

McCann
and partners

Consulting Engineers

Bicester Health and Wellbeing Hub For Apollo Capital Projects

Building Regulations Part L Compliance Report

Bicester Health and Wellbeing Hub

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Prepared by:
McCann & Partners
First Floor, Suite 2
Vivian Court
New Mill Court
Swansea Enterprise Park
SA7 9FG
T: 01792 794285
E:swanseaoffice@mccannp.com
W:mccannp.com

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1.0 EXECUTIVE SUMMARY

1.1 Executive Summary

McCann and Partners have undertaken a Stage 2 analysis of the proposed Bicester Health and Wellbeing Hub with the aim of assessing the following:

- Compliance with Part-L2A of the 2014 Building Regulations.
- Production of a Stage 2 Energy Performance Certificate (EPC).
- The building performance under BREEAM has also been reviewed, identifying the amount of credits achieved and resulting classification under ENE01.
- Compliance with local planning policy ESD1-5.

The results ascertained from the dynamic simulation model, allow us to draw the following conclusions:

- The building achieves a predicted Energy Performance Certificate Rating of 17 – A (Benchmarks for a similar building are 27 – B rated for a new building and 78 – D rated for an existing building).
- The Building Emission Rate (BER) is lower than the targets set by Part L2A, resulting in Criterion 1 compliance.
- The building achieves 4 energy credits under BREEAM’s ENE01.
- The inclusion of air source heat pumps and photovoltaic panels provides a significant on-site renewable energy resource. The scheme therefore complies with the local planning policy ESD1-5.

Note: *This assessment has been undertaken at Stage 2 and has in some instances, been based on assumptions which will be developed and refined as the detailed design progresses.*

2.0 INTRODUCTION

2.1 Introduction

This report has been created by McCann and Partners with the aim of assessing the building's compliance with Part-L2A of the 2014 Building Regulations and producing a draft Energy Performance Certificate (EPC).

The buildings performance will also be assessed under the BREEAM 2018 scheme, where a classification of 'Excellent' has been targeted, with a minimum of 4 being required under ENE01.

In order to obtain an Energy Performance Certificate rating and Part L2A Assessment, a dynamic simulation model has been created which provides a geometrical and thermal representation of the proposed development, using the National Calculation Methodology (NCM).

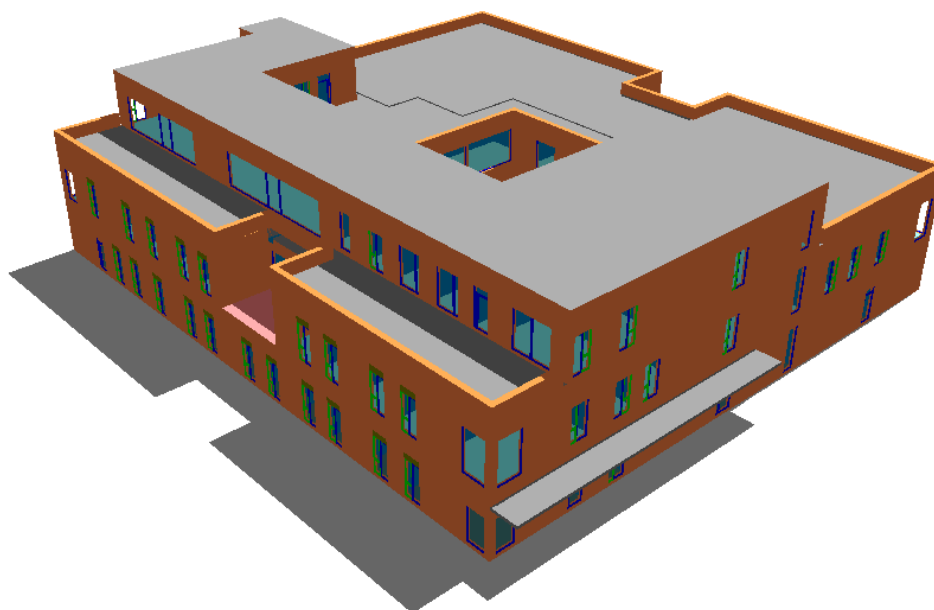
It is important to note that EPC's/Part L Assessments are used to benchmark energy ratings only and are not to be mistaken for the proposed buildings predicted energy usage/ carbon production.

The NCM uses sets of standardised databases containing operational inputs which are used for both the proposed building and a comparison building (Notional Building). These standards include hours of operation, occupancy density, temperature set points, domestic hot water demand, fresh air flow rates and lighting (lux) levels. Other energy uses are not included in the assessment e.g. unregulated small power, servers, external lighting, catering and lifts etc. The input parameters that will determine the buildings overall energy performance are the efficiencies of the building fabric and mechanical and electrical services. These parameters are pivotal to the results produced by the software and should be carefully considered. Where information has not yet been finalised, estimates of performance levels (agreed with the Design Team and Client) will be used.

