

ENERGY ASSESSMENT

**Proposed Development
of a Care Home**

Yapton Road, Middleton-on-Sea

Prepared for: Frontier Estates Ltd

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CONTENTS

1.0 INTRODUCTION	1
1.1 Site Location.....	1
1.2 Description of the Proposed Development.....	2
2.0 PLANNING POLICY	6
2.1 Local Plan	6
2.1.1 Energy Efficiency.....	6
2.1.2 Renewable Energy	6
2.2 Site Specific Targets	6
3.0 BASELINE ENERGY DEMANDS.....	7
3.1 Background	7
3.2 Energy Efficiency & Renewables	7
3.2.1 Building Fabric and Energy Efficiency Approach.....	7
3.2.2 Non-Domestic Energy Demand Modelling.....	7
3.2.3 Model Parameters and Building Fabric	7
3.2.4 Renewable Energy	9
4.0 SIMULATION RESULTS	10
4.1 Scenario 1: Baseline	10
4.2 Scenario 2: Baseline + PV Solar	10
4.3 Scenario 3: Baseline + PV Solar + ASHP	11
5.0 CONCLUSION.....	12
6.0 CLOSURE	13

DOCUMENT REFERENCES

TABLES

Table 3-1 Building General Parameters.....	8
Table 3-2 Building Fabric	8
Table 3-3 System Details	9
Table 4-1 Predicted Annual Energy Consumption (Baseline).....	10
Table 4-2 Predicted Annual Energy Consumption (Photovoltaics)	10

Table 4-3 Predicted Annual Energy Consumption (PV + ASHP)	11
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FIGURES

Figure 1-1 Proposed Development Site Location.....	1
Figure 1-2 Elevations of the Proposed Development	2
Figure 1-3 Proposed Basement Floor Plan	3
Figure 1-4 Proposed Ground Floor Plan	4
Figure 1-5 Proposed Level 1 Floor Plan	5

APPENDICES

Appendix A: BRUKL Documents	
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1.0 Introduction

SLR Consulting Limited (SLR) was commissioned by Frontier Estates Limited (the Client) to provide an energy assessment statement to accompany the planning application for a proposed care home on land to the west of Yapton Road, Middleton-on-Sea. This report has been prepared in support of a planning application to Arun District Council.

The assessment reviews the options for reducing the energy consumption of the building using passive design, building fabric specifications, energy efficiency measures, application of efficient heating systems and renewable energy technologies, with due regard to the site characteristics and local environment.

1.1 Site Location

The proposed site is located on the west side of Yapton Road, Middleton-on-Sea. Immediately to the south of the site boundary are residential houses along Silver Birch Drive. To the north and west of the site boundary consists of agricultural land.

Figure 1-1
Proposed Development Site Location



Image Source: Google Earth

1.2 Description of the Proposed Development

A planning application will be made for Frontier Estates Limited and will seek to demolish the existing buildings and redevelop the site into a care home, which will comprise:

- A two-storey building with a partial basement;
- 66 no. en-suite bedrooms, along with internal communal and operational areas;
- Car parking and cycle storage, and
- Managed landscaped gardens.

The east and north elevations of the proposed development (provided by Edmund Williams Architects) are shown in Figure 1-2 below.

Figure 1-2
Elevations of the Proposed Development



The architectural drawings used for this study were provided by Edmund Williams Architects, dated August 2019. These drawings are shown in Figure 1-3, Figure 1-4 and Figure 1-5.

