable areas with the size of the space and the fabric performance of the building. For selected rooms other options have been studied including the use of mechanical ventilation or cooling in order to avoid the overheating phenomena.

The planners had requested that windows were closed during activities in the hall so a naturally ventilated option only is not possible.

The table below shows the occupancy patterns applied in the model for each correspondent space:

Room	Occupancy	People Heat Gain [W/person]		Light Heat Gain [W/m²]	Internal Gain from other equipment (Computers) [W]
	People	Maximum Sensible Gain	Maximum Latent Gain		
Belsize room	8 People	90	60	6	35
Nursery	6 Staff & 6 Children	90 & 70	60 & 50	6	75
Main Office	3 People	90	60	6	35
Breakout	3 People	90	60	6	-
Office 2	3 People	90	60	6	35
Volunteers Office	2 People	90	60	6	35
HAW Office	2 People	90	60	6	35
Garden Room	6 People	90	60	6	35
Foyer	13 People	90	60	6	35
Kitchen Resource	12 People	90	60	6	35
Hall	15 People	90	60	6	0

Table 2 - Heat Gain and occupation - Modelling & Data Inputs

3.5 Minimum Window Requirements

For the initial simulation the ventilation of the rooms in table 2 was assumed to be via opening windows only. It is assumed that they will be opened during occupied hours as follows:-

- Garden room - 2 low level opening windows with 300mm restrictors plus double doors
- Belsize room - 2 low level opening windows with 300mm restrictors plus double doors
- Nursery Crèche - 1 low level opening windows with 300mm restrictors plus double doors
- Break Out Space - 2 low level opening windows with 300mm restrictors. 1 on each side plus single doors
- Volunteers office - 1 low level opening windows with 300mm restrictors
- HAW Office - 1 low level opening windows with 300mm restrictors
- Main Office - 1 low level opening windows with 300mm restrictors
- Office 2 - 1 low level opening windows with 300mm restrictors

High level windows will have 380mm restrictors.

Note: In an attempt to avoid the risk of overheating, the fixed high level windows detailed above were changed to openable and external doors have also been opened 100%.

4.0 Cooling and Overheating

4.1 The Cooling Hierarchy

The proposed development utilises a number of design measures to reduce the demand for cooling and prevent the risk of overheating.

An overheating analysis of the building has been carried out and demonstrates the effectiveness of the measures listed below, in ensuring the community centre and health centre achieves the thermal comfort levels as dictated by CIBSE TM52.

1 – Minimise internal heat generation through energy efficient design – The use of high efficiency insulation in excess of the levels required by the building regulations shall limit heat losses from heating distribution within the building. The heat distribution pipe lengths have been kept to a minimum.

2 – Reducing the amount of heat entering the building in the summer – The south facing glazing provided to the waiting areas to maximise views of the park have been provided with external solar shading (included on the drawings submitted for planning) . Additional external solar shading is also provided to the windows on the west elevation (included on the drawings submitted for planning). Internal blinds shall also be provided to consulting rooms and offices.

3 – Use of thermal mass and high ceilings to manage heat within the building – The community centre is being provided with high ceilings to assist with the management of heat in the building.

4 - Mechanical ventilation – The health centre is being provided with mechanical ventilation and partial cooling for clinical reasons and Health Technical Memorandum (HTM) compliance. Heat recovery is being provided and the system can be used for free cooling in the summer. The community centre foyer, resource room and hall are also being provided with heat recovery mechanical ventilation due to the restricted use of opening windows for acoustic reasons. The ventilation will be used for night time cooling in the summer.

5 - Passive ventilation – The rooms to the community centre shall generally be ventilated via opening windows and doors with the exception of the hall, foyer and resource room which require mechanical ventilation as window opening are restricted due to noise. The health centre is provided with opening windows however these are provided with 100mm restrictors for HTM compliance, mechanical ventilation and partial cooling is therefore required for clinical reasons and to comply with HTM's.

