As Designed SBEM Report

Client:

CJR Maintenance Solutions
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Gainsborough
Lincolnshire
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Project:

Park Grove Surgery
Burleigh Street Health Centre
Barnsley
South Yorkshire

Report date: 11th March 2016

Issue: 01

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1.0 EXECUTIVE SUMMARY

The new Park Grove Surgery SBEM computer thermal model has been developed utilising thermal properties, services details and proposed Low and Zero Carbon Technology solutions at pre-construction design stages.

Part L Compliance Calculations (SBEM)

The new Park Grove Surgery development is a new build and as such falls under Part L2A of the 2010 Building Regulations, 2013 Edition, England.

The table below demonstrates that the current specification will comply with Part L2A (2013 edition); calculated CO_2 is less than the target rate.

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	23.3
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	23.3
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21.1
Are emissions from the building less than or equal to the target?	BER =< TER

2.0 INTRODUCTION

MES Building Solutions has been commissioned to provide thermal simulation for the proposed new Park Grove Surgery development. The purpose of this report is to provide the compliance/assessment evidence at the current design stage for:

- Part L2A – CO_2 Emissions, U-values and Solar Gains
- Energy Performance Certificate

The thermal modelling work has been carried out using the dynamic thermal software developed by Integrated Environmental Solutions (IES) and applied in accordance with CIBSE AM11 "Building Energy and Environmental Modelling".
It has been used to analyse different ventilation strategies and anticipate internal temperatures in different areas. The thermal model has been simulated using the following IES packages:

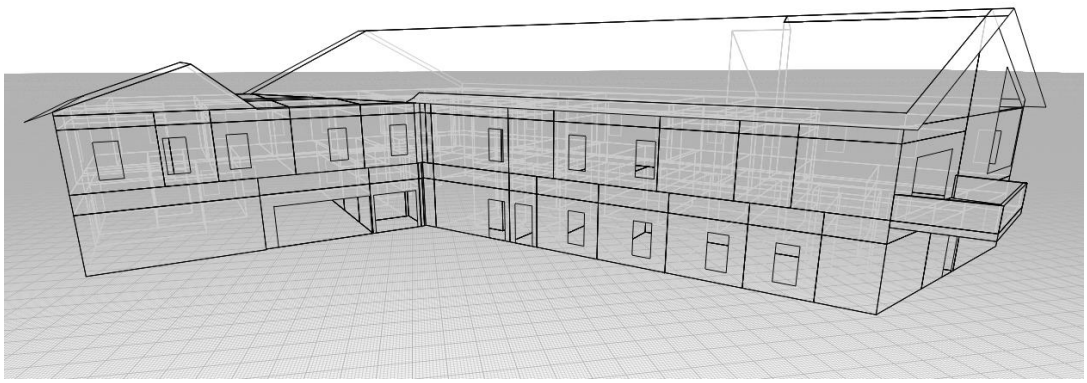
- Model IT – 3-D view model was constructed
- <VE> Compliance – to test compliance with UK Building Regulations dealing with the conservation of fuel and power and to generate Energy Performance Certificates (EPCs)
- Suncast – solar shading analysis and invoked as an adjunct to <VE> simulation.

3.0 MODELLING SOFTWARE PRINCIPLES

To fully understand the results produced in this report, it is important for the reader to understand how the modelling software works and how data is put into the model. The accredited IES thermal modeling package has been used to create a thermal representation of the proposed new Park Grove Surgery development and may also be used to inform the design process in terms of heating loads, day lighting, thermal comfort conditions, overheating assessment, Part L2A compliance document and Energy Performance Certificates.
In the first instance a three dimensional model of the proposed new Park Grove Surgery was constructed using the "Model IT" tool in IES, based on the architectural plans and elevations. The model is a true representation of the building in respect of:

1) Floor Areas
2) Room Volumes
3) Surface Areas
4) Window Sizes
5) Orientation
6) Room Layouts

Once the geometric model is completed, certain elements such as fabric details (U values for walls, floors, roof, windows and doors) and window openings are assigned to the model. Construction U-values have been entered inline with the completed and returned SBEM data collection form. By assigning an orientation to the model, the software will detect the orientation of each window, wall and door in relation to due north as illustrated in the final model below.