Figure 1-3
Proposed Basement Floor Plan

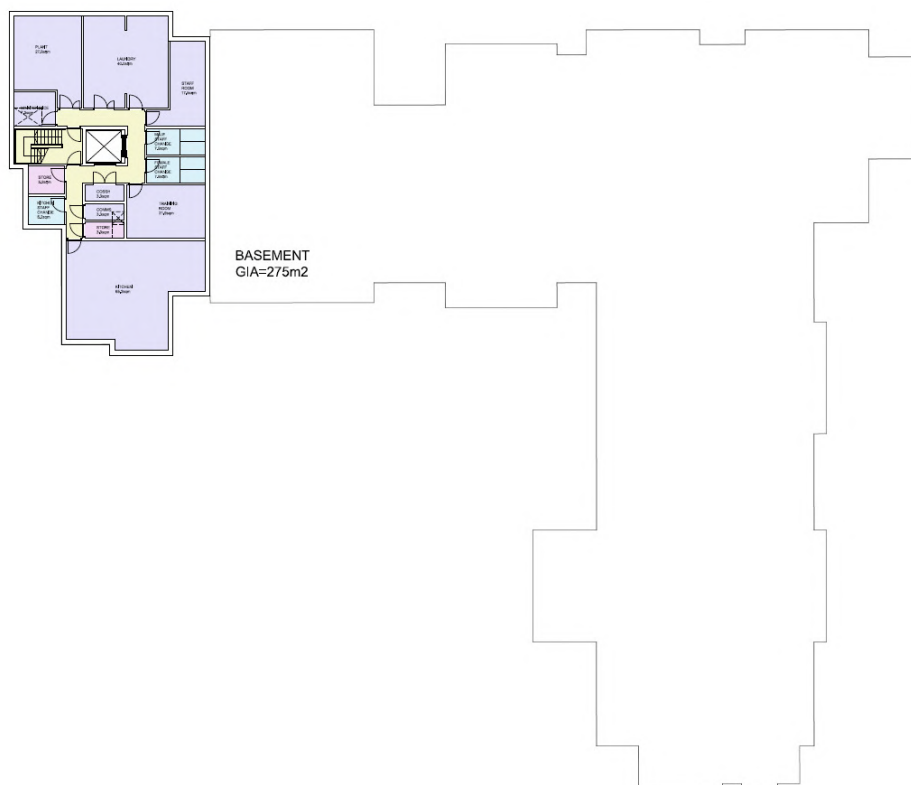


Figure 1-4
Proposed Ground Floor Plan

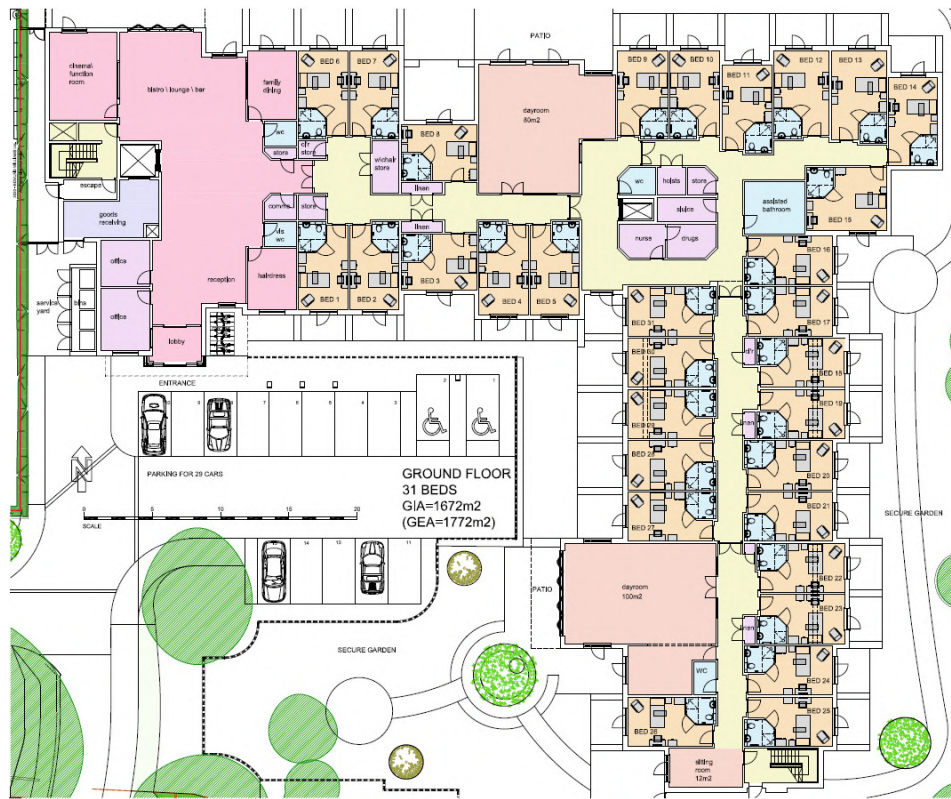


Figure 1-5
Proposed Level 1 Floor Plan



2.0 Planning Policy

2.1 Local Plan

Arun District Council's "Adopted Local Plan 2011-2031" (Local Plan) sets out policies in design with respect to addressing climate change via sustainable development. This is sub-categorised into renewable energy and energy efficiency initiatives for new buildings to comply with.

2.1.1 Energy Efficiency

Arun District Council's Local Plan recognises the "Energy Hierarchy" from the Energy Act 2013 as a key component to addressing energy efficiency based on the following initiatives:

- "Reduce the use of energy;
- Use energy more efficiently;
- Move to energy from renewable sources; and
- Use remaining fossil fuels cleanly".

2.1.2 Renewable Energy

A key policy from Arun District Council's Local Plan describes the following in relation to renewable energy:

"The South East Plan previously set the ground rules for this type of policy for Local Planning Authorities in the South East. Policy NRM11 required 10% of energy to come from renewable or low carbon technologies for major residential development or commercial development 1000m² or larger. Despite the revocation of the South East Plan, Arun District Council, in line with its commitments to mitigate the impacts of climate change under Climate Local, will take forward this policy requirement."

2.2 Site Specific Targets

In-line with energy and climate change mitigation set out in the Local Plan, targets for the proposed Middleton-on-Sea development can be summarised as follows

"All new residential and commercial development (including conversions, extensions and changes of use) will be expected to be energy efficient and to demonstrate how they will:

- Achieve energy efficiency measures that reflect the current standards applicable at the time of submission;*
- Use design and layout to promote energy efficiency; and*
- Incorporate decentralised, renewable and low carbon energy supply systems, for example small scale renewable energy systems such as solar panels.*

All major developments must produce 10% of the total predicted energy requirements from renewable or low carbon energy generation on site, unless it can be demonstrated that this is unviable."

