



PROJECT REF BS 1369 DATE May 2020 REVISION 2

ABBEY ROAD – PHASE 2

ENERGY 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: <u>mail@normanbromley.co.uk</u> Website: <u>www.normanbromley.co.uk</u>



PROJECT REVISION SHEET

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Table of Contents

1.0	EXECUTIVE SUMMARY	1
2.0	PROPOSED DEVELOPMENT	3
3.0	PLANNING REQUIREMENTS	4
4.0	ASSESSMENT METHODOLOGY	5
5.0	COOLING AND OVERHEATING	7
6.0	CARBON EMISSIONS	8
6.1	Baseline Scheme	8
6.2	"Be Lean" Reduction by Energy Efficient Measures	9
6.3	"Be Clean" Reduction by Energy Efficient Measures 1	0
6.4	"Be Green" Renewable Energy Technologies1	2
7.0	COOLING AND OVERHEATING 1	6
7.1	The Cooling Hierarchy1	6
7.2	Overheating Risk Analysis1	6
8.0	MONITORING 1	7
9.0	CONCLUSION1	7
APPE	NDIX 'A' 1	8
BRUK	L REPORT FOR COMMUNITY CENTRE INCORPORATING BASELINE DESIGN 1	8
APPE	NDIX 'B' 1	9
BRUK	L REPORT FOR HEALTH CENTRE INCORPORATING BASELINE DESIGN 1	9
APPE	NDIX 'C'	0
BRUK	L REPORT FOR COMMUNITY CENTRE INCORPORATING "BE LEAN" DESIGN2	0
APPE	NDIX 'D'	.1
BRUK	L REPORT FOR HEALTH CENTRE INCORPORATING "BE LEAN" DESIGN 2	.1
APPE	NDIX 'E'	2
BRUK	L REPORT FOR COMMUNITY CENTRE INCORPORATING "BE GREEN" DESIGN	1
		2
APPE	NDIX 'F'	3
BRUK	L REPORT FOR HEALTH CENTRE INCORPORATING "BE GREEN" DESIGN 2	3
APPE	NDIX 'G'	4
DISCO	DUNTED RENEWABLE ENERGY TECHNOLOGIES 2	4



1.0 EXECUTIVE SUMMARY

Norman Bromley Partnership were commissioned by Wates London to provide an Energy Assessment to support the planning application for the proposed Abbey Road Phase 2, London NW6 4DW

The aim of this report is to support a full planning application for the phase 2 development and addresses the key requirements of local, regional and national policy.

Our assessment methodology adopts the principles and procedures outlined within the Greater London Authority Energy Assessment Guidance (October 2018) and consequently the key stages described therein have been fully incorporated within our calculation, review and reporting processes in delivering this report.

Our assessment conclusion can be summarized by the following tables:

	Regulated Carbon Dioxide Emissions (Tonnes CO ₂ /Annum)		
Step 1 – Baseline	31.48		
Step 2 – Energy Demand Reduction	25.38		
Step 3 – Low Carbon Energy Supply	25.38		
Step 4 – Renewable Energy	19.75		

Regulated carbon dioxide savings from each stage of the energy hierarchy

	Regulated Carbon Dioxide Emissions (Tonnes CO ₂ /Annum)	CO ₂ Emissions Reduction (%)
Savings from Energy Demand Reduction	6.10	19.38
Savings from Low Carbon Energy Supply	0.0	0.0
Savings from Renewable Energy	5.63	17.88
Total Cumulative Savings	11.73	37.26

Our assessment concludes that the proposed Abbey Road Phase 2 development, based upon the proposed building geometry and incorporating the following measures will achieve compliance with the Building Regulation and the London Plan.



Energy Demand Reduction

- 1. Improved building fabric over Part L 2013
- 2. Low Energy Lighting
- 3. High Efficiency Pumps
- 4. Intelligent Building Controls

Low Carbon Energy Supply

1. Heating and hot water supplied by air source heat pumps with a heating efficiency of 350% and a hot water efficiency of 250%.

Renewable Energy

1. Photovoltaic Cells providing an output of 15.5 kWp

It is predicted that the Abbey Road Phase 2 development shall achieve a 37.26% improvement over Part L2A 2013 in compliance with the London Plan.

The 37.26 % improvement over Part L2A 2013 shall wholly be satisfied by onsite measures.

It is also predicted that the PV array will reduce the buildings energy usage by 20%.



2.0 PROPOSED DEVELOPMENT

The scheme comprises of a 2 storey building of 1,858.7m² 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.

The site currently includes Snowman and Casterbridge residential towers, residential car park and private open space. The proposal also includes the landscaping of the site and provision of a play area.



Figure 1 – Abbey Centre View

3.0 PLANNING REQUIREMENTS

The development is required to adhere to a number of national, regional and local policies. These form the key principles in the development of the energy strategy and as such ensure compliance is achieved with all relevant targets.

This report serves to satisfy the requirements of The London Plan Energy Assessments Guidance which has been confirmed as being a 35% reduction in the CO₂ emissions for the building. The report also needs to address the relevant policies in the Intend to Publish London Plan (ItP,2019) and the Camden Local Plan 2017, Policy CC1-Climate Change Mitigation.

In addition to the requirements of the outline planning consent, the following key policies and legislation must be met:

- 1. Building Regulations Part L 2013
- 2. London Plan 35% reduction from site measures
- 1. BREEAM circa 20% reduction to achieve 6No ENE01 credits

In line with the requirements of the London Plan, this report will demonstrate the route to delivering a proposed building which achieves a 37.26% reduction in CO₂ emissions over Part L2A 2013 and a 20% reduction in carbon dioxide emission from on-site renewable energy generation.

4.0 ASSESSMENT METHODOLOGY

The London Plan Energy Hierarchy strategy provides an inclusive approach to energy use considering on site energy use, efficiency of energy supply and the use of sources of renewable energy.

The purpose of the energy hierarchy approach is to demonstrate that climate change mitigation measures form a fundamental part of the proposed scheme's design and evolution. Any measures taken forward must be demonstrated as appropriate and feasible in the context of the overall development.

There are 4 steps to the energy hierarchy process:

1.	2.	3.	4.
Design Criteria	'Be Lean'	'Be Clean'	'Be Green'
Building Regulations compliant building	Reduction by energy efficiency measures	Selection of low carbon energy supply strategy	Renewable technologies

Step 1 – Design Criteria

Establish the regulated CO_2 emissions for a Part L 2013 compliant building (baseline design) using BRE accredited SBEM calculation software.

Step 2 – 'Be Lean' – Reduction by Energy Efficiency Measures

Apply energy demand reduction measures specific to the scheme such as enhanced building fabric to deliver reduced heat loss, heat gain and improved air permeability.

Other measures include improved efficiency of fixed building services beyond that of the statutory requirements.

Step 3 – 'Be Clean' – Selection of low carbon energy supply strategy

Once demand for energy has been minimised it should be demonstrated that the use of a low carbon energy supply has been explored through the order of preference of the following options:

1 - Connection to an existing heat distribution network

Investigate the potential for connecting onto an existing heat network referencing the London Heat Map and contacting local heat network operators.

2 - Connection to a planned heat distribution network

Investigate the potential for connecting onto a planned heat network referencing the London Heat Map and local energy master plans.



4 - Combined heat and power (CHP) – Consider the appropriateness of CHP for the development. Typically CHP is deemed feasible where there is a simultaneous demand for heat and power in excess of 5,000 hours per annum.

Step 4 – 'Be Green' – Renewable Energy Technologies

Subject to the 'Be Lean and Be Clean' principles being appropriately satisfied and demonstrated accordingly, consideration should be made to feasible renewable energy technologies.

Figure 2 provides a graphical representation of the London Plan Energy Hierarchy.



Figure 2 – 'Be Lean, Be Clean and Be Green' Diagram, London Plan

5.0 COOLING AND OVERHEATING

Design measures shall be employed to reduce the demand for cooling and its associated energy consumption in accordance with the London Plan Cooling hierarchy.

1 – **Minimise internal heat generation through energy efficient design** – By limiting heat losses from heating distribution within buildings.

2 - Reducing the amount of heat entering the building in summer – By use of carefully designed shading measures.

3 – Use of thermal mass and high ceilings to manage heat within the building
– Increasing the amount of exposed thermal mass can help absorb excess heat

4 - Passive ventilation – Passive measures could include the use of openable windows, louvres designing for stack effect.

5 – Mechanical Ventilation – Use of mechanical ventilation to provide free cooling where outside air temperature is below that inside the building during the summer months.



6.0 CARBON EMISSIONS

6.1 <u>Baseline Scheme</u>

The baseline scheme utilizes the U-Values and engineering solutions as below to comply with Building Regulations 2013 Part L2A.