Park Grove Surgery development 3-D view from thermal modelling software

Following this, each room is assigned a thermal template that specifies the following:

1) Occupancy gains
2) Lighting gains
3) Miscellaneous gains (computers, photocopiers, etc.)
4) Infiltration and ventilation rates

Each gain is assigned a specific profile that turns it on or off, depending on the occupancy times. Solar shading devices have been added to the model, the effects of which are modelled by the SunCast engine.
The weather data is assigned, which is usually the nearest detailed weather file available. Upon completion of all of the above criteria, the model is ready to simulate compliance with Building Regulations.

4.0 SUMMARY OF INPUT DATA

4.1 Building Fabric

The following area-weighted average U-values are the specified for the new Park Grove Surgery development:

- External Wall 0.26 W/m^{2}K
- Ground Floor[1] 0.14 W/m^{2}K
- Roof 0.18 W/m^{2}K
- Glazing 1.83 W/m^{2}K [G-value of 0.4]

The air permeability was targeted at 7.0 m^3.h /m^2 @ 50 Pa.

4.2 Weather

The new large extension development is located in Barnsley, therefore the appropriate Leeds weather files were used for the simulation.

4. 3 Internal Gains

Lighting:

- Fittings: Not Specified.
  - Unset Lamp type with Efficacy of 70 lm/W
- Display Lighting
  - Lamp Efficacy 22 lm

Occupancy:

- As NCM

Small Power:

- As NCM

4.4 Occupation Hours / Periods

All occupation rates and schedules are determined as NCM 2010 data.

[1] U-Value 0.20 before ground floor contact adjustment. EN-ISO 13370.

5.0 PROPOSED HVAC SERVICES

The mechanical services in the thermal model have been based upon the supplied design information as follows:-

• Heating systems:
    - Natural Gas fired LPHW boiler with under floor heating serving all spaces, other than the pharmacy areas.
    - Split air source heat pumps to Pharmacy using grid electricity.

• DHW systems:
    - Domestic hot water CT circuit with hot water storage cylinder with factory insulated foam.
• Ventilation systems:
    - Local Extract to W.C.s
    - Mechanical Ventilation to Pharmacy areas
    - Natural ventilation to all other areas

5.1 HVAC system efficiencies

The performance of the building HVAC services in the model have been based upon the design information as follows:

- Mains gas boiler serving radiators
    - Heating System Efficiency 92%
    - Fuel – Natural Gas
    - Central time control
    - Local Time Control
    - Local Temperature
    - Weather Compensator
    - Variable Speed Pump with Sensors

- Split air source heat pump
    - SCoP: 3.26 kW/kW
    - SSEER: 3.20 kW/kW
    - Central time control
    - Local Time Control
    - Local Temperature
    - Weather Compensator

- Domestic Hot Water
    - Heating System Del. Efficiency 95.0%
    - Storage Volume: 1000 lts
    - Storage loss: 0.0075 kWh/l/day

- Extract Fans
    - SFP 0.5

5.2 Electrical Services

The electrical services in the model have been based on the information supplied as follows:

- Electric power factor for the whole building: <0.9
- Lighting system has provision for metering?: No
- Lighting system metering warns of "out of range" values?: No
- Lighting Controls:
    - Auto On/Off – W.C. & circulation areas.
    - Man On / Auto Off – Consulting & Offices.
    - Man On / Man Off – to all other spaces.