4.2 Overheating Risk Analysis

A dynamic thermal simulation of the building has been carried out to predict internal temperatures using IES thermal modelling software. The naturally ventilated rooms to the community centre will be compliant with the CIBSE TM52 overheating criteria. Results included in Section 5 of this report.

5.0 Results

The overheating results for the building without mechanical ventilation or active cooling are included in appendix A which demonstrates that very few rooms are compliant with TM 52 without the introduction of solar shading, internal blinds, additional opening windows and then as a last resort ventilation and to some areas also cooling.

The tables below shows the results for the naturally ventilated rooms with the free areas detailed in 3.5 above being provided, all rooms have passed.

Room Name	Occupied days (%)	Criteria 1 (%Hrs Top-Tmax>=1K)	Criteria 2 (Max. Daily Deg.Hrs)	Criteria 3 (Max. DeltaT)	Criteria failing
Nursery	56.9	3.4	5	2	1
Breakout	71.2	2.4	1	1	
Main Office	71.2	3.3	7	2	2
Office 2	71.2	3.1	6	2	1
Volunteers Office	71.2	0.9	4	1	
HAW Office	71.2	3	1	1	
Belsize Room	71.2	3.6	7	2	2
Garden Room	71.2	1.3	4	1	

Table 3 Results Summary for Neutral Ventilation Only

The thermal modelling has also been used to demonstrate that for the air conditioned areas of the health centre 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) and for the health centre the Health Technical Memorandum (HTM).

For naturally ventilated areas:

- Winter operative temperature ranges in occupied spaces are in accordance with the criteria set out in CIBSE Guide A Environmental Design (table 1.5)

Thermal Zoning and Control

The thermal modelling analysis has informed the temperature control strategy for the building and its users.

The building has two distinct primary thermal zones:-

1. The ground floor community center which has its own dedicated heating and hot water plant.

2. The first floor health care center which has its own dedicated heating and hot water plant.

Each of the two main zones above are designed to bring the individual floors up to temperature at the required occupancy times/patterns to suite the different needs of each user.

Each floor has a dedicated weather compensated heating circuit which monitors the external temperature and modulates the flow temperature to provide the required heating to each floor and in turn minimizes the transportation losses.

The two variable temperature heating zones allow for the different heat loads for each floor. The first floor has an external roof which leads to a higher heat loss than the ground floor, therefore, the two variable temperature heating circuits can operate at different flow temperatures to suit the different heating demands to minimize transportation losses.

The health Centre's is provided with an air handling unit to meet the ventilation and temperature requirements of HTM 03. The unit provides tempered air to the floor at a constant temperature and the individual room temperature is controlled via a wall mounted sensor. The supply temperature of the fresh air can be changed on the BMS if required by the user.

The health Centre air handling unit also provides a degree of cooling to reduce the peak room temperatures during the summer. The temperature during the summer should not exceeded 25deg in the rooms to be HTM compliant therefore a small amount of cooling is provided on the air handling unit. The set point of the supply temperature can be adjusted by the users on the central BMS.

Building occupants will receive a full operation and maintenance manual to guide them on how to correctly operate the building services. They will also receive a full controls and demonstration on their own systems allowing them to set occupancy times and patterns, also how to set individual room temperatures.

The building heating system can control each individual room independently via a wall mounted controller. All occupied rooms, toilets, corridors and stair cores can be controlled individually to meet the user's requirements.

Manual override: A central system will provide control of all zones and automatic systems for when override control is required.

6.0 Conclusion

The initial overheating modelling simulations demonstrated that all occupied rooms failed the TM52 criteria with regard to summer overheating. Further simulations were then carried out including changing some fixed high level windows to opening, provision of solar shading (included prior to the planning submission) and the introduction of blinds in an effort to provide the maximum number of naturally ventilated rooms. The results are included in this report.