3.0 Baseline Energy Demands

This section outlines proposals for improving the energy efficiency of the building in line with the Local Plan and reducing CO₂ emissions beyond the minimum standard required by the Building Regulations Part L 2013. This includes identifying building fabric and energy efficiency measures, before considering the low and zero carbon energy supply options.

3.1 Background

Part L2a sets out three compliance criteria that a building should comply with.

- Criterion 1 – calculated CO₂ emission rate for the building (BER) should not exceed the target (TER);
- Criterion 2 – performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency; and
- Criterion 3 – space in the building should have appropriate passive control measures to limit solar gains.

3.2 Energy Efficiency & Renewables

3.2.1 Building Fabric and Energy Efficiency Approach

Consideration has been given to the building orientation, fabric, systems and principles of passive design, including the following key measures:

- specification of high-performance u-values for the building fabric (reflecting high performance insulation properties);
- high level of air tightness;
- high efficiency lighting and ventilation systems;
- large areas of windows on the south façade;

3.2.2 Non-Domestic Energy Demand Modelling

The energy demands of the commercial element of the development were assessed using a dynamic simulation model (DSM). DSM is a method used to demonstrate compliance with Part L2a for non-domestic developments. The outputs derived from this model were then applied to estimate the baseline energy demands and CO₂ emissions from this element of the development.

The Energy Simulation Program used in this study is the computer program IES Virtual Environment (IESVE). The program is an approved software to undertake building energy rating calculations in accordance with Part L2 (2013) of the Building Regulations.

3.2.3 Model Parameters and Building Fabric

The following tables describe the modelling inputs including general parameters, building fabric and system details. Whilst not all details are known at this stage of the design, assumptions have been made based off current proposed building fabric and likely systems. Frontier Estates have a high-grade standard specification of systems; the systems selected for this model are somewhat representative of systems used in other Frontier care homes.

Table 3-1
Building General Parameters

Item	Description
Weather File	Southampton (TRY 05)
Total modelled building gross floor area (GFA)	3863m ²
Infiltration [m ³ /hm ² @50Pa]	3
Blinds	No internal blinds

Table 3-2
Building Fabric

Item	Description	Target U-Value
External Walls	Brickwork + cavity + insulation+ plaster	0.2
Floor	Concrete slab on ground	0.12
Roof	Clay/slate tiles with insulation in cavity	0.12
Glazing	Double glazed low-e	1.85
Doors	Solid insulated door	1.85
Internal ceiling/floor	Concrete slab with plaster board	0.15

Table 3-3
System Details

Item	Description	Fuel type	Efficiency	Additional details
Heating	Central heating using water: radiators	Gas	Heating Efficiency = 0.95	Weather compensation control; variable speed: pressure control across pumps
Cooling	Single room cooling to offices, drug room, day rooms, lounges and dining	Electricity	Cooling Efficiency = 1.25	
Hot Water	LTHW boiler	Gas	Seasonal Efficiency = 0.95	
Mechanical Ventilation	Extract fans to WCs, bathrooms, stores, laundry and kitchen.	Electricity	N/A	N/A

3.2.4 Renewable Energy

Options for delivering on-site renewable energy generation have been assessed. Based on the nature and scale of the site the following options have been considered potentially viable:

- Photovoltaics (assuming up to 200m² of available roof space); and
- Air Source Heat Pumps

For each technology the potential application has been assessed within the model.

4.0 Simulation Results

The following tables detail the predicted energy consumptions for the proposed building including scenarios with photovoltaics and air source heat pumps. It must be noted that simulations have been performed based on the assumptions made in Section 3.0. A detailed assessment of the energy consumption of the building is recommended for the detailed design stage once the Mechanical and Electrical specification is confirmed so the model can represent proposed systems and building fabric with greater accuracy.

4.1 Scenario 1: Baseline

Table 4-1
Predicted Annual Energy Consumption (Baseline)

Energy End-Use	Annual Energy Consumption (MWh)
Heating	170.8
Cooling	41.2
DHW	420.7
Auxiliary	6.1
Lighting	58.0
Total	696.8

4.2 Scenario 2: Baseline + PV Solar

Table 4-2
Predicted Annual Energy Consumption (Photovoltaics)

Energy End-Use	Annual Energy Consumption (MWh)
Heating	170.8
Cooling	41.2
DHW	420.7
Auxiliary	6.1
Lighting	58.0
PV Generated Electricity	-33.46
Total	663.4

4.8% reduction from Baseline

4.3 Scenario 3: Baseline + PV Solar + ASHP

Table 4-3
Predicted Annual Energy Consumption (PV + ASHP)

Energy End-Use	Annual Energy Consumption (MWh)
Heating	46.3
Cooling	41.2
DHW	113.6
Auxiliary	5.8
Lighting	58.0
PV	-33.5
Total	231.5

66.8% reduction from Baseline

5.0 Conclusion

A high level of energy efficiency is proposed for the fabric and services within the care home development. The intention is to exceed the requirements of Building Regulations Part L 2013 through fabric and efficiency measures alone, before accounting for the inclusion of low/zero carbon technologies. A DSM model was developed, and iterations were performed to account for renewable energy options including photovoltaics and air source heat pumps.