5.3 Low and Zero Carbon Technologies

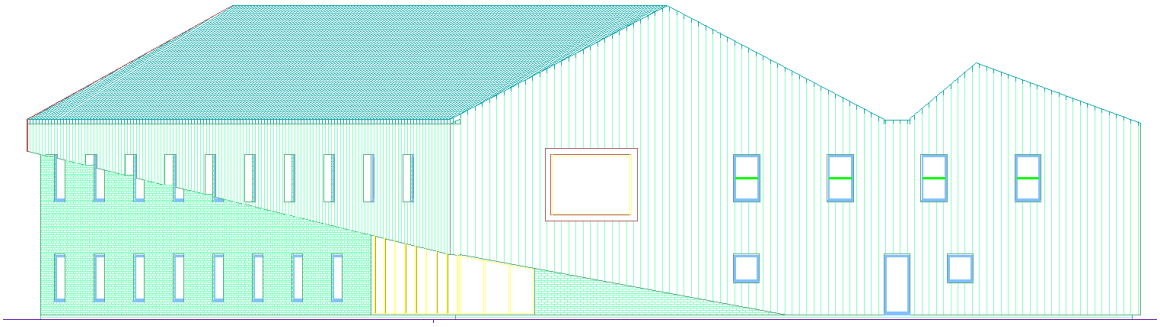
Photovoltaic array

- 150m^2 of South Westerly orientation mounted at 30°, monocrystalline silicon.

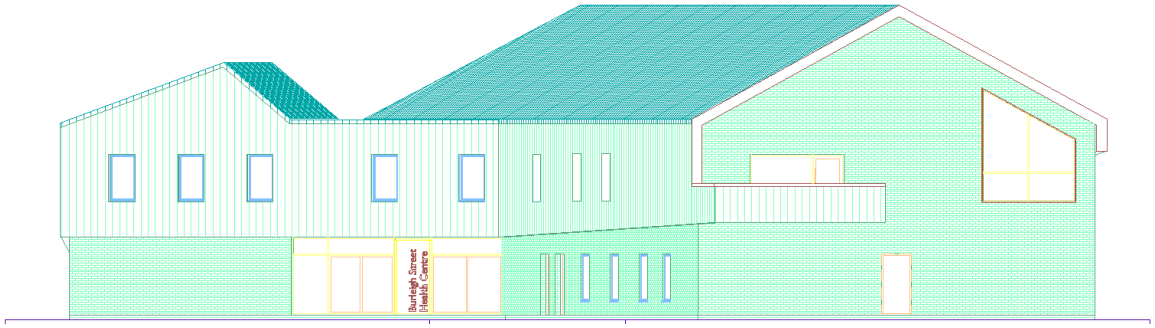
6.0 ARCHITECTURAL GENERAL ARRANGEMENT PLANS.