There are a number of areas which cannot be naturally ventilated for reasons as follows:-

The health centre needs to comply with the Health Technical Memorandum (HTM's) which requires treatment rooms to be maintained between 18-25 degrees C and all other areas 18 to 28 degrees C. Also there is a requirement to restrict window openings to 100mm. Ventilation and cooling is therefore required to the health centre and this has been demonstrated by dynamic thermal modelling. Solar shading has been introduced externally to reduce the solar gain and cooling loads.

A few rooms to the road elevation in the community centre have restricted window openings for acoustic reasons so also fail more than one of the TM52 criteria which has resulted in the introduction of mechanical ventilation to the hall, foyer and resource room. As the building is being constructed over a Thames Water sewer the construction needs to be lightweight, we therefore do not have the benefit of thermal mass.

Other factors which have influenced the decision to introduce mechanical ventilation to some rooms include the planners request that windows to the hall are not opened during functions so that the neighbors are not disturbed by noise. Also the foyer which is used for other functions including ICT classes and breakout space has limited options for the introduction of opening windows. During the pre-application consultations large windows were requested to the waiting area and foyer to maximise views over the external open space which has increased the solar gain to these spaces.

Mechanical ventilation has therefore only been introduced where required. The Client and users do not want mechanical ventilation to the community centre due to the additional capital cost and maintenance/ running costs, we have therefore taken all sensible measure available so that mechanical ventilation is only provided where essential.

This report has also assessed thermal comfort levels against BREEAM Hea 04 criteria 1, 2 and 3 which have been satisfied as demonstrated within this report.

The thermal modeling analysis has informed the temperature control strategy for the building and details of the proposed heating and cooling controls are indicated in this report.

APPENDIX A – OVERHEATING RESULTS WITHOUT VENTILATION OR ACTIVE COOLING

Overall
Passed: 4 rooms:
Failed: 89 rooms:
Unoccupiec 0 rooms:

Data:
Building ca Category II (new builds.)
Weather fil London_GTW_DSY1.epw
Days data= 365 01-Jan 31-Dec
Days (sumr 153 01-May 30-Sep
Data OK? OK Full summer

Occupancy:
Note: This report assesses occupied periods only. Please be aware that TM52 should be conducted
Use of educational NCM profiles may be seen as inappropriate due to prolonged unoccupied
See Section 6.1.2 (a) of TM52 for further information.

Passed: 4 rooms:

Room Nam	Room ID	Occupied (	Criteria 1 (	Criteria 2 (	Criteria 3 (	Criteria failing	
GP Treatm	GP000001	85.6	0	0	0	-	A/C included as HTM re
Physio Trea	PH000000	85.6	0	0	0	-	A/C included as HTM re
Podiatry Tr	PD000001	85.6	0	0	0	-	A/C included as HTM re
Podiatry Tr	PD000002	85.6	0	0	0	-	A/C included as HTM re

Failed: 89 rooms:

Room Nam	Room ID	Occupied (	Criteria 1 (	Criteria 2 (	Criteria 3 (	Criteria failing
ACC	CC000002	71.2	93.9	183	21	1 & 2 & 3
Acc. Staff V	CC000001	85.6	96.7	93	10	1 & 2 & 3
Acc. WC	CC000000	85.6	97.4	104	11	1 & 2 & 3
Baby ch.	BB000001	71.2	95.8	83	11	1 & 2 & 3
Baby Chang	BB000000	71.2	96.1	83	10	1 & 2 & 3
Belsize	BL000000	71.2	58.6	45	7	1 & 2 & 3
BREAKOUT	BR000000	71.2	41.6	11	6	1 & 2 & 3
Child WC	CH000000	71.2	41.4	43	4	1 & 2
Circ. 1	CR000001	71.2	86.4	99	9	1 & 2 & 3
Circ. 2	CR000002	71.2	89.7	109	10	1 & 2 & 3
Clean Utilit	CL000000	85.6	94.8	73	8	1 & 2 & 3
Cleaner	CL000002	71.2	89.1	74	10	1 & 2 & 3
Cleaner st	CL000001	85.6	33.9	12	2	1 & 2
Comms roc	CM000000	100	100	101	13	1 & 2 & 3
CORRIDOR	CR000003	85.6	96.8	93	10	1 & 2 & 3
CORRIDOR	CR000000	85.6	86.8	44	5	1 & 2 & 3
DH	DH000000	85.6	80.9	45	5	1 & 2 & 3
Dirty Utility	DR000000	85.6	90.5	55	6	1 & 2 & 3
ELEC	LC000000	71.2	13.3	20	3	1 & 2
Exam / Cor	XM000008	85.6	98	126	11	1 & 2 & 3
Exam / Cor	XM000004	85.6	95.8	106	10	1 & 2 & 3
Exam / Cor	XM000006	85.6	96.6	119	11	1 & 2 & 3
Exam / Cor	XM000005	85.6	96.6	112	10	1 & 2 & 3
Exam / Cor	XM000003	85.6	94.6	94	9	1 & 2 & 3