The proposed baseline energy performance is 696.8MWh per annum. Initial calculations revealed that, when considering the inclusion of photovoltaics as the low/zero carbon technology alone, there is a shortfall in the required energy offset to meet the 10% target, which demonstrated a reduction in annual energy consumption by 4.8%.

In contrast the inclusion of a combination of photovoltaics and air source heat pumps demonstrates an improvement of 66.8% over the baseline scenario. This is primarily due to the reduced demand on domestic hot water and space heating.

For the purposes of this report, a BRUKL document including both photovoltaics and air source heat pumps is appended as means of demonstrating both feasibility to meet the 10% target whilst also achieving Part L 2013 compliance. The inclusion of photovoltaics may not be necessary for the building to achieve compliance against the Target Energy Rate (TER). A “fabric-first” approach utilising further improvements to building fabric thermal properties as well as improved system efficiencies should also help achieve Part L 2013 compliance. These options will be explored in further detail during the post-planning stages.

Disclaimer

It must be noted that due to the energy assessment being carried out prior to the detailed design stage, a number of assumptions of likely systems and building fabric have been made. A detailed assessment of the energy consumption of the building is recommended for the detailed design stage so the model can represent proposed systems and building fabric with greater accuracy.

Computer building simulation provides an estimate of building performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all of the intricacies of the building once built. As a result, simulation results only represent an interpretation of the potential performance of the building. No guarantee or warranty of building performance in practice can be based on building simulation results alone.

6.0 Closure

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

APPENDIX A

BRUKL Documents:

1. Baseline
2. Baseline + Solar PV
3. Baseline + ASHP

Project name

Middleton-on-Sea Care Home

As designed

Date: Fri Jul 31 15:30:05 2020

Administrative information

Building Details

Address: Land to the West of Yapton Road,
Middleton-on-Sea,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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

The building does not comply with England Building Regulations Part L 2013

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	41.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	41.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	49.6
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	0.2	0.26	FN000001:Surf[0]
Floor	0.25	0.12	0.12	SS000000:Surf[0]
Roof	0.25	0.12	0.12	DY000002:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.85	1.85	BD000040:Surf[2]
Personnel doors	2.2	1.8	1.8	HS000000:Surf[2]
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 -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	3

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	>0.95

1- Hot water system / natural ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.95	-	0.2	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- Hot water system

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	-	0.2	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.					

3- Air conditioning

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	1.25	0	0	-
Standard value	0.91*	0.7	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.					

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

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Assisted Bathroom		-	100	-	71
Assisted Bathroom		-	100	-	66
Bed		-	100	-	88
Bed		-	100	-	87
Bed		-	100	-	88
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	85
Bed		-	100	-	81
Bed		-	100	-	83
Bed		-	100	-	84
Bed		-	100	-	92
Bed		-	100	-	83

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Bed		-	100	-	88
Bed		-	100	-	83
Bed		-	100	-	81
Bed		-	100	-	86
Bed		-	100	-	82
Bed		-	100	-	81
Bed		-	100	-	90
Bed		-	100	-	87
Bed		-	100	-	91
Bed		-	100	-	89
Bed		-	100	-	84
Bed		-	100	-	87
Bed		-	100	-	100
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	91
Bed		-	100	-	100
Bed		-	100	-	106
Bed		-	100	-	93
Bed		-	100	-	95
Bed		-	100	-	85
Bed		-	100	-	87
Bed		-	100	-	86
Bed		-	100	-	84
Bed		-	100	-	81
Bed		-	100	-	84
Bed		-	100	-	84
Bed		-	100	-	81
Bed		-	100	-	94
Bed		-	100	-	87
Bed		-	100	-	94
Bed		-	100	-	93
Bed		-	100	-	91
Bed		-	100	-	87
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	92
Bed		-	100	-	92
Bed		-	100	-	88
Bed		-	100	-	97
Bed		-	100	-	92
Bed		-	100	-	95
Bed		-	100	-	86