Building fabric details

U Values	Proposed	Building Regulations Minimum	Units
Wall	0.3	0.35	W/m2K
Roof	0.2	0.25	W/m2K
Floor	0.21	0.25	W/m2K
Windows	1.6	2.2	W/m2K
	North Elevation	G Value 40%	
	South Elevation	G Value 40%	
	East Elevation	G Value 40%	
	West Elevation	G Value 40%	
Infiltration	0.25	ACH	(Air Permeability of 5m ³ /h/m ² @50Pa)

Fixed Building Services

Service	
Lighting Luminaire	85 lm/circuit watt
Lighting Occupancy control	Yes
Lighting presence detections	Yes
Heating	Efficiency 350%
Hot Water	Efficiency 200%
Variable speed control of pumps	Yes
Heat Recovery Ventilation SFP	1.6 W/l/s
Heat Recovery Efficiency	83% - Community Centre
	68% - Health Centre
Zonal Extract Ventilation SFP	0.5 W/l/s
Ventilation demand control	Yes
Cooling – Split Systems (Treatment /rooms)	Efficiency 350%

Based upon the building inputs detailed above, the SBEM calculation has identified the following baseline CO₂ emissions:

Part L: TER & BER

	Community Centre	Health Centre
Notional building emissions	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Target emissions rate	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Building emissions rate	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Pass/Fail	PASS	PASS
% emissions improvement	0	0

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The BRUKL output document associated with this stage can be found in Appendix A (Community Centre) and B (Health Centre)

6.2 "Be Lean" Reduction by Energy Efficient Measures

Passive design measures have been included to reduce CO₂ emissions including optimising orientation and site layout, natural ventilation and lighting and solar shading. Refer to the Design and Access Statement.

To further reduce the CO2 emissions associated with the scheme, the following measures have been applied to exceed the standards used as part of the baseline scheme.

U Values	Proposed	Building Regulations Minimum	Units
Wall	0.16	0.35	W/m2K
Roof	0.17	0.25	W/m2K
Floor	0.15	0.25	W/m2K
Windows	1.41	2.2	W/m2K
	North Elevation	G Value 40%	
	South Elevation	G Value 40%	
	East Elevation	G Value 40%	
	West Elevation	G Value 40%	
Infiltration	0.25	ACH	(Air Permeability of 5m3/h/m2 @50Pa)

Building fabric details

Fixed Building Services

Service	
Lighting Luminaire	100 lm/circuit watt
Lighting Occupancy control	Yes
Lighting presence detections	Yes
Heating	Efficiency 350%
Hot Water	Efficiency 250%
Variable speed control of pumps	Yes
Heat Recovery Ventilation SFP	1.5 W/I/s Community Centre
	1.6 W/l/s Health Centre
Heat Recovery Efficiency	83% Community Centre
	68% Health Centre
Zonal Extract Ventilation SFP	0.5 W/I/s
Ventilation demand control	Yes
Cooling – Split Systems (Treatment /rooms)	Efficiency 350%

Based upon the building inputs detailed above, the SBEM calculation has identified the following "Be Lean" CO₂ emissions:



Part L: TER & BER

	Community Centre	Health Centre
Notional building emissions	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Target emissions rate	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Building emissions rate	11.7 kgCO ₂ /m ²	15.1 kgCO ₂ /m ²
Pass/Fail	PASS	PASS
% emissions improvement	25.9	13.7

Energy Demand Following Energy Efficiency Measures (MWh / Year)

	Space Heating	Hot Water	Lighting	Auxiliary	Cooling	Unregulated Electricity	Unregulated Gas
Community Centre	7.388	5.931	7.296	3.671	0	24.203	N/A
Health Centre	5.361	3.236	15.967	4.955	0.483	26.874	N/A
Total	12.749	9.167	23.263	8.626	0.483	26.898	N/A

The BRUKL output document associated with this stage can be found in Appendix C (Community Centre) and Appendix D (Health Centre).

6.3 "Be Clean" Reduction by Energy Efficient Measures

6.3.1 - Connection to an Existing Heat Distribution Network

The potential for connecting onto an existing heat network has been investigated and as can be seen from the excerpt from the London Heat Map below, the site is not near any existing heat distribution networks.





Figure 3 – London Heat Map for the site.

6.3.2 - Connection to a Planned Heat Distribution Network

The site is not near any planned heat distribution networks.

6.3.3 - Site Wide Heating Networks

In line with the GLA requirement to use the SAP 10 emission factors which promote the use of electricity over gas as a heat source, air source heat pumps (ASHP) are proposed for the project.

The proposed ASHP's have a heat efficiency of 350%

It is proposed that the ASHP's are connected to underfloor heating in the community centre and health centre. The system shall be arranged to permit future connection of the underfloor heating network. Valved connections shall be included to the plantroom.

6.3.4 – Air Quality

The proposed use of ASHP also eliminates any NOx emissions associated with the project.



6.4 <u>"Be Green" Renewable Energy Technologies</u>

The energy efficient measures undertaken as part of the baseline design are sufficient to achieve Part L2A 2013 compliance, however further measures are required to achieve the 35% CO₂ reduction required for The London Plan.

The following renewable energy technologies are proposed for this development:

- Air Source Heat Pumps
- Photovoltaic Cells

The remaining renewable energy technologies listed below have been investigated and discounted.

- Wind Turbines
- Biomass Boilers
- Ground Source Heat Pump
- Solar Thermal Panels
- Hydroelectric Power

Further explanation of the discounted technologies are given within Appendix G.

6.4.1 Air Source Heat Pumps

It has been decided to provide air source heat pumps on the project which will provide a portion of the buildings energy usage via a renewable source.

The use of air source heat pumps for heating only are eligible for payment via the Government's Renewable Heat Incentive (RHI).

The "Be Lean" SBEM included in Appendix C includes the use of air source heat pumps with heating efficiency of 350% and hot water generation efficiency of 250%.

6.4.2 Photovoltaic Cells

The adoption of photovoltaic panels will offset the buildings electrical demand and does not conflict with the overall design strategy of the building.

An area of the roof has been identified which could be used for PV panels and this is indicated on the Architects drawings included with the planning application.

The buildings surrounding the site on the south elevation are 2 storey so will not shade the proposed PV panels and there are currently no planned buildings adjacent to the site that could shade the panels in the future.



Figure 6 – Proposed Roof Plan

Based upon the application of photovoltaic panels, the SBEM calculation has identified the following "Be Green" CO2 emissions:

Part L: TER & BER

	Community Centre	Health Centre
Notional building emissions	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Target emissions rate	15.8 kgCO ₂ /m ²	17.5 kgCO ₂ /m ²
Building emissions rate	10.1 kgCO ₂ /m ²	10.8 kgCO ₂ /m ²
Pass/Fail	PASS	PASS
% emissions improvement	36	38.3

Energy Demand Following Energy Efficiency Measures MWh/year)

	Space Heating	Hot Water	Lighting	Auxiliary	Cooling	Unregulated Electricity	Unregulated Gas
Community Centre	7.388	5.931	7.296	3.671	0	24.203	N/A

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Health Centre	5.361	3.236	15.967	4.955	0.483	26.874	N/A
Total	12.749	9.167	23.263	8.626	0.483	51,077	N/A

The BRUKL output document associated with this stage can be found in Appendix E and F.

A 15.5 kilowatt peak (kWp) PV array would provide a 5.629 tonne reduction in CO2 emissions per annum which equates to a total reduction of 28.5% CO₂ emissions.

The PV array will generate 10,865kwh per annum which equates to a reduction in the buildings energy usage from on-site renewable energy of 20%.

The total reduction in the buildings energy usage from on-site renewable energy with the use of air source heat pumps and PV's is 35%

The photovoltaic panels (PV's) work well with the ASHP as much of the electricity generated by the PV's will be used by the ASHP for heating and hot water.

Whole Life Costing

Whole life costing includes costs for (1) installation, (2) maintenance, (3) operating cost and (4) avoided cost. Summary of whole life costing is listed as below:

(1) Installation	£23,000.00	Assuming 15.5 kWp PV panels
(2) Maintenance	£300 pa	For electrical inspection and testing
(3) Operating cost; fuel	N/A	No operating costs except annual maintenance
(4) Total avoided cost	£760.55 per annum	Avoided costs include offset of electric consumption and feed- in tariff yield

Annual energy saving: 10,865 kWh Electrical offset: $5,439 \text{ kWh} \times 14 \text{ p/kWh} = \text{\pounds}760.55 \text{ per annum}$ (Assuming 50% of the generated electricity is consumed by the facility)



The whole life costs (25 years) would be in the order of:

 $(\pounds 23,000 + (25 \times 300)) - (\pounds 760.55 \times 25) = -\pounds 11,486.25$

The above calculation is based on the unit cost of electricity remaining constant, when in reality it will increase, therefore the payback and life costing will improve further.

The above figure concludes that the installation will not provide a financial return over a 25 year period.

Grants

We are not aware of any applicable grants at this current time for the PV installation. However as the air source heat pumps will be eligible for payment via the Government Department of Energy and Climate Change (DRCC).

7.0 COOLING AND OVERHEATING

7.1 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. Additional external solar shading is also provided to the windows on the west elevation. 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 partrial 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 for acoustic reasons.

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 although mechanical ventilation is required to clinical rooms.