3.0 MODELLING PARAMETERS

A Dynamic Simulation Model (DSM) has been produced using EDSL TAS Version 9.4.4. The DSM is a computer generated representation of the proposed building, that will simulate a comparable energy usage and carbon production. This is based on the building construction, internal conditions (lighting, heating, comfort cooling, etc.), weather data (based on location) and mechanical and electrical services. The DSM will then provide a Building Regulation Compliance Document (BRUKL), which compares the building performance against the various criteria and targets set out within Building Regulation Part L2A Conservation of Fuel within buildings, in the form of a “Notional Building”. The software produces a draft Energy Performance Certificate (EPC) rating. The predicted energy performance of the dynamic simulation model, can then also be used to evaluate the buildings performance with regards to the Building Research Establishment Environmental Assessment Method (BREEAM).

3D Model



(Images taken from EDSL Tas 3D Modeller)

Building-specific information is entered into the software to form the basis of the Part L assessment. The software produce a geometrical and thermal representation of the proposed development. For this reason, it is important to note that any changes to this information can/will result in changes to the results depicted in this report.

3.1 Architectural Drawings/Revit Model

The thermal model has been created using the following Revit model provided by IBI Architects:

Date Received:	Title	Revision
24-02-21	122447-IBI-WB-00-M3-A-001 Bicester	P04

Note: The model used is the latest revisions available to McCann & Partners at the time of writing and is subject to future revisions by the architect.

3.2 Weather Data

The nearest available weather station to the proposed development is located in Swindon, referred to as The Swindon Typical Record Year (TRY). This weather data has been utilised for the project.

3.3 Construction Materials

To prevent excessive heat loss and increase the energy efficiency of the building, the construction details specified have been carefully considered to ensure an improved performance over the Building Regulation limiting values. Their performance of each construction is listed below.

U-Values

The u-values modelled are detailed below:

Building Element	Actual Building U-Values	Notional Building U-Values	Building Regulation Limiting U-Values
External Wall	0.14 W/m².⁰C	0.26 W/m ² . ⁰ C	0.35 W/m ² . ⁰ C
Ground Floor	0.1 W/m².⁰C	0.22 W/m ² . ⁰ C	0.25 W/m ² . ⁰ C
Roof	0.1 W/m².⁰C	0.18 W/m ² . ⁰ C	0.25 W/m ² . ⁰ C
Frame	1.4 W/m².⁰C	2.2 W/m ² . ⁰ C	N/A
Glazing Pane	1.4 W/m².⁰C	1.527 W/m ² . ⁰ C	2.2 W/m ² . ⁰ C
Glazing Pane & Frame (Average)	1.4 W/m².⁰C	N/A	2.2 W/m ² . ⁰ C

Glazing Properties

Glazing can also have a large bearing on a building's energy performance, with heating, cooling and lighting consumption all influenced by the amount of light and solar energy transmitted through the building's facade.

The performance of the glazing used in the thermal model is detailed below:

Glazing Specification	Actual Building	Notional Building
Light Transmittance	70%	71.2%
Solar Transmittance	28.7%	33%
G-Value	0.35	0.40

3.4 Internal Conditions

The building's usage is determined by a set of internal conditions provided by the National Calculation Methodology (NCM). The internal conditions specify the set points and profiles for heating and cooling, the minimum ventilation flow rate, infiltration rate, hot water consumption, internal gains and (where relevant) the electrical consumption associated with lighting, equipment and occupancy. The values contained in the NCM internal conditions are pre-determined and cannot be altered or amended in any way for the purposes of Building Regulation Part L assessments.

3.5 Shading Devices

Shading elements of a building's façade can be both beneficial and/or detrimental to its energy consumption, depending on the heating and cooling strategies in place and time of year. This development has been modelled with the shading devices shown on the architectural elevations and Revit model.

3.6 Air Permeability

The predicted air tightness of the building is detailed below:

Air Permeability:	5 m ³ /h.m ²
-------------------	------------------------------------

4.0 MECHANICAL & ELECTRICAL SERVICES

4.1 Mechanical Services

The building's mechanical services are categorised in Part L2A as Heating, DWS, Ventilation and Cooling.

4.1.1 Heating/DWS

Heating to the building comprises of Air Source Heat Pumps (ASHPs) providing LTHW to a water central heating system. The ASHPs have a seasonal efficiency of 3.5 which is input into the model as 350%.