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Bed	-	100	-	82
Bed	-	100	-	82
Bed	-	100	-	79
Bed	-	100	-	90
Bed	-	100	-	90
Bed	-	100	-	90
Bed	-	100	-	93
Bed	-	100	-	90
Bed	-	100	-	93
Bed	-	100	-	91
Comms	50	-	-	40
Dayroom 100m2	-	100	-	405
Dayroom 100m2	-	100	-	391
Dayroom 50m2	-	100	-	194
Dayroom 80m2	-	100	-	325
Drugs	50	-	-	56
Ensuite	-	100	-	32
Ensuite	-	100	-	33
Ensuite	-	100	-	29
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	31
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	24
Ensuite	-	100	-	27
Ensuite	-	100	-	29
Ensuite	-	100	-	31
Ensuite	-	100	-	31
Ensuite	-	100	-	24
Ensuite	-	100	-	26
Ensuite	-	100	-	24
Ensuite	-	100	-	27
Ensuite	-	100	-	31
Ensuite	-	100	-	26
Ensuite	-	100	-	30
Ensuite	-	100	-	26
Ensuite	-	100	-	26
Ensuite	-	100	-	31
Ensuite	-	100	-	30
Ensuite	-	100	-	31

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Ensuite		-	100	-	27
Ensuite		-	100	-	28
Ensuite		-	100	-	29
Ensuite		-	100	-	31
Ensuite		-	100	-	31
Ensuite		-	100	-	30
Ensuite		-	100	-	31
Ensuite		-	100	-	33
Ensuite		-	100	-	26
Ensuite		-	100	-	26
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	32
Ensuite		-	100	-	33
Ensuite		-	100	-	32
Ensuite		-	100	-	33
Ensuite		-	100	-	32
Ensuite		-	100	-	27
Ensuite		-	100	-	31
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	28
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	31
Ensuite		-	100	-	33
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	33
Ensuite		-	100	-	24
Ensuite		-	100	-	24
Family Dining		-	100	-	88
Hairdress		-	100	15	306
Hallway		-	100	-	1007
Hoists		50	-	-	34
Lift		-	100	-	29
Lift		-	100	-	25

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Linen		50	-	-	30
Linen		50	-	-	37
Linen		50	-	-	40
Linen		50	-	-	26
Linen		50	-	-	62
Linen/store		50	-	-	33
Linen/store		50	-	-	30
Linen/store		50	-	-	30
Linen/store		50	-	-	30
Linen/store		50	-	-	56
Linen/store		50	-	-	33
Nurse		50	-	-	128
Nurse		50	-	-	140
Office		50	-	-	183
Office		50	-	-	230
Sluice		50	-	-	49
Sluice		50	-	-	55
Stairwell		-	100	-	60
Stairwell		-	100	-	65
Store		50	-	-	31
Store		50	-	-	38
Store		50	-	-	36
Store		50	-	-	40
Store		50	-	-	37
Store		50	-	-	61
Store		50	-	-	55
Store		50	-	-	56
Store		50	-	-	31
Store		50	-	-	33
WC		-	100	-	60
WC		-	100	-	53
WC		-	100	-	56
WC		-	100	-	53
WC		-	100	-	51
WC		-	100	-	61
Laundry basement		-	100	-	521
Staff Room basement		50	-	-	271
Function Room		-	100	15	525
Ground - stairwell		-	100	-	71
Lift - Ground		-	100	-	38
Goods receiving/escape		-	100	-	107
Bistro/lounge		-	100	-	721
Plant - basement		50	-	-	145

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Maintenance basement		-	100	-	35
Stairwell basement		-	100	-	55
Lift basement		-	100	-	38
Hall basement		-	100	-	118
Kitchen basement		-	100	-	658
Store basement		50	-	-	40
COMMS basement		50	-	-	41
COSSH basement		50	-	-	41
Training room basement		50	-	-	335
M Staff Change basement		50	-	-	62
F Staff Change basement		50	-	-	62
Store basement		50	-	-	44
K Staff Change basement		50	-	-	44
First - stairwell		-	100	-	45
Sluice		50	-	-	29
Lift first floor		-	100	-	28
Hallway		-	100	-	1265
Dayroom 40m2		-	100	-	185
Ensuite		-	100	-	36
Bed		-	100	-	113
Ensuite		-	100	-	35
Bed		-	100	-	104