Proposed Ground Floor Plan

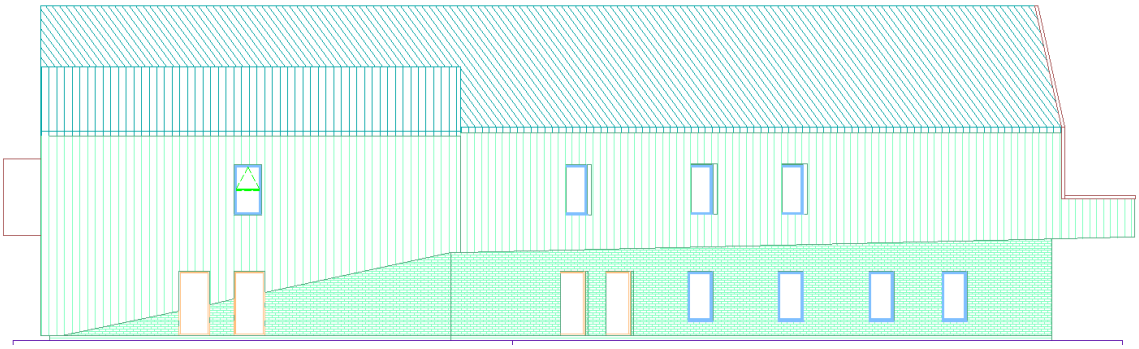
Proposed First Floor Plan



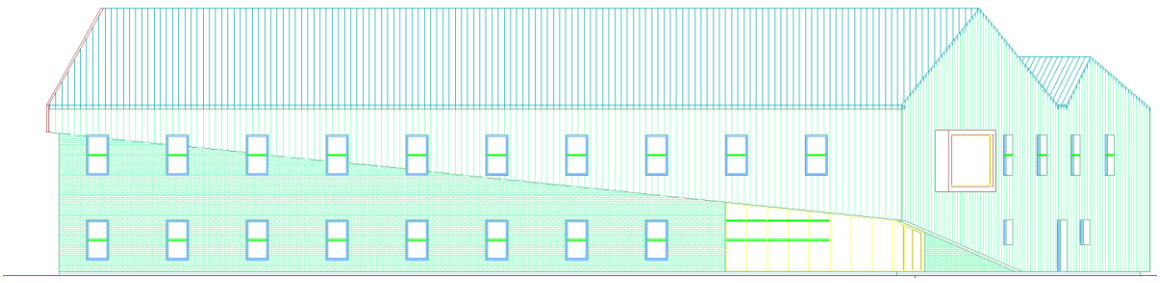
North West Elevation.



South East Elevation



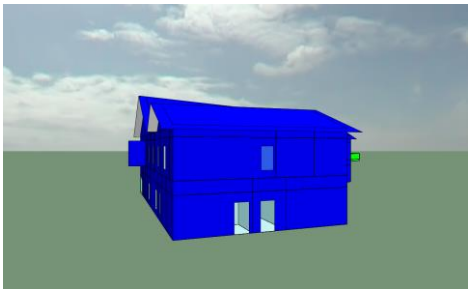
South West Elevation



North East Elevation

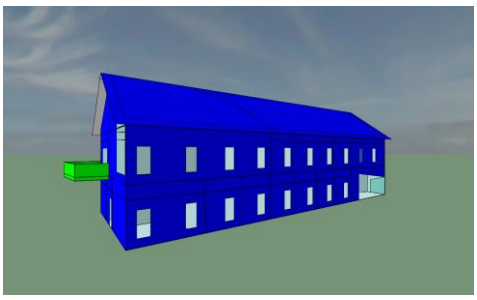
6.1 Computer Model Images.