7.2 Overheating Risk Analysis

A dynamic thermal simulation of the building has been carried out to predict internal temperatures using IES thermal modelling software. The building will be compliant with the CIBSE TM52 overheating criteria.



8.0 <u>MONITORING</u>

Each Service to the community centre and health centre shall be provided with energy monitoring with additional energy meters provided to large loads.

9.0 <u>CONCLUSION</u>

Following the assessment methodology set out by the London Plan and Intend to Publish London Plan (ItP,2019) and the Camden Local Plan we have identified a number of measures to improve energy efficiency and limit CO₂ emissions for the proposed Abbey Road Phase 2 development.

The table below provides a summary of the improvements achieved at each step of the energy hierarchy approach:

	Regulated Carbon Dioxide Emissions (Tonnes CO ₂ /Annum)
Step 1 – Baseline	31.48
Step 2 –	25.38
Step 3 –	25.38
Step 4 – Renewable Energy	19.75

	Regulated Carbon Dioxide Emissions (Tonnes CO ₂ /Annum)	CO ₂ Emissions Reduction (%)
Savings from Energy Demand Reduction	6.10	19.38
Savings from Low Carbon Energy Supply	0.0	0.0
Savings from Renewable Energy	5.63	17.88
Total Cumulative Savings	11.73	37.26

The predicted reduction in CO_2 from the proposed measures is 37.26% and the reduction in energy usage from on-site renewable energy is 20%.



APPENDIX 'A'

BRUKL REPORT FOR COMMUNITY CENTRE INCORPORATING BASELINE DESIGN

BRUKL Output Document

Compliance with England Building Regulations Part L 2013

Project name

COMMUNITY CENTRE

Date: Tue May 12 09:57:33 2020

Administrative information

Building Details

Address: Abbey Road Phase 2, London, TBC

Certification tool

Calculation engine: SBEM Calculation engine version: v5.6.a.2 Interface to calculation engine: Virtual Environment Interface to calculation engine version: v7.0.12 BRUKL compliance check version: v5.6.a.1

Owner Details

Name: TBC Telephone number: TBC Address: TBC, TBC, TBC

Certifier details

Name: Daniel Watt Telephone number: 01614343103 Address: Watt Energy & Consulting Engineers, 40 King Street, Manchester, M2 6BA

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.3	0.3	HC000000_W5
Floor	0.25	0.21	0.21	HC000000_F
Roof	0.25	0.2	0.2	HC000000_C
Windows***, roof windows, and rooflights	2.2	1.81	1.81	HC000000_W7_O0
Personnel doors	2.2	2.2	2.2	HC000000_W14_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Lister = Limiting area-weighted average Listalues [W/(m²K)]				

 U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

Calculated area-weighted average U-values [VV/(m⁻K)] Ui-Calc = Calcu

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m³/(h.m²) at 50 Pa	10	5

As designed

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- COMMUNITY - ASHP underfloor heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency
This system	3.5	-		-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES					
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825					

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0004-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2	0.002
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
1	Zonal extract system where the fan is remote from the zone with grease filter

l	I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name		SFP [W/(I/s)]									
ID of system type	Α	В	С	D	E	F	G	н	I	пке	mciency
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Male WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Cleaner	-	-	0.5	-	-	-	-	-	-	-	N/A
Baby ch.	-	-	0.5	-	-	-	-	-	-	-	N/A
WHC WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Kitchen/Resource	-	-	-	1.5	-	-	-	-	-	0.83	0.5
Child WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Hall	-	-	-	1.5	-	-	-	-	-	0.83	0.5
ACC	-	-	0.5	-	-	-	-	-	-	-	N/A
Foyer	-	-	-	1.5	-	-	-	-	-	0.83	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
HCC OFFICE	67	-	-	308
Reception	-	67	22	74

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	and the second second
Female	-	67	-	77
Office 2	67	H 1	-	207
Volunteers Office	67	- 1	-	242
HAW	67	- 1	-	195
Circ. 1	3 - 2	67		58
Staff		67	-	42
Male WC	-	67		77
Cleaner	67	-	-	10
Baby ch.	-	67	-	23
WHC WC	-	67	-	47
Store 1	67	-	-	24
BREAKOUT	-	67	-	665
Kitchen/Resource	-	67	-	728
Belsize	-	67	-	442
Plant	67	-	-	201
Milk	-	67	-	50
Nursery/	-	67	-	320
Main Office	67	-	-	209
Store 5B	67	-	-	16
Child WC	-	67	-	34
St	67	-	-	6
Store 5A	67	-	-	12
Refuse	67	-	-	35
Store 3	67	-	-	15
Hall	-	67	-	646
ACC	-	67	-	71
Foyer	-	67	-	235
Store 4	67	-	-	15
ELEC	67	-	-	14
Store 6	67	-	-	12
LIFT	-	67	-	28
Play Store	67	-	-	12
Circ. 2	-	67	-	36
St.	67	-	-	9
LIFT	-	67	-	22
GARDEN ROOM	67	-	-	547
Store	67	-	-	4

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
HCC OFFICE	YES (+15.5%)	NO
Reception	N/A	N/A
Office 2	NO (-13.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Volunteers Office	YES (+127.7%)	NO
HAW	YES (+126.4%)	NO
BREAKOUT	YES (+125%)	NO
Belsize	YES (+66.3%)	NO
Nursery/	N/A	N/A
Main Office	N/A	N/A
Hall	YES (+43.8%)	NO
GARDEN ROOM	YES (+51.6%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	922.4	922.4
External area [m ²]	1512.7	1512.7
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	720.26	635.12
Average U-value [W/m ² K]	0.48	0.42
Alpha value* [%]	16.27	15.63

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	a Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
100	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	7.25	9.41
Cooling	0	0
Auxiliary	3.98	2.03
Lighting	15.89	15.95
Hot water	8.03	9.19
Equipment*	26.24	26.24
TOTAL**	35.16	36.59

* Energy used by equipment does not count towards the total for consumption or calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	200.18	150.97
Primary energy* [kWh/m ²]	93.07	93.22
Total emissions [kg/m ²]	15.8	15.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

	HVAC Systems Performance									
System Type		Heat dem	Cool dem	Heat con	Cool con	Aux con	Heat	Cool	Heat gen	Cool gen
		MJ/m2	MJ/m2	kWh/m2	kWh/m2	kWh/m2	SSEEF	SSEER	SEFF	SEER
[ST] Central heating using water: floor heating, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricit										
	Actual	85.8	114.4	7.2	0	3.9	3.29	0	3.5	0
	Notional	82.4	68.6	9.4	0	2	2.43	0		Transfer.

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*
Wall	0.23	0.3	HC000000_W5
Floor	0.2	0.21	HC000000_F
Roof	0.15	0.2	HC000000_C
Windows, roof windows, and rooflights	1.5	1.81	HC000000_W7_O0
Personnel doors	1.5	2.2	HC000000_W14_O0
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors 1.5 -		-	"No external high usage entrance doors"
U _{I-Typ} = Typical individual element U-values [W/(m ² K)] U _{I-Min} = Minimum individual element U-values [W/(m ² K)]			U _{I-Min} = Minimum individual element U-values [W/(m ² K)]
* There might be more than one surface where the minimum U-value occurs.			

Air PermeabilityTypical valueThis buildingm³/(h.m²) at 50 Pa55

BRUKL REPORT FOR HEALTH CENTRE INCORPORATING BASELINE DESIGN

O:\2019\1369 - Abbey Road - Phase 2\Correspondence\REPORTS\Energy Report\Energy Assessment Report - MR.Doc





BRUKL Output Document

Compliance with England Building Regulations Part L 2013

Project name

HEALTH CENTRE

Date: Tue May 12 10:35:03 2020

Administrative information

Building Details

Address: Abbey Road Phase 2, London, TBC

Certification tool

Calculation engine: SBEM Calculation engine version: v5.6.a.2 Interface to calculation engine: Virtual Environment Interface to calculation engine version: v7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: TBC Telephone number: TBC Address: TBC, TBC, TBC

Certifier details

Name: Daniel Watt Telephone number: 01614343103 Address: Watt Energy & Consulting Engineers, 40 King Street, Manchester, M2 6BA

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	17.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	17.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	17.5
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.3	0.3	HL000000_W5
Floor	0.25	0.21	0.21	HL000000_F
Roof	0.25	0.2	0.2	HL000000_C
Windows***, roof windows, and rooflights	2.2	1.81	1.81	HL000000_W5_O0
Personnel doors	2.2	1.8	1.8	CR000000_W5_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Usumit = Limiting area-weighted average U-values M	//(m ² K)]			

 U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

acculated area-weighted average U-values [vv/(m⁻K)] Ui-calc = Calculat

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m³/(h.m²) at 50 Pa	10	5

As designed

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- HEALTH CARE - ASHP underfloor heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HF	R efficiency
This system	3.5	-		-	-	
Standard value	2.5*	N/A	N/A	N/A	N//	A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES						