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?
Bed	NO (-67.7%)	NO
Bed	NO (-52.3%)	NO
Bed	NO (-70.2%)	NO
Bed	NO (-79.7%)	NO
Bed	NO (-80.5%)	NO
Bed	NO (-65.8%)	NO
Bed	NO (-67.6%)	NO
Bed	NO (-65.4%)	NO
Bed	NO (-54.7%)	NO
Bed	NO (-74.9%)	NO
Bed	NO (-68.6%)	NO
Bed	NO (-68%)	NO
Bed	NO (-69.6%)	NO
Bed	NO (-66.7%)	NO
Bed	NO (-68%)	NO
Bed	NO (-68.3%)	NO
Bed	NO (-66.9%)	NO
Bed	NO (-66%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Bed	NO (-83.4%)	NO
Bed	NO (-82.6%)	NO
Bed	NO (-58.1%)	NO
Bed	NO (-62.4%)	NO
Bed	NO (-89.3%)	NO
Bed	NO (-82.5%)	NO
Bed	NO (-77.6%)	NO
Bed	NO (-74%)	NO
Bed	NO (-70.8%)	NO
Bed	NO (-75.9%)	NO
Bed	NO (-79%)	NO
Bed	NO (-88.1%)	NO
Bed	NO (-80%)	NO
Bed	NO (-74%)	NO
Bed	NO (-78.4%)	NO
Bed	NO (-88%)	NO
Bed	NO (-79.7%)	NO
Bed	NO (-79.3%)	NO
Bed	NO (-82.4%)	NO
Bed	NO (-80%)	NO
Bed	NO (-70.2%)	NO
Bed	NO (-54.1%)	NO
Bed	NO (-45.7%)	NO
Bed	NO (-56.9%)	NO
Bed	NO (-56.9%)	NO
Bed	NO (-46.8%)	NO
Bed	NO (-44.5%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-48.5%)	NO
Bed	NO (-62.3%)	NO
Bed	NO (-69.1%)	NO
Bed	NO (-66.2%)	NO
Bed	NO (-65%)	NO
Bed	NO (-50.9%)	NO
Bed	NO (-77%)	NO
Bed	NO (-89%)	NO
Bed	NO (-71.6%)	NO
Bed	NO (-85.8%)	NO
Bed	NO (-68.8%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-46.4%)	NO
Bed	NO (-58.9%)	NO
Bed	NO (-44.5%)	NO
Bed	NO (-48.4%)	NO
Bed	NO (-55.4%)	NO
Dayroom 100m2	NO (-42.8%)	NO
Dayroom 100m2	NO (-59.4%)	NO
Dayroom 50m2	NO (-51.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Dayroom 80m2	NO (-70.2%)	NO
Drugs	NO (-100%)	NO
Family Dining	NO (-69.6%)	NO
Hairdress	NO (-55.2%)	NO
Nurse	NO (-100%)	NO
Nurse	N/A	N/A
Office	N/A	N/A
Office	NO (-86.8%)	NO
Staff Room basement	N/A	N/A
Function Room	NO (-86.1%)	NO
Bistro/lounge	NO (-57%)	NO
Training room basement	N/A	N/A
Dayroom 40m2	NO (-78.8%)	NO
Bed	NO (-84.3%)	NO
Bed	NO (-81.5%)	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?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	3649.5	3649.5
External area [m ²]	5997.9	5997.9
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	1511.54	2193.94
Average U-value [W/m ² K]	0.25	0.37
Alpha value* [%]	10	10

* 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
100 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	46.79	49.65
Cooling	11.29	1.69
Auxiliary	1.68	1.59
Lighting	15.9	15.95
Hot water	115.27	97.48
Equipment*	57.6	57.6
TOTAL **	190.93	166.36

* 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]	151.15	177.09
Primary energy* [kWh/m ²]	284.13	237.06
Total emissions [kg/m ²]	49.6	41.5

* 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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	144.6	0	55.6	0	2.3	0.72	0	0.81	0
Notional	190	0	61.2	0	2.1	0.86	0	----	----
[ST] Single room cooling system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	65.4	151.7	24.1	59.3	0	0.75	0.71	0.81	1
Notional	71.2	120.8	22.9	8.9	0	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	128.8	0	49.5	0	1.9	0.72	0	0.95	0
Notional	160.9	0	51.9	0	1.8	0.86	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 Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	PL000002:Surf[1]
Floor	0.2	0.12	SS000000:Surf[0]
Roof	0.15	0.12	SS000001:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	BD000009:Surf[2]
Personnel doors	1.5	1.8	HS000000:Surf[2]
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-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-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	3

Project name

Middleton-on-Sea Care Home

As designed

Date: Fri Jul 31 15:42:10 2020

Administrative information

Building Details

Address: Land to the West of Yapton Road,
Middleton-on-Sea,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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

The building does not comply with England Building Regulations Part L 2013

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	41.5
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	41.5
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	44.9
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	0.2	0.26	FN000001:Surf[0]
Floor	0.25	0.12	0.12	SS000000:Surf[0]
Roof	0.25	0.12	0.12	DY000002:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.85	1.85	BD000040:Surf[2]
Personnel doors	2.2	1.8	1.8	HS000000:Surf[2]
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 -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	3

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	>0.95

1- Hot water system / natural ventilation

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.95	-	0.2	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- Hot water system

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	-	0.2	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.					

3- Air conditioning

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.81	1.25	0	0	-
Standard value	0.91*	0.7	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.					