Model view from South

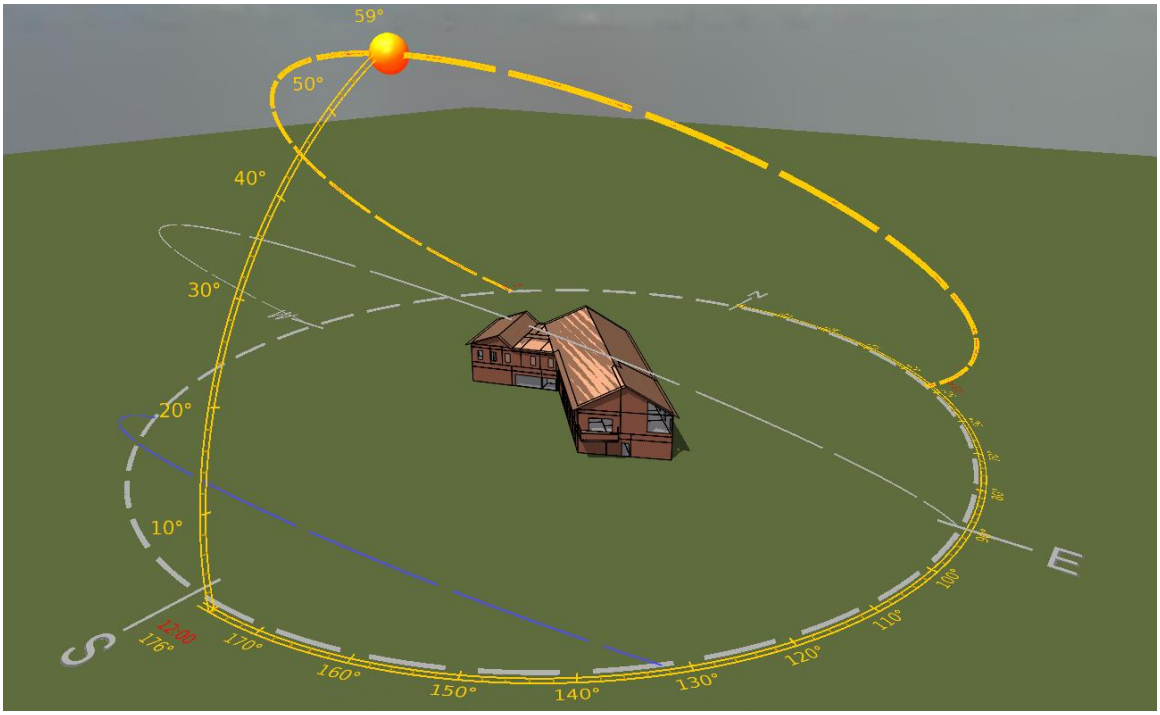


Model view from West

Model view from North



Model view from East



Solar Diagram. 12 noon, 21st June

7: SBEM BRUKL OUTPUT DOCUMENT and PREDICTED ENERGY PERFORMANCE CERTIFICATE.

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Park Grove Surgery

As designed

Date: Fri Mar 11 16:32:50 2016

Administrative information

Building Details

Address: Burleigh Street Health Centre, BARNSLEY,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.5

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.5

BRUKL compliance check version: v5.2.g.3

Owner Details

Name: Not Advised

Telephone number: ---

Address: ---, ---, ---

Certifier details

Name: MES Building Solutions

Telephone number: 01636 653 055

Address: Newark Beacon, NEWARK, NG24 2TN

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	23.3
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	23.3
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	21.1
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 the building services should achieve reasonable overall standards of energy efficiency

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

Building fabric

Element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.26	0.26	GN000006:Surf[2]
Floor	0.25	0.14	0.14	GN000006:Surf[0]
Roof	0.25	0.18	0.18	1S000014:Surf[7]
Windows***, roof windows, and rooflights	2.2	1.83	1.83	GN000006:Surf[1]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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
$m^3/(h.m^2)$ at 50 Pa	10	7

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	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Dalton LPHW Floor Heating

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	0.92	-	0	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

2- Dalton Air Source H.Pumps

	Heating efficiency	**Cooling efficiency**	**Radiant efficiency**	**SFP [W/(l/s)]**	**HR efficiency**
This system	3.5	3.2	0	0	-
Standard value	2.5*	3.2	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* 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.

"No HWS in project, or hot water is provided by HVAC system"