Exam / Cor	XM000000	85.6	91.9	78	7	1 & 2 & 3
Exam / Cor	XM000002	85.6	94.2	91	9	1 & 2 & 3
Exam / Cor	XM000001	85.6	93.3	87	8	1 & 2 & 3
Exam / Cor	XM000007	85.6	97.3	123	11	1 & 2 & 3
Female	FM000000	71.2	96	121	11	1 & 2 & 3
Cafe/ Foye	FY000000	71.2	92.5	151	17	1 & 2 & 3
GARDEN R(	GR000000	71.2	66.4	53	7	1 & 2 & 3
GP Admin	GP000004	85.6	98.7	143	13	1 & 2 & 3
GP Exam C	GP000003	85.6	99.1	173	18	1 & 2 & 3
GP Exam C	GP000002	85.6	98.9	164	17	1 & 2 & 3
GP Exam C	GP000006	85.6	98.5	144	15	1 & 2 & 3
GP Exam C	GP000000	85.6	97.6	111	12	1 & 2 & 3
GP Office	GP000005	85.6	98.5	131	12	1 & 2 & 3
GP Study /	GP000007	85.6	98.7	153	15	1 & 2 & 3
Hall	HL000001	71.2	93.6	27	10	1 & 2 & 3
HAW	HW000000	71.2	88.5	58	12	1 & 2 & 3
HCC OFFICI	HC000000	71.2	96.4	127	16	1 & 2 & 3
Health Cen	HL000000	85.6	99.1	176	18	1 & 2 & 3
IPC Office 2	PC000000	85.6	97.5	126	12	1 & 2 & 3
Kitchen/Re	KT000000	71.2	95.7	34	15	1 & 2 & 3
LIFT	LF000003	71.2	93.6	91	11	1 & 2 & 3
LIFT	LF000000	71.2	92.3	87	11	1 & 2 & 3
LIFT	LF000001	85.6	98.3	117	13	1 & 2 & 3
LIFT	LF000002	85.6	98.5	120	14	1 & 2 & 3
Main Office	MN000000	71.2	44.5	32	6	1 & 2 & 3
Male WC	ML000001	71.2	91.2	99	9	1 & 2 & 3
Milk	ML000002	71.2	79.8	41	6	1 & 2 & 3
Multidiscip	ML000003	85.6	98.9	167	16	1 & 2 & 3
Multidiscip	ML000000	85.6	98.9	161	15	1 & 2 & 3
Nursery/	NR000000	56.9	62.3	28	6	1 & 2 & 3
Office 2	FF000000	71.2	53.6	32	6	1 & 2 & 3
Plant	PL000000	71.2	99.5	71	10	1 & 2 & 3
Play Store	PL000001	71.2	10	17	2	1 & 2
PM Office	PM000000	85.6	97.8	118	11	1 & 2 & 3
Podiatry W	PD000000	85.6	96.4	100	11	1 & 2 & 3
Reception	RC000001	71.2	91.7	89	11	1 & 2 & 3
Reception	RC000000	85.6	98.5	142	13	1 & 2 & 3
Refuse	RF000000	71.2	63.2	47	6	1 & 2 & 3
St	ST00000A	71.2	31	27	4	1 & 2
St.	ST00000F	71.2	91.3	88	11	1 & 2 & 3
Staff	ST000007	71.2	85.2	78	10	1 & 2 & 3
Staff Kitche	ST000003	85.6	97.9	104	11	1 & 2 & 3
Staff WC	ST000010	85.6	94.6	65	7	1 & 2 & 3
Staff WC	ST000002	85.6	96.3	93	10	1 & 2 & 3
Staff WC	ST000005	85.6	96.4	92	10	1 & 2 & 3
Staff WC	ST000004	85.6	96.9	98	11	1 & 2 & 3
Staff WC	ST000000	85.6	96.3	74	8	1 & 2 & 3
STORE	ST000011	85.6	98.2	113	12	1 & 2 & 3
Store	ST000012	71.2	58.5	44	5	1 & 2 & 3
Store 1	ST000001	85.6	91.1	57	6	1 & 2 & 3