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

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Assisted Bathroom		-	100	-	71
Assisted Bathroom		-	100	-	66
Bed		-	100	-	88
Bed		-	100	-	87
Bed		-	100	-	88
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	85
Bed		-	100	-	81
Bed		-	100	-	83
Bed		-	100	-	84
Bed		-	100	-	92
Bed		-	100	-	83

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Bed		-	100	-	88
Bed		-	100	-	83
Bed		-	100	-	81
Bed		-	100	-	86
Bed		-	100	-	82
Bed		-	100	-	81
Bed		-	100	-	90
Bed		-	100	-	87
Bed		-	100	-	91
Bed		-	100	-	89
Bed		-	100	-	84
Bed		-	100	-	87
Bed		-	100	-	100
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	91
Bed		-	100	-	100
Bed		-	100	-	106
Bed		-	100	-	93
Bed		-	100	-	95
Bed		-	100	-	85
Bed		-	100	-	87
Bed		-	100	-	86
Bed		-	100	-	84
Bed		-	100	-	81
Bed		-	100	-	84
Bed		-	100	-	84
Bed		-	100	-	81
Bed		-	100	-	94
Bed		-	100	-	87
Bed		-	100	-	94
Bed		-	100	-	93
Bed		-	100	-	91
Bed		-	100	-	87
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	92
Bed		-	100	-	92
Bed		-	100	-	88
Bed		-	100	-	97
Bed		-	100	-	92
Bed		-	100	-	95
Bed		-	100	-	86

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Bed	-	100	-	82
Bed	-	100	-	82
Bed	-	100	-	79
Bed	-	100	-	90
Bed	-	100	-	90
Bed	-	100	-	90
Bed	-	100	-	93
Bed	-	100	-	90
Bed	-	100	-	93
Bed	-	100	-	91
Comms	50	-	-	40
Dayroom 100m2	-	100	-	405
Dayroom 100m2	-	100	-	391
Dayroom 50m2	-	100	-	194
Dayroom 80m2	-	100	-	325
Drugs	50	-	-	56
Ensuite	-	100	-	32
Ensuite	-	100	-	33
Ensuite	-	100	-	29
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	31
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	24
Ensuite	-	100	-	27
Ensuite	-	100	-	29
Ensuite	-	100	-	31
Ensuite	-	100	-	31
Ensuite	-	100	-	24
Ensuite	-	100	-	26
Ensuite	-	100	-	24
Ensuite	-	100	-	27
Ensuite	-	100	-	31
Ensuite	-	100	-	26
Ensuite	-	100	-	30
Ensuite	-	100	-	26
Ensuite	-	100	-	26
Ensuite	-	100	-	31
Ensuite	-	100	-	30
Ensuite	-	100	-	31

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Ensuite		-	100	-	27
Ensuite		-	100	-	28
Ensuite		-	100	-	29
Ensuite		-	100	-	31
Ensuite		-	100	-	31
Ensuite		-	100	-	30
Ensuite		-	100	-	31
Ensuite		-	100	-	33
Ensuite		-	100	-	26
Ensuite		-	100	-	26
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	32
Ensuite		-	100	-	33
Ensuite		-	100	-	32
Ensuite		-	100	-	33
Ensuite		-	100	-	32
Ensuite		-	100	-	27
Ensuite		-	100	-	31
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	28
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	31
Ensuite		-	100	-	33
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	33
Ensuite		-	100	-	24
Ensuite		-	100	-	24
Family Dining		-	100	-	88
Hairdress		-	100	15	306
Hallway		-	100	-	1007
Hoists		50	-	-	34
Lift		-	100	-	29
Lift		-	100	-	25

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Linen		50	-	-	30
Linen		50	-	-	37
Linen		50	-	-	40
Linen		50	-	-	26
Linen		50	-	-	62
Linen/store		50	-	-	33
Linen/store		50	-	-	30
Linen/store		50	-	-	30
Linen/store		50	-	-	30
Linen/store		50	-	-	56
Linen/store		50	-	-	33
Nurse		50	-	-	128
Nurse		50	-	-	140
Office		50	-	-	183
Office		50	-	-	230
Sluice		50	-	-	49
Sluice		50	-	-	55
Stairwell		-	100	-	60
Stairwell		-	100	-	65
Store		50	-	-	31
Store		50	-	-	38
Store		50	-	-	36
Store		50	-	-	40
Store		50	-	-	37
Store		50	-	-	61
Store		50	-	-	55
Store		50	-	-	56
Store		50	-	-	31
Store		50	-	-	33
WC		-	100	-	60
WC		-	100	-	53
WC		-	100	-	56
WC		-	100	-	53
WC		-	100	-	51
WC		-	100	-	61
Laundry basement		-	100	-	521
Staff Room basement		50	-	-	271
Function Room		-	100	15	525
Ground - stairwell		-	100	-	71
Lift - Ground		-	100	-	38
Goods receiving/escape		-	100	-	107
Bistro/lounge		-	100	-	721
Plant - basement		50	-	-	145

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Maintenance basement		-	100	-	35
Stairwell basement		-	100	-	55
Lift basement		-	100	-	38
Hall basement		-	100	-	118
Kitchen basement		-	100	-	658
Store basement		50	-	-	40
COMMS basement		50	-	-	41
COSSH basement		50	-	-	41
Training room basement		50	-	-	335
M Staff Change basement		50	-	-	62
F Staff Change basement		50	-	-	62
Store basement		50	-	-	44
K Staff Change basement		50	-	-	44
First - stairwell		-	100	-	45
Sluice		50	-	-	29
Lift first floor		-	100	-	28
Hallway		-	100	-	1265
Dayroom 40m2		-	100	-	185
Ensuite		-	100	-	36
Bed		-	100	-	113
Ensuite		-	100	-	35
Bed		-	100	-	104