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- SPLIT SYSTEM (TREATMENT)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency
This system	3.5	3.5	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring 8 targeting with clarma for out of range values for this HVAC system					

Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0004-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2	0.006
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name		SFP [W/(I/s)]					UD officionov				
ID of system type	Α	В	С	D	Е	F	G	Н	1	пке	mciency
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Podiatry Workshop	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 4	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 2	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 1	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5

Zone name	SFP [W/(I/s)]					UD officiency					
ID of system type	Α	в	С	D	Е	F	G	Н	1	нке	miciency
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	(H.)	-	-	1.6	-	-	-	-	- 1	0.68	0.5
Exam / Consult	(\mathbf{H})	-	-	1.6	-	-	-	-	- 1	0.68	0.5
Exam / Consult	(\mathbf{H})	-	-	1.6	-	-	-	-	- 1	0.68	0.5
Exam / Consult	-1	-	-	1.6		-	-	24	-	0.68	0.5
GP Admin	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Office	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 3	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Study / Meeting	-	-	-	1.6	-	-	-	-	-	0.68	0.5
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Acc. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
PM Office	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Dirty Utility	-	-	0.5	-	-	-	-	-	-	-	N/A
Comms room	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
IPC Office 22 Desks	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Acc. Staff WC /	-	-	0.5	-	-	-	-	-	-	-	N/A
Staff Kitchen / Rest	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Multidisciplinary Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Multidisciplinary Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Podiatry Treatment 1	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Physio Treatment	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Podiatry Treatment 2	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Treatment Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Health Centre Core	-	65	-	71
Podiatry Workshop	65	-	-	286
GP Exam Consult 4	65	-	-	174
GP Exam Consult 2	65	-	-	185
GP Exam Consult 1	65	-	-	190
Waiting Area	-	65	15	625
Reception	-	65	15	103
Exam / Consult	65	-	-	176

General lighting and display lighting	Lumino	ous effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Exam / Consult	65	- 1	-	175
Exam / Consult	65	H 1	-	175
Exam / Consult	65	- 1	-	174
Exam / Consult	65	-	-	186
Exam / Consult	65	-	-	175
Exam / Consult	65	-	-	175
Exam / Consult	65	- 1	-	186
Exam / Consult	65	-	-	145
GP Admin	65	-	-	269
GP Office	65	-	-	136
GP Exam Consult 3	65	-	-	173
GP Study / Meeting	65	-	-	182
WC	-	65	-	31
WC	-	65	-	33
Acc. WC	-	65	-	42
PM Office	65	-	-	140
Staff WC	-	65	-	29
Dirty Utility	65	-	-	10
Store 1	65	-	-	19
Comms room	65	-	-	23
DH	65	-	-	5
Baby Change	-	65	-	43
Staff WC	-	65	-	30
IPC Office 22 Desks	65	-	-	834
Utility	65	-	-	12
Acc. Staff WC /	-	65	-	59
Staff Kitchen / Rest	65	-	-	253
Staff WC	-	65	-	28
Staff WC	-	65	-	28
Clean Utility	65	-	-	13
CORRIDOR	-	65	-	143
Store 3	65	-	-	24
Cleaner st	65	-	-	9
Multidisciplinary Room	65	-	-	187
LIFT	-	65	-	24
LIFT	-	65	-	16
Staff WC	-	65	-	29
STORE	65	-	-	6
WC	-	65	-	31
WC	-	65	-	32
Multidisciplinary Room	65	-	-	212
CORRIDOR	-	65	-	207
Podiatry Treatment 1	65	-	-	202

General lighting and display lighting	Lumino	us effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	1 · · · · · · · · · · · · · · · · · · ·
Physio Treatment	65	- 1	-	157
Podiatry Treatment 2	65	÷	-	190
GP Treatment Room	65	Ξ.	-	214

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Podiatry Workshop	NO (-55.9%)	NO
GP Exam Consult 4	YES (+34%)	NO
GP Exam Consult 2	YES (+4.2%)	NO
GP Exam Consult 1	YES (+51%)	NO
Waiting Area	YES (+51%)	NO
Reception	N/A	N/A
Exam / Consult	NO (-37.6%)	NO
Exam / Consult	NO (-35%)	NO
Exam / Consult	YES (+60.2%)	NO
Exam / Consult	NO (-45.4%)	NO
Exam / Consult	YES (+34.5%)	NO
Exam / Consult	NO (-35%)	NO
Exam / Consult	YES (+55.4%)	NO
Exam / Consult	YES (+23.2%)	NO
Exam / Consult	NO (-14.6%)	NO
GP Admin	N/A	N/A
GP Office	N/A	N/A
GP Exam Consult 3	YES (+53.5%)	NO
GP Study / Meeting	YES (+73.8%)	NO
PM Office	N/A	N/A
IPC Office 22 Desks	NO (-58.1%)	NO
Staff Kitchen / Rest	NO (-20.8%)	NO
Multidisciplinary Room	YES (+30.9%)	NO
Multidisciplinary Room	YES (+15.1%)	NO
Podiatry Treatment 1	NO (-57.8%)	NO
Physio Treatment	NO (-74.3%)	NO
Podiatry Treatment 2	YES (+1.4%)	NO
GP Treatment Room	YES (+39.5%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
	Actual	Notional
Area [m ²]	966	966
External area [m ²]	1472.5	1472.5
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	587.08	546.52
Average U-value [W/m ² K]	0.4	0.37
Alpha value* [%]	18.25	17.66

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways B1 Offices and Workshop businesses B2 to B7 General Industrial and Special Industrial Groups **B8** Storage or Distribution C1 Hotels C2 Residential Institutions: Hospitals and Care Homes C2 Residential Institutions: Residential schools C2 Residential Institutions: Universities and colleges C2A Secure Residential Institutions **Residential spaces** D1 Non-residential Institutions: Community/Day Centre D1 Non-residential Institutions: Libraries, Museums, and Galleries D1 Non-residential Institutions: Education 99 D1 Non-residential Institutions: Primary Health Care Building D1 Non-residential Institutions: Crown and County Courts D2 General Assembly and Leisure, Night Clubs, and Theatres Others: Passenger terminals Others: Emergency services Others: Miscellaneous 24hr activities

Others: Car Parks 24 hrs

1

Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.58	5.39
Cooling	1.35	0.77
Auxiliary	5.13	2.51
Lighting	20.98	25.21
Hot water	4.18	1.45
Equipment*	27.82	27.82
TOTAL**	36.22	35.34

* Energy used by equipment does not count towards the total for consumption or calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO, Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	229.21	181.34
Primary energy* [kWh/m ²]	103.47	103.2
Total emissions [kg/m ²]	17.5	17.5

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.
| HVAC Systems Performance | | | | | | | | | | | |
|--|-----------|-------------------|-------------------|--------------------|--------------------|-------------------|---------------|---------------|------------------|------------------|--|
| Sys | stem Type | Heat dem
MJ/m2 | Cool dem
MJ/m2 | Heat con
kWh/m2 | Cool con
kWh/m2 | Aux con
kWh/m2 | Heat
SSEEF | Cool
SSEER | Heat gen
SEFF | Cool gen
SEER | |
| [ST] Central heating using water: floor heating, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | | |
| | Actual | 54.2 | 174.6 | 4.6 | 0 | 4.9 | 3.29 | 0 | 3.5 | 0 | |
| | Notional | 47.4 | 133.7 | 5.4 | 0 | 2.5 | 2.43 | 0 | | a terrar | |
| [ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | | |
| Actual | | 56.4 | 178.5 | 4.6 | 18.9 | 5.6 | 3.43 | 2.62 | 3.5 | 3.5 | |
| | Notional | 44.7 | 140.7 | 5.1 | 10.9 | 2.4 | 2.43 | 3.6 | | | |

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

= Cooling fuel type

Page 8 of 9

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element		Ui-Min	Surface where the minimum value occurs*
Wall		0.3	HL000000_W5
Floor	0.2	0.21	HL000000_F
Roof		0.2	HL000000_C
Windows, roof windows, and rooflights		1.81	HL000000_W5_O0
Personnel doors		1.8	CR000000_W5_O0
Vehicle access & similar large doors		-	"No external vehicle access doors"
High usage entrance doors		-	"No external high usage entrance doors"
U _{I-Typ} = Typical individual element U-values [W/(m ² K)]		U _{I-Min} = Minimum individual element U-values [W/(m ² K)]
* There might be more than one surface where the n	ninimum U	J-value oc	curs.