Store 1	ST000008	71.2	92.6	80	10	1 & 2 & 3
Store 3	ST000006	85.6	95.6	85	9	1 & 2 & 3
Store 3	ST00000C	71.2	66.5	48	6	1 & 2 & 3
Store 4	ST00000D	71.2	64.4	47	5	1 & 2 & 3
Store 5A	ST00000B	71.2	36.5	28	4	1 & 2
Store 5B	ST000009	71.2	63.7	42	6	1 & 2 & 3
Store 6	ST00000E	71.2	61.2	42	6	1 & 2 & 3
Utility	TL000000	85.6	94	77	8	1 & 2 & 3
Volunteers	VL000000	71.2	93	52	11	1 & 2 & 3
Waiting Are	WT000000	85.6	99	154	14	1 & 2 & 3
WC	WC000000	85.6	96.8	94	10	1 & 2 & 3
WC	WC000001	85.6	96.9	99	11	1 & 2 & 3
WC	WC000002	85.6	97.8	102	11	1 & 2 & 3
WC	WC000003	85.6	96.9	95	10	1 & 2 & 3
WHC WC	WH000000	71.2	95.8	120	11	1 & 2 & 3

Unoccupied 0 rooms:

Room Nam	Room ID	Occupied (	Criteria 1 (	Criteria 2 (	Criteria 3 (	Criteria failing

Note: A TM 52 2013 analysis provides an assessment of comfort compliance based on bulk air mo
i.e. each space is considered idealised and the air in the space perfectly mixed. The assessm
not assess placement of space features e.g. windows & openings, airflow patterns or discom
The user should assess these design aspects outside of the TM52 analysis.

d for occupied and/or “available hours”.
d periods during summer months.

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ꞏent does
ꞏnfort issues.

APPENDIX B – PREDICTED MEAN VOTE (PMV) AND PREDICTED PERCENTAGE OF PEOPLE DISSATISFIED (PPD)

Project	Abbey Phase 2 - Health Centre
Subject	PMV indices
Revision	-
Date	27/11/2020