See system efficiency details below:

Heating Fuel	Electricity
Heating Technology	ASHP
Emitter Type	Radiators
Heating Source Efficiency (%)	350.0
Distribution Efficiency (%)	95.0

The building's domestic hot water system is generated by a hot water cylinder within the plant room fed from the ASHPs.

See system efficiency details below:

DHW Fuel	Electricity
DHW Technology	ASHP
DHW Heating Source Efficiency	350.0
Distribution Efficiency (Domestic Hot Water %)	95.0
Total Storage Volume (litres)	300.0
Insulation Conductivity (W/m*C)	0.02
Insulation Thickness (mm)	80.0
Circulation Pump Power (kW)	N/A

4.1.2 Ventilation

Supply ventilation shall take the form of tempered mechanical supply air from ceiling void mounted local air handling units complete with heat recovery.

Extract ventilation shall be provided to WC and shower provisions, to remove excess moisture and stale/foul air.

Auxiliary/Ventilation Fuel	Electricity	Electricity	Electricity
Ventilation Type	Natural Ventilation	NVHR	Extract
Specific Fan Power (W/l/s)	N/A	1.1	0.5
Heat Recovery Efficiency (%)	N/A	85	N/A

4.1.3 Cooling

Comfort cooling shall be provided to the Comms Room by means of a wall mounted cooling only unit with associated outdoor unit located externally at roof level.

Cooling Fuel	Electricity
Cooling Technology	Split DX
Emitter Type	Wall mounted
Cooling Source Efficiency (%)	350.0
Distribution Efficiency (%)	95.0

4.2 Electrical Services

The building's electrical services are categorised under Part L2A as Lighting and Equipment.

4.2.1 Lighting

The emphasis on energy efficient and user-friendly controlled lighting shall be paramount. The range of lamp types will be minimised as LED technology shall be used extensively for its inherent instantaneous light output, energy efficiency and prolonged life.

Lighting control shall be selected for the specific room type and to maximise the use of natural light and energy efficiency.

4.2.2 Equipment

The energy consumption of equipment is pre-determined by the NCM internal condition for the purposes of Part L assessments.

4.3 Miscellaneous Services

Typical equipment requiring electrical supplies are listed below, but are not intended to be a full or exhaustive list as this shall be determined during the next stage of work:

- Mechanical services control centre panel(s)
- Building management systems
- Extract fans
- Water heaters
- VRF Refrigerant Heating and Cooling
- Air Handling Units
- Underfloor Heating Manifolds

Power Factor:	0.9 – 0.95
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4.4 Renewable Technologies

The inclusion of air source heat pumps as the primary heating source for the project allows the scheme to pass the requirement of Part L of the Building regulations without the need for further renewable technologies. However photovoltaics have been added to the scheme to further reduce the reliance on fossil fuels.

Details of the proposed PV installation modelled are shown below:

Technical Data

No of panels:	48
Peak Output (W):	250
Array Rating(kWp):	12
Location:	Main Roof
Mounting Angle(°):	16
Panel Size (m):	1.58 x 0.798
Module Efficiency (%):	19.8%
Manufacturer:	Panasonic
Model No:	VBHN250SJ25

5.0 Results

Using the (NCM) and the input parameters detailed in this report, the dynamic simulation model has produced an energy performance rating for the proposed development. The resulting energy performance of the building is comparable to a pre-determined set of standards defined as the Notional Building and can be used to assess its compliance with Part L2A of Building Regulations. A Building Regulation Compliance Document (BRUKL) and draft Energy Performance Certificate have been produced, the results of which, are detailed below:

5.1 Part L 2A - BRUKL

Criterion 1:

To pass **Criteria 1** the **Building Emission rate and building primary energy consumption should not exceed the target values.**

	Emission Rate
Building	11.4kg/CO ₂ /annum
Target	17.8kg/CO ₂ /annum
Result	Pass

Refer to Appendix for BRUKL and EPC.

Criterion 2:

“The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency.”

Building Element	Actual Building U-Values	Notional Building U-Values	Building Regulation Limiting U-Values
External Wall	0.14 W/m².⁰C	0.26 W/m ² . ⁰ C	0.35 W/m ² . ⁰ C
Ground Floor	0.1 W/m².⁰C	0.22 W/m ² . ⁰ C	0.25 W/m ² . ⁰ C
Roof	0.12 W/m².⁰C	0.18 W/m ² . ⁰ C	0.25 W/m ² . ⁰ C
Frame	1.4 W/m².⁰C	2.2 W/m ² . ⁰ C	N/A
Glazing Pane	1.4 W/m².⁰C	1.527 W/m ² . ⁰ C	2.2 W/m ² . ⁰ C

All construction elements used in the thermal model meet the Limiting area-weighted average u-value limit set by Building Regulations. The building therefore passes Criterion 2 of Part L2A.