Air PermeabilityTypical valueThis buildingm³/(h.m²) at 50 Pa55

APPENDIX 'C'

BRUKL REPORT FOR COMMUNITY CENTRE INCORPORATING "BE LEAN" DESIGN



BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

COMMUNITY CENTRE

Date: Tue May 12 10:07:03 2020

Administrative information

Building Details

Address: Abbey Road Phase 2, London, TBC

Certification tool

Calculation engine: SBEM Calculation engine version: v5.6.a.2 Interface to calculation engine: Virtual Environment Interface to calculation engine version: v7.0.12 BRUKL compliance check version: v5.6.a.1

Owner Details

Name: TBC Telephone number: TBC Address: TBC, TBC, TBC

Certifier details

Name: Daniel Watt Telephone number: 01614343103 Address: Watt Energy & Consulting Engineers, 40 King Street, Manchester, M2 6BA

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	11.7
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.16	HC000000_W5
Floor	0.25	0.15	0.15	HC000000_F
Roof	0.25	0.17	0.17	HC000000_C
Windows***, roof windows, and rooflights	2.2	1.41	1.41	HC000000_W7_O0
Personnel doors	2.2	1.8	1.8	HC000000_W14_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Used imit = Limiting area-weighted average U-values M	//(m²K)]			

 U_{a-Calc} = Calculated area-weighted average U-values [W/(m-K)]

 $U_{a-Calc} = Calculated area-weighted average U-values [vv/(m^k)]$

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building			
m³/(h.m²) at 50 Pa	10	5			

As designed

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- COMMUNITY - ASHP underfloor heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency			
This system	3.5	-	- 1	-	-			
Standard value	2.5*	N/A	N/A	N/A	N/A			
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES								
* Standard shown is for all types >12 kW output, except absorption and gas engine heat numps. For types <=12 kW output, refer to EN 14825								

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0004-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	0.002
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
1	Zonal extract system where the fan is remote from the zone with grease filter

I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name ID of system type		SFP [W/(I/s)]										
		В	С	D	E	F	G	н	I	R emclency		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard	
Male WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Cleaner	-	-	0.5	-	-	-	-	-	-	-	N/A	
Baby ch.	-	-	0.5	-	-	-	-	-	-	-	N/A	
WHC WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Kitchen/Resource	-	-	-	1.5	-	-	-	-	-	0.83	0.5	
Child WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Hall	-	-	-	1.5	-	-	-	-	-	0.83	0.5	
ACC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Foyer	-	-	-	1.5	-	-	-	-	-	0.83	0.5	

General lighting and display lighting	Lumino	ous effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
HCC OFFICE	100	-	-	207
Reception	-	100	22	49

General lighting and display lighting	Lumino	ous effic]		
Zone name	Luminaire Lamp		Display lamp	General lighting [W]	
Standard value	60	60	22	ALC: A REAL CON	
Female	-	100	-	51	
Office 2	100	H 1	-	139	
Volunteers Office	100	- 1	-	162	
HAW	100	- 1	-	131	
Circ. 1	3 - 2	100		39	
Staff		100	-	28	
Male WC	-	100		51	
Cleaner	100	-	-	6	
Baby ch.	-	100	-	15	
WHC WC	-	100	-	31	
Store 1	100	-	-	16	
BREAKOUT	-	100	-	446	
Kitchen/Resource	-	100	-	488	
Belsize	-	100	-	296	
Plant	100	-	-	135	
Milk	-	100	-	34	
Nursery/	-	100	-	215	
Main Office	100	-	-	140	
Store 5B	100	-	-	11	
Child WC	-	100	-	23	
St	100	-	-	4	
Store 5A	100	-	-	8	
Refuse	100	-	-	23	
Store 3	100	-	-	10	
Hall	-	100	-	433	
ACC	-	100	-	47	
Foyer	-	100	-	158	
Store 4	100	-	-	10	
ELEC	100	-	-	9	
Store 6	100	-	-	8	
LIFT	-	100	-	19	
Play Store	100	-	-	8	
Circ. 2	-	100	-	24	
St.	100	-	-	6	
LIFT	-	100	-	15	
GARDEN ROOM	100	-	-	366	
Store	100	-	-	3	

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
HCC OFFICE	NO (-74.1%)	NO
Reception	N/A	N/A
Office 2	NO (-80.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Volunteers Office	NO (-49%)	NO
HAW	NO (-49.3%)	NO
BREAKOUT	NO (-49.6%)	NO
Belsize	NO (-62.7%)	NO
Nursery/	N/A	N/A
Main Office	N/A	N/A
Hall	NO (-67.8%)	NO
GARDEN ROOM	NO (-66%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?		
Is evidence of such assessment available as a separate submission?	NO	
Are any such measures included in the proposed design?	NO	

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	922.4	922.4
External area [m ²]	1512.7	1512.7
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	527.19	635.12
Average U-value [W/m ² K]	0.35	0.42
Alpha value* [%]	22.23	15.63

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	a Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
100	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	8.01	9.41
Cooling	0	0
Auxiliary	3.98	2.03
Lighting	7.91	15.95
Hot water	6.43	9.19
Equipment*	26.24	26.24
TOTAL**	26.32	36.59

* Energy used by equipment does not count towards the total for consumption or calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	127.12	150.97
Primary energy* [kWh/m ²]	68.92	93.22
Total emissions [kg/m ²]	11.7	15.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

H	VAC Sys	tems Per	formanc	е						
Syst	tem Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricit										
	Actual	94.8	32.4	8	0	3.9	3.29	0	3.5	0
1	Notional	82.4	68.6	9.4	0	2	2.43	0		Terreto.

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*				
Wall	0.23	0.16	HC000000_W5				
Floor	0.2	0.15	HC000000_F				
Roof	0.15	0.17	HC000000_C				
Windows, roof windows, and rooflights	1.5	1.41	HC000000_W7_O0				
Personnel doors	1.5	1.8	HC000000_W14_O0				
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"				
High usage entrance doors	1.5	-	"No external high usage entrance doors"				
U _{I-Typ} = Typical individual element U-values [W/(m ² K)] U _{I-Min} = Minimum individual element U-values [W/(m ² K)]							
* There might be more than one surface where the minimum U-value occurs.							

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5

BRUKL REPORT FOR HEALTH CENTRE INCORPORATING "BE LEAN" DESIGN

O:\2019\1369 - Abbey Road - Phase 2\Correspondence\REPORTS\Energy Report\Energy Assessment Report - MR.Doc



BRUKL Output Document

Compliance with England Building Regulations Part L 2013

Project name

HEALTH CENTRE

Date: Tue May 12 10:36:46 2020

Administrative information

Building Details

Address: Abbey Road Phase 2, London, TBC

Certification tool

Calculation engine: SBEM Calculation engine version: v5.6.a.2 Interface to calculation engine: Virtual Environment Interface to calculation engine version: v7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: TBC Telephone number: TBC Address: TBC, TBC, TBC

Certifier details

Name: Daniel Watt Telephone number: 01614343103 Address: Watt Energy & Consulting Engineers, 40 King Street, Manchester, M2 6BA

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	17.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	17.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	15.1
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.16	HL000000_W5
Floor	0.25	0.15	0.15	HL000000_F
Roof	0.25	0.17	0.17	HL000000_C
Windows***, roof windows, and rooflights	2.2	1.41	1.41	HL000000_W5_O0
Personnel doors	2.2	1.8	1.8	CR000000_W5_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Used imit = Limiting area-weighted average U-values M	//(m²K)]	•	•	•

 U_{a-Calc} = Calculated area-weighted average U-values [W/(m⁻K)] U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

Ui-Calc = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m³/(h.m²) at 50 Pa	10	5

As designed

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- HEALTH CARE - ASHP underfloor heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency				
This system	3.5	-	-	-	-				
Standard value	2.5*	N/A N/A N/A		N/A	N/	A			
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES									

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- SPLIT SYSTEM (TREATMENT)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency				
This system	3.5	3.5	-	-	-				
Standard value	2.5*	2.6	N/A	N/A N/A					
Automatic monitoring 8 targeting with clarme for out of range values for this HVAC system									

Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0004-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	0.006
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
T	Zonal extract system where the fan is remote from the zone with grease filter

Zone name		SFP [W/(I/s)]					UD officionov							
ID of system type	Α	В	С	D	Е	F	G	Н	1	пке	пк епісіенсу			
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard			
Podiatry Workshop	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
GP Exam Consult 4	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
GP Exam Consult 2	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
GP Exam Consult 1	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5			
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5			

Zone name		SFP [W/(I/s)]									UD officiences	
ID of system type	Α	В	С	D	Е	F	G	н	1	нке	miciency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard	
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Exam / Consult	(H.)	-	-	1.6	-	-	-	-	- 1	0.68	0.5	
Exam / Consult	\pm	-	-	1.6	-	-	-	-	- 1	0.68	0.5	
Exam / Consult	(\mathbf{H})	-	-	1.6	-	-	-	-	- 1	0.68	0.5	
Exam / Consult	-1	-	-	1.6		-	-	24	-	0.68	0.5	
GP Admin	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
GP Office		-	-	1.6	-	-	-	8 	-	0.68	0.5	
GP Exam Consult 3	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
GP Study / Meeting	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Acc. WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
PM Office	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Dirty Utility	-	-	0.5	-	-	-	-	-	-	-	N/A	
Comms room	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
IPC Office 22 Desks	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Acc. Staff WC /	-	-	0.5	-	-	-	-	-	-	-	N/A	
Staff Kitchen / Rest	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Multidisciplinary Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Multidisciplinary Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Podiatry Treatment 1	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Physio Treatment	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
Podiatry Treatment 2	-	-	-	1.6	-	-	-	-	-	0.68	0.5	
GP Treatment Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5	