Var. Name	Location	Min. Val.	Min. Time	Max. Val.	Max. Time	Mean
Predicted mean vote	Acc. Staff WC /	-3	00:30,01/Jan	3	13:30,23/Jul	-0.97
Predicted mean vote	Acc. WC	-3	00:30,01/Jan	3	15:30,21/Jul	-0.33
Predicted mean vote	Baby Change	-3	00:30,01/Jan	2.84	17:30,24/Jul	-1
Predicted mean vote	Clean Utility	-3	00:30,01/Jan	2.95	17:30,24/Jul	-0.86
Predicted mean vote	Cleaner st	-3	00:30,01/Jan	1.49	17:30,24/Jul	-1.3
Predicted mean vote	Comms room	-1.49	05:30,03/Dec	3	12:30,24/May	0.97
Predicted mean vote	CORRIDOR	-3	00:30,01/Jan	2.38	17:30,23/Jul	-1.12
Predicted mean vote	CORRIDOR	-3	00:30,01/Jan	3	14:30,23/Jul	-0.85
Predicted mean vote	DH	-3	00:30,01/Jan	2.33	17:30,24/Jul	-1.21
Predicted mean vote	Dirty Utility	-3	00:30,01/Jan	2.41	17:30,24/Jul	-1.17
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	10:30,23/Jul	-0.81
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	10:30,23/Jul	-0.74
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	12:30,23/Jul	-0.72
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	11:30,23/Jul	-0.68
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	2.99	16:30,25/Jul	-0.97
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	11:30,23/Jul	-0.91
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	15:30,24/Jul	-0.89
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	10:30,23/Jul	-0.7
Predicted mean vote	Exam / Consult	-3	00:30,01/Jan	3	15:30,23/Jul	-0.82
Predicted mean vote	GP Admin	-3	01:30,03/Dec	3	15:30,20/Jun	-0.01
Predicted mean vote	GP Exam Consult 1	-3	00:30,01/Jan	3	16:30,05/May	-0.17
Predicted mean vote	GP Exam Consult 2	-3	00:30,01/Jan	3	17:30,07/May	-0.16
Predicted mean vote	GP Exam Consult 3	-3	00:30,01/Jan	3	17:30,08/May	-0.29
Predicted mean vote	GP Exam Consult 4	-3	00:30,01/Jan	3	17:30,23/May	-0.44
Predicted mean vote	GP Office	-3	01:30,03/Dec	3	16:30,21/Jun	-0.06
Predicted mean vote	GP Study / Meeting	-3	00:30,01/Jan	3	12:30,19/Jun	-0.46
Predicted mean vote	GP Treatment Room	-3	00:30,01/Jan	1.95	17:30,22/Jul	-1.13
Predicted mean vote	Health Centre Core	-3	00:30,01/Jan	3	17:30,07/May	-0.16
Predicted mean vote	IPC Office 22 Desks	-3	00:30,01/Jan	3	16:30,23/Jul	-0.75
Predicted mean vote	LIFT	-3	00:30,01/Jan	3	17:30,23/May	-0.3
Predicted mean vote	LIFT	-3	00:30,01/Jan	3	16:30,23/May	-0.22
Predicted mean vote	Multidisciplinary Room	-3	00:30,01/Jan	3	15:30,21/May	-0.39
Predicted mean vote	Multidisciplinary Room	-3	00:30,01/Jan	3	13:30,23/May	-0.36
Predicted mean vote	Physio Treatment	-3	00:30,01/Jan	0.38	20:30,23/Jul	-1.31
Predicted mean vote	PM Office	-3	00:30,01/Jan	3	11:30,23/Jul	-0.39
Predicted mean vote	Podiatry Treatment 1	-3	00:30,01/Jan	0.59	20:30,23/Jul	-1.26
Predicted mean vote	Podiatry Treatment 2	-3	00:30,01/Jan	1.61	17:30,22/Jul	-1.16
Predicted mean vote	Podiatry Workshop	-3	00:30,01/Jan	3	17:30,23/May	-0.49
Predicted mean vote	Reception	-3	00:30,01/Jan	3	15:30,20/Jun	-0.12
Predicted mean vote	Staff Kitchen / Rest	-3	00:30,01/Jan	3	11:30,23/Jul	-0.8
Predicted mean vote	Staff WC	-3	00:30,01/Jan	3	16:30,23/Jul	-0.77
Predicted mean vote	Staff WC	-3	00:30,01/Jan	3	13:30,23/Jul	-0.86
Predicted mean vote	Staff WC	-3	00:30,01/Jan	3	15:30,23/Jul	-0.9
Predicted mean vote	Staff WC	-3	00:30,01/Jan	2.81	17:30,24/Jul	-0.95
Predicted mean vote	Staff WC	-3	00:30,01/Jan	3	17:30,23/Jul	-0.88
Predicted mean vote	STORE	-3	00:30,01/Jan	3	16:30,19/Jun	-0.11
Predicted mean vote	Store 1	-3	00:30,01/Jan	2.6	17:30,24/Jul	-1.02
Predicted mean vote	Store 3	-3	00:30,01/Jan	2.75	17:30,23/Jul	-1.09
Predicted mean vote	Utility	-3	00:30,01/Jan	2.55	17:30,25/Jul	-1.15
Predicted mean vote	Waiting Area	-3	00:30,01/Jan	3	12:30,23/May	-0.13
Predicted mean vote	WC	-3	00:30,01/Jan	3	13:30,23/Jul	-0.49
Predicted mean vote	WC	-3	00:30,01/Jan	3	17:30,21/Jul	-0.45
Predicted mean vote	WC	-2.92	05:30,03/Dec	3	14:30,21/Jul	-0.06
Predicted mean vote	WC	-3	04:30,01/Jan	3	17:30,21/Jul	-0.41
BUILDING AVERAGE		**-2.97**		**2.77**		**-0.64**