Local mechanical ventilation, exhaust, and terminal units

ID	**System type in Non-domestic Building Services Compliance Guide**
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	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
E	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
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	**Zone**	**Standard**
Gnd_021 WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Gnd_006 WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Gnd_007 WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Gnd_030 Acc WC	-	-	0.5	-	-	-	-	-	-	-	N/A
Gnd_025 Pharmacy	-	-	0.5	-	-	-	-	-	-	-	N/A
Gnd_026 Dispensary	-	-	0.5	-	-	-	-	-	-	-	N/A
Gnd_028 Acc. WC	-	-	0.5	-	-	-	-	-	-	-	N/A
1st_42 WC/Shwr/Ch	-	-	0.5	-	-	-	-	-	-	-	N/A
1st_43 WC	-	-	0.5	-	-	-	-	-	-	-	N/A
1st_54 Acc WC	-	-	0.5	-	-	-	-	-	-	-	N/A
1st_55 WC	-	-	0.5	-	-	-	-	-	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
1st_64 WC	-	-	0.5	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Gnd_015	70	-	-	194
Gnd_017 ANP / PN	70	-	-	193
Gnd_Circulation	-	70	-	117
Gnd_021 WC	-	70	-	31
Gnd_023 Dirty Utility	70	-	-	15
Gnd_019 Clean Utility	70	-	-	18
Gnd_013 ANP / GP	70	-	-	194
Gnd_011 Cleaner	70	-	-	10
Gnd_022 Treatment	70	-	-	257
Gnd_010 ANP / PN	70	-	-	194
Gnd_012 Exam	70	-	-	195
Gnd_014 HCA	70	-	-	195
Gnd_016 GP Consulting	70	-	-	195
Gnd_018 GP Consulting	70	-	-	195
Gnd_020 GP Consulting	70	-	-	195
Gnd_009 Stair 1	-	70	-	63
Gnd_001 Lobby	-	70	-	22
Gnd_002 Interview	70	-	-	114
Gnd_004 Back Office	70	-	-	196
Gnd_006 WC	-	70	-	31
Gnd_007 WC	-	70	-	31
Gnd_030 Acc WC	-	70	-	57
Gnd_025 Pharmacy	-	70	22	1325
Gnd_026 Dispensary	-	70	22	190
Gnd_029 Stair 2	-	70	-	35
Gnd_027 Back Office	70	-	-	205
Gnd_028 Acc. WC	-	70	-	32
1st_47 Consulting	70	-	-	191
1st_56 Practice Man.	70	-	-	180
1st_39 Cupboard	70	-	-	6
1st_40 Staff Room	-	70	-	97
1st_41 Comms	70	-	-	101
1st_42 WC/Shwr/Ch	-	70	-	48
1st_43 WC	-	70	-	34
1st_59 Meeting	70	-	-	250
1st_58 Plant	70	-	-	72
1st_Circulation	-	70	-	87
1st_46 Multi Purpose	70	-	-	313

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
1st_46 Cupboard	70	-	-	9
1st_54 Acc WC	-	70	-	38
1st_55 WC	-	70	-	31
1st_56 Cleaner	70	-	-	10
1st_69 Waiting	-	70	22	324
1st_64 WC	-	70	-	27
1st_67 Stair 2	-	70	-	42
1st_65 Dirty Utility	70	-	-	14
1st_66 Clean Utility	70	-	-	15
1st_68 Treatment	70	-	-	220
1st_Circulation	-	70	-	76
1st_50 GP Consulting	70	-	-	194
1st_49 GP Consulting	70	-	-	195
1st_48 Room	70	-	-	195
1st_51 GP Consulting	70	-	-	194
1st_53 GP Consulting	70	-	-	196
1st_52 GP Consulting	70	-	-	194
1st_57 Stair 1	-	70	-	62
Gnd_005 Waiting	-	70	22	397
1st_39 Office	70	-	-	784

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?
Gnd_015	NO (-78.5%)	NO
Gnd_017 ANP / PN	NO (-78.1%)	NO
Gnd_013 ANP / GP	NO (-79.3%)	NO
Gnd_022 Treatment	NO (-89.2%)	NO
Gnd_010 ANP / PN	NO (-81.7%)	NO
Gnd_012 Exam	NO (-81.7%)	NO
Gnd_014 HCA	NO (-81.8%)	NO
Gnd_016 GP Consulting	NO (-81.7%)	NO
Gnd_018 GP Consulting	NO (-81.7%)	NO
Gnd_020 GP Consulting	NO (-81.7%)	NO
Gnd_002 Interview	N/A	N/A
Gnd_004 Back Office	NO (-81.1%)	NO
Gnd_025 Pharmacy	NO (-78.6%)	NO
Gnd_026 Dispensary	NO (-21.3%)	NO
Gnd_027 Back Office	NO (-80.7%)	NO
1st_47 Consulting	NO (-84.1%)	NO
1st_56 Practice Man.	NO (-80.5%)	NO
1st_40 Staff Room	NO (-62.7%)	NO
1st_41 Comms	N/A	N/A
1st_59 Meeting	NO (-73.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1st_46 Multi Purpose	NO (-82.1%)	NO
1st_69 Waiting	NO (-66.3%)	NO
1st_68 Treatment	NO (-87.8%)	NO
1st_50 GP Consulting	NO (-85.1%)	NO
1st_49 GP Consulting	NO (-85%)	NO
1st_48 Room	NO (-84.9%)	NO
1st_51 GP Consulting	NO (-79%)	NO
1st_53 GP Consulting	NO (-84.4%)	NO
1st_52 GP Consulting	NO (-79.8%)	NO
Gnd_005 Waiting	NO (-28.2%)	NO
1st_39 Office	NO (-78.7%)	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?	YES
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]	1109	1109
External area [m^2]	2501.6	2501.6
Weather	LEE	LEE
Infiltration [m^3/hm^2@ 50Pa]	7	3
Average conductance [W/K]	684.04	853.82
Average U-value [W/m^2K]	0.27	0.34
Alpha value* [%]	12.42	10