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Health Centre Core	-	100	-	46
Podiatry Workshop	100	-	-	186
GP Exam Consult 4	100	-	-	113
GP Exam Consult 2	100	-	-	121
GP Exam Consult 1	100	-	-	123
Waiting Area	-	100	15	406
Reception	-	100	15	67
Exam / Consult	100	-	-	114

Zone name Luminaire Lamp Display lamp General lighting [W] Standard value 60 60 22 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 10	General lighting and display lighting	Lumino	ous effic		
Standard value 60 60 22 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - -	Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 175 GP Admin 100 - - 175 GP Office 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20 <td>Standard value</td> <td>60</td> <td>60</td> <td>22</td> <td></td>	Standard value	60	60	22	
Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 88 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-1	-	114
Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-1	-	114
Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	-	113
Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 94 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	-	121
Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	2 2 1	114
Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-	-	114
Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	-	121
GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-	-	94
GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	GP Admin	100	-	-	175
GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	GP Office	100	-	-	88
GP Study / Meeting 100 - - 118 WC - 100 - 20	GP Exam Consult 3	100	-	-	112
WC - 100 - 20	GP Study / Meeting	100	-	-	118
	WC	-	100	-	20
WC - 100 - 21	WC	-	100	-	21
Acc. WC - 100 - 28	Acc. WC	-	100	-	28
PM Office 100 91	PM Office	100	-	-	91
Staff WC - 100 - 19	Staff WC	-	100	-	19
Dirty Utility 100 6	Dirty Utility	100	-	-	6
Store 1 100 12	Store 1	100	-	-	12
Comms room 100 15	Comms room	100	-	-	15
DH 100 3	DH	100	-	-	3
Baby Change - 100 - 28	Baby Change	-	100	-	28
Staff WC - 100 - 20	Staff WC	-	100	-	20
IPC Office 22 Desks 100 542	IPC Office 22 Desks	100	-	-	542
Utility 100 8	Utility	100	-	-	8
Acc. Staff WC / - 100 - 38	Acc. Staff WC /	-	100	-	38
Staff Kitchen / Rest 100 164	Staff Kitchen / Rest	100	-	-	164
Staff WC - 100 - 18	Staff WC	-	100	-	18
Staff WC - 100 - 18	Staff WC	-	100	-	18
Clean Utility 100 9	Clean Utility	100	-	-	9
CORRIDOR - 100 - 93	CORRIDOR	-	100	-	93
Store 3 100 16	Store 3	100	-	-	16
Cleaner st 100 6	Cleaner st	100	-	-	6
Multidisciplinary Room 100 122	Multidisciplinary Room	100	-	-	122
LIFT - 100 - 16	LIFT	-	100	-	16
LIFT - 100 - 10	LIFT	-	100	-	10
Staff WC - 100 - 19	Staff WC	-	100	-	19
STORE 100 4	STORE	100	-	-	4
WC - 100 - 20	WC	-	100	-	20
WC - 100 - 21	WC	-	100	-	21
Multidisciplinary Room 100 138	Multidisciplinary Room	100	-	-	138
CORRIDOR - 100 - 134	CORRIDOR	-	100	-	134
Podiatry Treatment 1 100 131	Podiatry Treatment 1	100	-	-	131

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	· · · · · ·
Physio Treatment	100	-1	-	102
Podiatry Treatment 2	100	ΞI	-	123
GP Treatment Room	100	81	-	139

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Podiatry Workshop	NO (-90.1%)	NO
GP Exam Consult 4	NO (-70%)	NO
GP Exam Consult 2	NO (-76.7%)	NO
GP Exam Consult 1	NO (-66.2%)	NO
Waiting Area	NO (-66.2%)	NO
Reception	N/A	N/A
Exam / Consult	NO (-86%)	NO
Exam / Consult	NO (-85.4%)	NO
Exam / Consult	NO (-64.1%)	NO
Exam / Consult	NO (-87.8%)	NO
Exam / Consult	NO (-69.9%)	NO
Exam / Consult	NO (-85.4%)	NO
Exam / Consult	NO (-65.2%)	NO
Exam / Consult	NO (-72.4%)	NO
Exam / Consult	NO (-80.9%)	NO
GP Admin	N/A	N/A
GP Office	N/A	N/A
GP Exam Consult 3	NO (-65.6%)	NO
GP Study / Meeting	NO (-61%)	NO
PM Office	N/A	N/A
IPC Office 22 Desks	NO (-90.6%)	NO
Staff Kitchen / Rest	NO (-82.2%)	NO
Multidisciplinary Room	NO (-70.7%)	NO
Multidisciplinary Room	NO (-74.2%)	NO
Podiatry Treatment 1	NO (-90.5%)	NO
Physio Treatment	NO (-94.2%)	NO
Podiatry Treatment 2	NO (-77.3%)	NO
GP Treatment Room	NO (-68.7%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?			
Is evidence of such assessment available as a separate submission?	NO		
Are any such measures included in the proposed design?	NO		

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	966	966
External area [m ²]	1472.5	1472.5
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	449.71	546.52
Average U-value [W/m ² K]	0.31	0.37
Alpha value* [%]	23.82	17.66

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

99

1

% Area Building Type

A1/A2 Retail/Financial and Professional services A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways B1 Offices and Workshop businesses B2 to B7 General Industrial and Special Industrial Groups **B8** Storage or Distribution C1 Hotels C2 Residential Institutions: Hospitals and Care Homes C2 Residential Institutions: Residential schools C2 Residential Institutions: Universities and colleges C2A Secure Residential Institutions **Residential spaces** D1 Non-residential Institutions: Community/Day Centre D1 Non-residential Institutions: Libraries, Museums, and Galleries D1 Non-residential Institutions: Education D1 Non-residential Institutions: Primary Health Care Building D1 Non-residential Institutions: Crown and County Courts D2 General Assembly and Leisure, Night Clubs, and Theatres Others: Passenger terminals Others: Emergency services Others: Miscellaneous 24hr activities

Others: Car Parks 24 hrs

Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.55	5.39
Cooling	0.5	0.77
Auxiliary	5.13	2.51
Lighting	16.53	25.21
Hot water	3.35	1.45
Equipment*	27.82	27.82
TOTAL**	31.06	35.34

* Energy used by equipment does not count towards the total for consumption or calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	145.51	181.34
Primary energy* [kWh/m ²]	89.16	103.2
Total emissions [kg/m ²]	15.1	17.5

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance										
Sys	stem Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	65.9	80.6	5.6	0	4.9	3.29	0	3.5	0
	Notional	47.4	133.7	5.4	0	2.5	2.43	0		
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	66.4	66.7	5.4	7.1	5.6	3.43	2.62	3.5	3.5
	Notional	44.7	140.7	5.1	10.9	2.4	2.43	3.6		

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*		
Wall	0.23	0.16	HL000000_W5		
Floor	0.2	0.15	HL000000_F		
Roof	0.15	0.17	HL000000_C		
Windows, roof windows, and rooflights	1.5	1.41	HL000000_W5_O0		
Personnel doors	1.5	1.8	CR000000_W5_O0		
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"		
High usage entrance doors	1.5	-	"No external high usage entrance doors"		
U _{I-Typ} = Typical individual element U-values [W/(m ² K)] U _{I-Min} = Minimum individual element U-values [W/(m ² K)]					
* There might be more than one surface where the minimum U-value occurs.					

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5



BRUKL REPORT FOR COMMUNITY CENTRE INCORPORATING "BE GREEN" DESIGN





BRUKL Output Document

Compliance with England Building Regulations Part L 2013

Project name

COMMUNITY CENTRE

Date: Tue May 12 10:25:59 2020

Administrative information

Building Details

Address: Abbey Road Phase 2, London, TBC

Certification tool

Calculation engine: SBEM Calculation engine version: v5.6.a.2 Interface to calculation engine: Virtual Environment Interface to calculation engine version: v7.0.12 BRUKL compliance check version: v5.6.a.1

Owner Details

Name: TBC Telephone number: TBC Address: TBC, TBC, TBC

Certifier details

Name: Daniel Watt Telephone number: 01614343103 Address: Watt Energy & Consulting Engineers, 40 King Street, Manchester, M2 6BA

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	15.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	15.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	10.1
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.16	HC000000_W5
Floor	0.25	0.15	0.15	HC000000_F
Roof	0.25	0.17	0.17	HC000000_C
Windows***, roof windows, and rooflights	2.2	1.41	1.41	HC000000_W7_O0
Personnel doors	2.2	1.8	1.8	HC000000_W14_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Usumit = Limiting area-weighted average U-values M	//(m ² K)]			

U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

 $U_{a-Calc} = Calculated area-weighted average U-values [vv/(m^k)]$

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building		
m³/(h.m²) at 50 Pa	10	5		