Project	Abbey Phase 2 - Health Centre
Subject	PPD indices
Revision	-
Date	27/11/2020

Var. Name	Location	Min. Val.	Min. Time	Max. Val.	Max. Time	Mean
People dissatisfied (%)	Acc. Staff WC /	5	16:30,05/Oct	100	00:30,01/Jan	51.16
People dissatisfied (%)	Acc. WC	5	09:30,14/May	100	00:30,01/Jan	42.67
People dissatisfied (%)	Baby Change	5	08:30,27/Aug	100	00:30,01/Jan	46.98
People dissatisfied (%)	Clean Utility	5	06:30,28/Jun	100	00:30,01/Jan	46.13
People dissatisfied (%)	Cleaner st	5	17:30,18/Sep	100	00:30,01/Jan	48.14
People dissatisfied (%)	Comms room	5	14:30,18/Mar	100	12:30,24/May	38.7
People dissatisfied (%)	CORRIDOR	5	12:30,17/May	100	00:30,01/Jan	47.75
People dissatisfied (%)	CORRIDOR	5	08:30,30/Aug	100	00:30,01/Jan	48.36
People dissatisfied (%)	DH	5	03:30,04/Aug	100	00:30,01/Jan	50.47
People dissatisfied (%)	Dirty Utility	5	14:30,01/Jun	100	00:30,01/Jan	50.01
People dissatisfied (%)	Exam / Consult	5	16:30,11/Oct	100	00:30,01/Jan	47.86
People dissatisfied (%)	Exam / Consult	5	18:30,20/May	100	00:30,01/Jan	46.42
People dissatisfied (%)	Exam / Consult	5	05:30,02/Aug	100	00:30,01/Jan	44.9
People dissatisfied (%)	Exam / Consult	5	15:30,11/Oct	100	00:30,01/Jan	45.32
People dissatisfied (%)	Exam / Consult	5	14:30,05/Jun	100	00:30,01/Jan	49.09
People dissatisfied (%)	Exam / Consult	5	04:30,03/Aug	100	00:30,01/Jan	48.92
People dissatisfied (%)	Exam / Consult	5	22:30,08/Sep	100	00:30,01/Jan	47.12
People dissatisfied (%)	Exam / Consult	5	05:30,11/Jul	100	00:30,01/Jan	46.9
People dissatisfied (%)	Exam / Consult	5	07:30,18/Aug	100	00:30,01/Jan	45.97
People dissatisfied (%)	GP Admin	5	14:30,07/Mar	100	15:30,20/Jun	41.21
People dissatisfied (%)	GP Exam Consult 1	5	17:30,09/Feb	100	00:30,01/Jan	53.09
People dissatisfied (%)	GP Exam Consult 2	5	08:30,04/May	100	00:30,01/Jan	51.22
People dissatisfied (%)	GP Exam Consult 3	5	13:30,20/Apr	100	00:30,01/Jan	50.13
People dissatisfied (%)	GP Exam Consult 4	5	21:30,01/Jul	100	00:30,01/Jan	45.67
People dissatisfied (%)	GP Office	5	05:30,04/Sep	100	16:30,21/Jun	39.07
People dissatisfied (%)	GP Study / Meeting	5	22:30,29/Jun	100	00:30,01/Jan	48.2