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

Building Use

% Area	Building Type
10	**A1/A2 Retail/Financial and Professional services**
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
6	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
84	**D1 Non-residential Inst.: Primary Health Care Building**
	D1 Non-residential Inst.: 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/m^2]

	Actual	Notional
Heating	41.76	35.48
Cooling	1.28	0.62
Auxiliary	1.29	1.24
Lighting	30.47	27.24
Hot water	7.09	3.55
Equipment*	27.84	27.84
TOTAL**	**81.88**	**68.14**

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

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	13.26	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	135.96	121.25
Primary energy* [kWh/m^2]	165.65	136.8
Total emissions [kg/m^2]	21.1	23.3

* 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] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	136.5	0	46.2	0	1.3	0.82	0	0.92	0
	Notional	121	0	39	0	1.2	0.86	0	----	----
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	27.8	103.1	2.4	12.6	1.6	3.26	2.27	3.5	3.2
	Notional	39.3	83.9	4.3	6.1	1.8	2.56	3.79	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

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 BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.26	GN000006:Surf[2]
Floor	0.2	0.14	GN000006:Surf[0]
Roof	0.15	0.18	1S000014:Surf[7]
Windows, roof windows, and rooflights	1.5	1.83	GN000006:Surf[1]
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = Minimum individual element U-values [W/(m²K)]

* 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	7

Energy Performance Certificate

Non-Domestic Building

HM Government

Burleigh Street Health Centre
Saville Street
BARNSLEY

Certificate Reference Number:
9783-3036-0754-0400-5295

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/epbd.

Energy Performance Asset Rating

More energy efficient

Less energy efficient

Technical information

Main heating fuel:	Natural Gas
Building environment:	Heating and Natural Ventilation
Total useful floor area (m^2):	1109.016
Building complexity (NOS level):	5
Building emission rate ($kgCO_2/m^2$):	21.1

Benchmarks

Buildings similar to this one could have ratings as follows:

33 If newly built

87 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in SI2007:991 as amended

Assessment Software:	Virtual Environment v7.0.5 using calculation engine ApacheSim v7.0.5
Property Reference:	734724380000
Assessor Name:	MES Building Solutions
Assessor Number:	LCEA075940
Accreditation Scheme:	CIBSE Certification Ltd
Employer/Trading Name:	MES Building Solutions
Employer/Trading Address:	Newark Beacon, Cafferata Way, NEWARK NG24 2TN
Issue Date:	11 Mar 2016
Valid Until:	10 Mar 2026 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the property are contained in Report Reference Number: 0570-0445-8749-3396-2006

If you have a complaint or wish to confirm that the certificate is genuine

Details of the assessor and the relevant accreditation scheme are on the certificate. You can get contact details of the accreditation scheme from the Government's website at www.communities.gov.uk/epbd, together with details of the procedures for confirming authenticity of a certificate and for making a complaint.

CARBON TRUST

For advice on how to take action and to find out about technical and financial assistance schemes to help make buildings more energy efficient visit **www.carbontrust.co.uk** or call us on **0800 085 2005**