Criterion 3:

“The spaces in the building should have appropriate passive control measures to limit solar gains.”

As part of the Building Regulation ADL2a Conservation of Fuel and Power in Buildings assessment, a ‘limiting solar gain check’ is performed for Criterion 3, where the aggregated solar gains between April and September are required to fall below a benchmark value. It is important to clarify that this does not mean that spaces are “overheating”, it refers only to the amount of direct and diffuse solar energy gained by these spaces via glazed areas of the façade. It is important that this is minimised where possible to reduce the amount of cooling energy or ventilation needed to overcome the resulting rise in temperature.

To reduce solar gain, the following passive measures are currently in place:

- Low G-Value Glass
- External vertical and horizontal shades, as detailed on the architectural Revit model.

The simulation results show that all areas pass the criteria.

(The overheating will also be assessed against the industry standard CIBSE TM52 as the detailed design develops).

5.2 **Energy Performance Certificate (EPC)**

This building achieves an EPC score of A-17. To view the draft EPC Certificate, please see appendix B.

5.3 **BREEAM**

The building achieves 4 credits under ENE01.

Note: *Energy Performance Certificates and Part L Assessments should not be used to predict the actual buildings future energy consumption and/or carbon production. The thermal model results are to form a comparable energy performance only, using the National Calculation Methodology.*

The results produced by the dynamic simulation model and findings detailed in this report, are based on the buildings form at the time of writing.

Any changes to the architectural drawings and/or the input parameters detailed in this report, may result in changes to the EPC Score, Building Regulations Compliance Document and BREEAM score.

It is important that the Part L assessment is regularly monitored and updated during the design and construction phases of the project to ensure that any changes are continuously reflected in the results.

Software updates may also result in changes to thermal model results.

APPENDIX A
BRUKL Document

BRUKL Output Document

Compliance with England Building Regulations Part L 2013



Project name

Bicester Health Hub

As designed

Date: Tue Mar 02 16:13:18 2021

Administrative information

Building Details

Address: ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.0"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Graham Carr

Telephone number: 02920 352450

Address: Faraday House, Terra Nova Way, Penarth Marina
, Cardiff, CF64 1SA

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	17.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	17.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	11.4
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	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	Surface where the maximum value occurs*
Wall**	0.35	0.14	0.14	External Wall
Floor	0.25	0.1	0.1	Ground Floor
Roof	0.25	0.1	0.1	Roof
Windows***, roof windows, and rooflights	2.2	1.4	1.4	Single door side panel
Personnel doors	2.2	2.13	1.66	Louvre
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project
U _{a-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² K)]				
* 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	5

APPENDIX B

Draft EPC Certificate

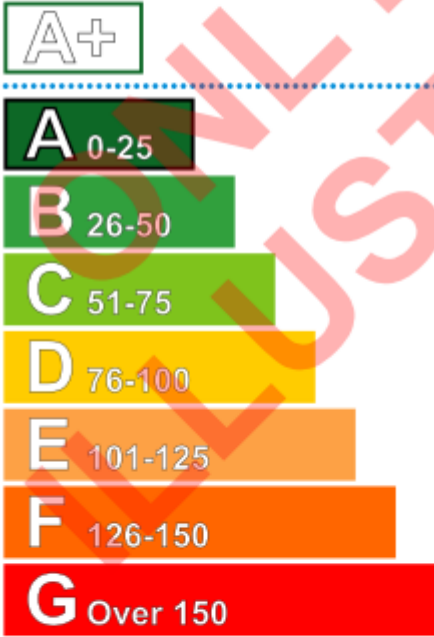
Energy Performance Certificate  HM Government
Non-Domestic Building

Certificate Reference Number:
0210-1245-9330-8772-6120

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 in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient



17 This is how energy efficient the building is.

Less energy efficient

Technical information

Main heating fuel:	Other
Building environment:	Unconditioned
Total useful floor area (m ²):	3165
Building complexity (NOS level):	5
Building emission rate (kgCO ₂ /m ² per year):	11.4
Primary energy use (kWh/m ² per year):	81.19

Benchmarks

Buildings similar to this one could have ratings as follows:

- 27** If newly built
- 78** If typical of the existing stock

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Consulting Engineers

Swansea Office:
Suite 2, Vivian Court
New Mill Court
Swansea Enterprise Park
Swansea
SA7 9FG
T: 01792 794285
E: swanseaoffice@mccannp.com

Cardiff Office:
Faraday House
Terra Nova Way
Penarth Marina
Cardiff
CF64 1SA
T: 029 2035 2450
F: 029 2035 2451
E: office@mccannp.com

mccannp.com