People dissatisfied (%)	GP Treatment Room	5	18:30,16/Jul	100	00:30,01/Jan	38.77
People dissatisfied (%)	Health Centre Core	5	02:30,02/Jun	100	00:30,01/Jan	51.88
People dissatisfied (%)	IPC Office 22 Desks	5	03:30,09/Sep	100	00:30,01/Jan	44.38
People dissatisfied (%)	LIFT	5	18:30,16/Sep	100	00:30,01/Jan	50.54
People dissatisfied (%)	LIFT	5	04:30,24/Sep	100	00:30,01/Jan	49.91
People dissatisfied (%)	Multidisciplinary Room	5	09:30,27/Mar	100	00:30,01/Jan	52.38
People dissatisfied (%)	Multidisciplinary Room	5	03:30,06/Sep	100	00:30,01/Jan	48.19
People dissatisfied (%)	Physio Treatment	5	21:30,26/Jul	100	00:30,01/Jan	43.34
People dissatisfied (%)	PM Office	5	10:30,25/Oct	100	00:30,01/Jan	40.41
People dissatisfied (%)	Podiatry Treatment 1	5	20:30,17/Jul	100	00:30,01/Jan	41.69
People dissatisfied (%)	Podiatry Treatment 2	5	01:30,18/Jul	100	00:30,01/Jan	39.2
People dissatisfied (%)	Podiatry Workshop	5	11:30,20/Oct	100	00:30,01/Jan	46.6
People dissatisfied (%)	Reception	5	16:30,15/Feb	100	00:30,01/Jan	43.08
People dissatisfied (%)	Staff Kitchen / Rest	5	01:30,30/May	100	00:30,01/Jan	49.87
People dissatisfied (%)	Staff WC	5	12:30,05/Oct	100	00:30,01/Jan	44.87
People dissatisfied (%)	Staff WC	5	18:30,07/Jun	100	00:30,01/Jan	48.02
People dissatisfied (%)	Staff WC	5	11:30,15/May	100	00:30,01/Jan	47.96
People dissatisfied (%)	Staff WC	5	04:30,11/Jul	100	00:30,01/Jan	46.17
People dissatisfied (%)	Staff WC	5	15:30,25/Oct	100	00:30,01/Jan	46.53
People dissatisfied (%)	STORE	5	21:30,16/Sep	100	00:30,01/Jan	44.34
People dissatisfied (%)	Store 1	5	18:30,10/May	100	00:30,01/Jan	47.05
People dissatisfied (%)	Store 3	5	01:30,10/Jul	100	00:30,01/Jan	49.97
People dissatisfied (%)	Utility	5	22:30,08/Sep	100	00:30,01/Jan	50.94
People dissatisfied (%)	Waiting Area	5	13:30,11/Apr	100	00:30,01/Jan	48.53
People dissatisfied (%)	WC	5	05:30,04/Jul	100	00:30,01/Jan	42.79
People dissatisfied (%)	WC	5	02:30,01/Jun	100	00:30,01/Jan	42.83
People dissatisfied (%)	WC	5	18:30,03/Apr	100	14:30,21/Jul	37.58
People dissatisfied (%)	WC	5	17:30,02/Sep	100	04:30,01/Jan	41.58
BUILDING AVERAGE		**5.00**		**100.00**		**46.31**