As designed

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- COMMUNITY - ASHP underfloor heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency		
This system	3.5	-		-	-		
Standard value	2.5*	N/A	N/A	N/A	N/A		
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES							
* Standard shown is for all types >12 kW output, except absorption and gas engine heat numps. For types <=12 kW output, refer to EN 14825							

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0004-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	0.002
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
1	Zonal extract system where the fan is remote from the zone with grease filter

I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name		SFP [W/(I/s)]										
ID of system type	Α	В	С	D	E	F	G	н	I	нк епісіепсу		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard	
Male WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Cleaner	-	-	0.5	-	-	-	-	-	-	-	N/A	
Baby ch.	-	-	0.5	-	-	-	-	-	-	-	N/A	
WHC WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Kitchen/Resource	-	-	-	1.5	-	-	-	-	-	0.83	0.5	
Child WC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Hall	-	-	-	1.5	-	-	-	-	-	0.83	0.5	
ACC	-	-	0.5	-	-	-	-	-	-	-	N/A	
Foyer	-	-	-	1.5	-	-	-	-	-	0.83	0.5	

General lighting and display lighting	Lumino	ous effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
HCC OFFICE	100	-	-	207
Reception	-	100	22	49

General lighting and display lighting	Lumino	ous effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	ALC: A ARREST
Female	-	100	-	51
Office 2	100	H 1	-	139
Volunteers Office	100	- 1	-	162
HAW	100	- 1	-	131
Circ. 1	3 - 2	100		39
Staff		100	-	28
Male WC	-	100		51
Cleaner	100	-	-	6
Baby ch.	-	100	-	15
WHC WC	-	100	-	31
Store 1	100	-	-	16
BREAKOUT	-	100	-	446
Kitchen/Resource	-	100	-	488
Belsize	-	100	-	296
Plant	100	-	-	135
Milk	-	100	-	34
Nursery/	-	100	-	215
Main Office	100	-	-	140
Store 5B	100	-	-	11
Child WC	-	100	-	23
St	100	-	-	4
Store 5A	100	-	-	8
Refuse	100	-	-	23
Store 3	100	-	-	10
Hall	-	100	-	433
ACC	-	100	-	47
Foyer	-	100	-	158
Store 4	100	-	-	10
ELEC	100	-	-	9
Store 6	100	-	-	8
LIFT	-	100	-	19
Play Store	100	-	-	8
Circ. 2	-	100	-	24
St.	100	-	-	6
LIFT	-	100	-	15
GARDEN ROOM	100	-	-	366
Store	100	-	-	3

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
HCC OFFICE	NO (-74.1%)	NO
Reception	N/A	N/A
Office 2	NO (-80.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Volunteers Office	NO (-49%)	NO
HAW	NO (-49.3%)	NO
BREAKOUT	NO (-49.6%)	NO
Belsize	NO (-62.7%)	NO
Nursery/	N/A	N/A
Main Office	N/A	N/A
Hall	NO (-67.8%)	NO
GARDEN ROOM	NO (-66%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?		
Is evidence of such assessment available as a separate submission?	NO	
Are any such measures included in the proposed design?	NO	

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	922.4	922.4
External area [m ²]	1512.7	1512.7
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	527.19	635.12
Average U-value [W/m ² K]	0.35	0.42
Alpha value* [%]	22.23	15.63

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	a Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
100	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	8.01	9.41
Cooling	0	0
Auxiliary	3.98	2.03
Lighting	7.91	15.95
Hot water	6.43	9.19
Equipment*	26.24	26.24
TOTAL**	26.32	36.59

* Energy used by equipment does not count towards the total for consumption or calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	3.14	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	127.12	150.97
Primary energy* [kWh/m ²]	68.92	93.22
Total emissions [kg/m ²]	10.1	15.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

H	VAC Sys	tems Per	formanc	е						
Syst	tem Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST]	Central he	eating using	g water: floo	or heating,	[HS] Heat p	ump (electi	ric): air sou	rce, [HFT] E	Electricity,	CFT] Electr
	Actual	94.8	32.4	8	0	3.9	3.29	0	3.5	0
1	Notional	82.4	68.6	9.4	0	2	2.43	0		Terreto.

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*	
Wall	0.23	0.16	HC000000_W5	
Floor	0.2	0.15	HC000000_F	
Roof	0.15	0.17	HC000000_C	
Windows, roof windows, and rooflights	1.5	1.41	HC000000_W7_O0	
Personnel doors	1.5	1.8	HC000000_W14_O0	
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"	
High usage entrance doors	gh usage entrance doors 1.5 - "No external high usage entrance doors"			
U _{I-Typ} = Typical individual element U-values [W/(m ² K)] U _{I-Min} = Minimum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the minimum U-value occurs.				

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5

May 2020

BRUKL REPORT FOR HEALTH CENTRE INCORPORATING "BE GREEN" DESIGN

APPENDIX 'F'



BRUKL Output Document

Compliance with England Building Regulations Part L 2013

Project name

HEALTH CENTRE

Date: Tue May 12 10:37:56 2020

Administrative information

Building Details

Address: Abbey Road Phase 2, London, TBC

Certification tool

Calculation engine: SBEM Calculation engine version: v5.6.a.2 Interface to calculation engine: Virtual Environment Interface to calculation engine version: v7.0.12

BRUKL compliance check version: v5.6.a.1

Owner Details

Name: TBC Telephone number: TBC Address: TBC, TBC, TBC

Certifier details

Name: Daniel Watt Telephone number: 01614343103 Address: Watt Energy & Consulting Engineers, 40 King Street, Manchester, M2 6BA

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	17.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	17.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	10.8
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	Ua-Limit	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.16	0.16	HL000000_W5
Floor	0.25	0.15	0.15	HL000000_F
Roof	0.25	0.17	0.17	HL000000_C
Windows***, roof windows, and rooflights	2.2	1.41	1.41	HL000000_W5_O0
Personnel doors	2.2	1.8	1.8	CR000000_W5_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"
Usumit = Limiting area-weighted average U-values M	//(m ² K)]		•	

U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

Ui-Calc = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m³/(h.m²) at 50 Pa	10	5

As designed

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- HEALTH CARE - ASHP underfloor heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HF	R efficiency	
This system	3.5	-	-	-	-		
Standard value	2.5*	N/A	N/A	N/A	N/	A	
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES							

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

2- SPLIT SYSTEM (TREATMENT)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency		
This system	3.5	3.5	-	-	-		
Standard value	2.5*	2.6	N/A	N/A	N/A		
Automatic manitaring 8 targeting with glarma for out of range values for this HVAC system							

Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system YES * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

1- SYST0004-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.5	0.006
Standard value	N/A	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
Α	Local supply or extract ventilation units serving a single area
В	Zonal supply system where the fan is remote from the zone
С	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
Н	Fan coil units
T	Zonal extract system where the fan is remote from the zone with grease filter

Zone name		SFP [W/(I/s)]					UD officiency				
ID of system type	Α	В	С	D	Е	F	G	Н	1	нк епісіенсу	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Podiatry Workshop	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 4	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 2	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Exam Consult 1	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5

Zone name	SFP [W/(I/s)]						fficience.				
ID of system type	Α	В	С	D	Е	F	G	н	1	нке	miciency
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Exam / Consult	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Exam / Consult	(H.)	-	-	1.6	-	-	-	-	- 1	0.68	0.5
Exam / Consult	\pm	-	-	1.6	-	-	-	-	- 1	0.68	0.5
Exam / Consult	(\mathbf{H})	-	-	1.6	-	-	-	-	- 1	0.68	0.5
Exam / Consult	-1	-	-	1.6		-	-	24	-	0.68	0.5
GP Admin	-	-	-	1.6		-	-	-	-	0.68	0.5
GP Office		-	-	1.6	-	-	-	8 	-	0.68	0.5
GP Exam Consult 3	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Study / Meeting	-	-	-	1.6	-	-	-	-	-	0.68	0.5
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Acc. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
PM Office	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Dirty Utility	-	-	0.5	-	-	-	-	-	-	-	N/A
Comms room	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
IPC Office 22 Desks	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Acc. Staff WC /	-	-	0.5	-	-	-	-	-	-	-	N/A
Staff Kitchen / Rest	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Multidisciplinary Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Staff WC	-	-	0.5	-	-	-	-	-	-	-	N/A
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Multidisciplinary Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Podiatry Treatment 1	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Physio Treatment	-	-	-	1.6	-	-	-	-	-	0.68	0.5
Podiatry Treatment 2	-	-	-	1.6	-	-	-	-	-	0.68	0.5
GP Treatment Room	-	-	-	1.6	-	-	-	-	-	0.68	0.5

General lighting and display lighting	Lumino	ous effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Health Centre Core	-	100	-	46
Podiatry Workshop	100	-	-	186
GP Exam Consult 4	100	-	-	113
GP Exam Consult 2	100	-	-	121
GP Exam Consult 1	100	-	-	123
Waiting Area	-	100	15	406
Reception	-	100	15	67
Exam / Consult	100	-	-	114

Zone name Luminaire Lamp Display lamp General lighting [W] Standard value 60 60 22 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 10	General lighting and display lighting	Luminous efficacy [lm/W]]
Standard value 60 60 22 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - -	Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 175 GP Admin 100 - - 175 GP Office 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20 <td>Standard value</td> <td>60</td> <td>60</td> <td>22</td> <td></td>	Standard value	60	60	22	
Exam / Consult 100 - - 114 Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 88 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-1	-	114
Exam / Consult 100 - - 113 Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-1	-	114
Exam / Consult 100 - - 121 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	-	113
Exam / Consult 100 - - 114 Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 94 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	-	121
Exam / Consult 100 - - 114 Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	2 2 1	114
Exam / Consult 100 - - 121 Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-	-	114
Exam / Consult 100 - - 94 GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	- 1	-	121
GP Admin 100 - - 175 GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	Exam / Consult	100	-	-	94
GP Office 100 - - 88 GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	GP Admin	100	-	-	175
GP Exam Consult 3 100 - - 112 GP Study / Meeting 100 - - 118 WC - 100 - 20	GP Office	100	-	-	88
GP Study / Meeting 100 - - 118 WC - 100 - 20	GP Exam Consult 3	100	-	-	112
WC - 100 - 20	GP Study / Meeting	100	-	-	118
	WC	-	100	-	20
WC - 100 - 21	WC	-	100	-	21
Acc. WC - 100 - 28	Acc. WC	-	100	-	28
PM Office 100 91	PM Office	100	-	-	91
Staff WC - 100 - 19	Staff WC	-	100	-	19
Dirty Utility 100 6	Dirty Utility	100	-	-	6
Store 1 100 12	Store 1	100	-	-	12
Comms room 100 15	Comms room	100	-	-	15
DH 100 3	DH	100	-	-	3
Baby Change - 100 - 28	Baby Change	-	100	-	28
Staff WC - 100 - 20	Staff WC	-	100	-	20
IPC Office 22 Desks 100 542	IPC Office 22 Desks	100	-	-	542
Utility 100 8	Utility	100	-	-	8
Acc. Staff WC / - 100 - 38	Acc. Staff WC /	-	100	-	38
Staff Kitchen / Rest 100 164	Staff Kitchen / Rest	100	-	-	164
Staff WC - 100 - 18	Staff WC	-	100	-	18
Staff WC - 100 - 18	Staff WC	-	100	-	18
Clean Utility 100 9	Clean Utility	100	-	-	9
CORRIDOR - 100 - 93	CORRIDOR	-	100	-	93
Store 3 100 16	Store 3	100	-	-	16
Cleaner st 100 6	Cleaner st	100	-	-	6
Multidisciplinary Room 100 122	Multidisciplinary Room	100	-	-	122
LIFT - 100 - 16	LIFT	-	100	-	16
LIFT - 100 - 10	LIFT	-	100	-	10
Staff WC - 100 - 19	Staff WC	-	100	-	19
STORE 100 4	STORE	100	-	-	4
WC - 100 - 20	WC	-	100	-	20
WC - 100 - 21	WC	-	100	-	21
Multidisciplinary Room 100 138	Multidisciplinary Room	100	-	-	138
CORRIDOR - 100 - 134	CORRIDOR	-	100	-	134
Podiatry Treatment 1 100 131	Podiatry Treatment 1	100	-	-	131

General lighting and display lighting	Lumino	us effic	acy [lm/W]	
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	- 1
Physio Treatment	100	-1	-	102
Podiatry Treatment 2	100	ΞI	-	123
GP Treatment Room	100	81	-	139

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Podiatry Workshop	NO (-90.1%)	NO
GP Exam Consult 4	NO (-70%)	NO
GP Exam Consult 2	NO (-76.7%)	NO
GP Exam Consult 1	NO (-66.2%)	NO
Waiting Area	NO (-66.2%)	NO
Reception	N/A	N/A
Exam / Consult	NO (-86%)	NO
Exam / Consult	NO (-85.4%)	NO
Exam / Consult	NO (-64.1%)	NO
Exam / Consult	NO (-87.8%)	NO
Exam / Consult	NO (-69.9%)	NO
Exam / Consult	NO (-85.4%)	NO
Exam / Consult	NO (-65.2%)	NO
Exam / Consult	NO (-72.4%)	NO
Exam / Consult	NO (-80.9%)	NO
GP Admin	N/A	N/A
GP Office	N/A	N/A
GP Exam Consult 3	NO (-65.6%)	NO
GP Study / Meeting	NO (-61%)	NO
PM Office	N/A	N/A
IPC Office 22 Desks	NO (-90.6%)	NO
Staff Kitchen / Rest	NO (-82.2%)	NO
Multidisciplinary Room	NO (-70.7%)	NO
Multidisciplinary Room	NO (-74.2%)	NO
Podiatry Treatment 1	NO (-90.5%)	NO
Physio Treatment	NO (-94.2%)	NO
Podiatry Treatment 2	NO (-77.3%)	NO
GP Treatment Room	NO (-68.7%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	966	966
External area [m ²]	1472.5	1472.5
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	449.71	546.52
Average U-value [W/m ² K]	0.31	0.37
Alpha value* [%]	23.82	17.66

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways B1 Offices and Workshop businesses B2 to B7 General Industrial and Special Industrial Groups **B8** Storage or Distribution C1 Hotels C2 Residential Institutions: Hospitals and Care Homes C2 Residential Institutions: Residential schools C2 Residential Institutions: Universities and colleges C2A Secure Residential Institutions **Residential spaces** D1 Non-residential Institutions: Community/Day Centre D1 Non-residential Institutions: Libraries, Museums, and Galleries D1 Non-residential Institutions: Education 99 D1 Non-residential Institutions: Primary Health Care Building D1 Non-residential Institutions: Crown and County Courts D2 General Assembly and Leisure, Night Clubs, and Theatres Others: Passenger terminals Others: Emergency services Others: Miscellaneous 24hr activities

Others: Car Parks 24 hrs

1

Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	5.55	5.39
Cooling	0.5	0.77
Auxiliary	5.13	2.51
Lighting	16.53	25.21
Hot water	3.35	1.45
Equipment*	27.82	27.82
TOTAL**	31.06	35.34

* Energy used by equipment does not count towards the total for consumption or calculating emissions. ** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	8.25	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO, Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	145.51	181.34
Primary energy* [kWh/m ²]	89.16	103.2
Total emissions [kg/m ²]	10.8	17.5

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.
| HVAC Systems Performance | | | | | | | | | | |
|--|----------|-------------------|-------------------|--------------------|--------------------|-------------------|---------------|---------------|------------------|------------------|
| System Type | | Heat dem
MJ/m2 | Cool dem
MJ/m2 | Heat con
kWh/m2 | Cool con
kWh/m2 | Aux con
kWh/m2 | Heat
SSEEF | Cool
SSEER | Heat gen
SEFF | Cool gen
SEER |
| [ST] Central heating using water: floor heating, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 65.9 | 80.6 | 5.6 | 0 | 4.9 | 3.29 | 0 | 3.5 | 0 |
| | Notional | 47.4 | 133.7 | 5.4 | 0 | 2.5 | 2.43 | 0 | | |
| [ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity | | | | | | | | | | |
| | Actual | 66.4 | 66.7 | 5.4 | 7.1 | 5.6 | 3.43 | 2.62 | 3.5 | 3.5 |
| | Notional | 44.7 | 140.7 | 5.1 | 10.9 | 2.4 | 2.43 | 3.6 | | |

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U і-Тур	Ui-Min	Surface where the minimum value occurs*		
Wall	0.23	0.16	HL000000_W5		
Floor	0.2	0.15	HL000000_F		
Roof		0.17	HL000000_C		
Windows, roof windows, and rooflights	1.5	1.41	HL000000_W5_O0		
Personnel doors	1.5	1.8	CR000000_W5_O0		
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"		
High usage entrance doors	1.5	-	"No external high usage entrance doors"		
UI-Typ = Typical individual element U-values [W/(m ² K)	U _{I-Min} = Minimum individual element U-values [W/(m ² K)]				
* There might be more than one surface where the minimum U-value occurs.					

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	5



<u>APPENDIX 'G'</u>

DISCOUNTED RENEWABLE ENERGY TECHNOLOGIES



The following renewable energy technologies were not considered to be feasible for the proposed development.

Wind Turbines

For the urban location the minimal annual average wind speed is not achieved for wind turbines to be viable.

Biomass Boilers

The size of the development within a constrained site allow limited space for fuel storage as such the logistical requirements of a biomass boiler system are out of proportion with the rest of the development and are therefore unsuitable.

In addition, the NOx emissions associated with biomass would not be acceptable within an urban area.

Ground Source Heat Pump

There is insufficient land available to install a slinky type closed loop array and the use of bore holes is precluded on cost grounds. The use of thermopiles has also been discounted as the building is to have a raft foundation.

Solar Water Heating

Solar Water Heating has been discounted as the solar panels compete with the PV panels for space on the roof and offset gas consumption which has a lower carbon emission factor than the grid derived electricity offset by the PV panels.