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?
Bed	NO (-67.7%)	NO
Bed	NO (-52.3%)	NO
Bed	NO (-70.2%)	NO
Bed	NO (-79.7%)	NO
Bed	NO (-80.5%)	NO
Bed	NO (-65.8%)	NO
Bed	NO (-67.6%)	NO
Bed	NO (-65.4%)	NO
Bed	NO (-54.7%)	NO
Bed	NO (-74.9%)	NO
Bed	NO (-68.6%)	NO
Bed	NO (-68%)	NO
Bed	NO (-69.6%)	NO
Bed	NO (-66.7%)	NO
Bed	NO (-68%)	NO
Bed	NO (-68.3%)	NO
Bed	NO (-66.9%)	NO
Bed	NO (-66%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Bed	NO (-83.4%)	NO
Bed	NO (-82.6%)	NO
Bed	NO (-58.1%)	NO
Bed	NO (-62.4%)	NO
Bed	NO (-89.3%)	NO
Bed	NO (-82.5%)	NO
Bed	NO (-77.6%)	NO
Bed	NO (-74%)	NO
Bed	NO (-70.8%)	NO
Bed	NO (-75.9%)	NO
Bed	NO (-79%)	NO
Bed	NO (-88.1%)	NO
Bed	NO (-80%)	NO
Bed	NO (-74%)	NO
Bed	NO (-78.4%)	NO
Bed	NO (-88%)	NO
Bed	NO (-79.7%)	NO
Bed	NO (-79.3%)	NO
Bed	NO (-82.4%)	NO
Bed	NO (-80%)	NO
Bed	NO (-70.2%)	NO
Bed	NO (-54.1%)	NO
Bed	NO (-45.7%)	NO
Bed	NO (-56.9%)	NO
Bed	NO (-56.9%)	NO
Bed	NO (-46.8%)	NO
Bed	NO (-44.5%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-48.5%)	NO
Bed	NO (-62.3%)	NO
Bed	NO (-69.1%)	NO
Bed	NO (-66.2%)	NO
Bed	NO (-65%)	NO
Bed	NO (-50.9%)	NO
Bed	NO (-77%)	NO
Bed	NO (-89%)	NO
Bed	NO (-71.6%)	NO
Bed	NO (-85.8%)	NO
Bed	NO (-68.8%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-46.4%)	NO
Bed	NO (-58.9%)	NO
Bed	NO (-44.5%)	NO
Bed	NO (-48.4%)	NO
Bed	NO (-55.4%)	NO
Dayroom 100m2	NO (-42.8%)	NO
Dayroom 100m2	NO (-59.4%)	NO
Dayroom 50m2	NO (-51.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Dayroom 80m2	NO (-70.2%)	NO
Drugs	NO (-100%)	NO
Family Dining	NO (-69.6%)	NO
Hairdress	NO (-55.2%)	NO
Nurse	NO (-100%)	NO
Nurse	N/A	N/A
Office	N/A	N/A
Office	NO (-86.8%)	NO
Staff Room basement	N/A	N/A
Function Room	NO (-86.1%)	NO
Bistro/lounge	NO (-57%)	NO
Training room basement	N/A	N/A
Dayroom 40m2	NO (-78.8%)	NO
Bed	NO (-84.3%)	NO
Bed	NO (-81.5%)	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?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	3649.5	3649.5
External area [m ²]	5997.9	5997.9
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	1511.54	2193.94
Average U-value [W/m ² K]	0.25	0.37
Alpha value* [%]	10	10

* 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
100 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	46.79	49.65
Cooling	11.29	1.69
Auxiliary	1.68	1.59
Lighting	15.9	15.95
Hot water	115.27	97.48
Equipment*	57.6	57.6
TOTAL **	190.93	166.36

* 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	9.17	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]	151.15	177.09
Primary energy* [kWh/m ²]	284.13	237.06
Total emissions [kg/m ²]	44.9	41.5

* 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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	144.6	0	55.6	0	2.3	0.72	0	0.81	0
Notional	190	0	61.2	0	2.1	0.86	0	----	----
[ST] Single room cooling system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	65.4	151.7	24.1	59.3	0	0.75	0.71	0.81	1
Notional	71.2	120.8	22.9	8.9	0	0.86	3.79	----	----
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	128.8	0	49.5	0	1.9	0.72	0	0.95	0
Notional	160.9	0	51.9	0	1.8	0.86	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 Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	PL000002:Surf[1]
Floor	0.2	0.12	SS000000:Surf[0]
Roof	0.15	0.12	SS000001:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	BD000009:Surf[2]
Personnel doors	1.5	1.8	HS000000:Surf[2]
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-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-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	3

Project name

Middleton-on-Sea Care Home

As designed

Date: Thu Aug 06 16:46:14 2020

Administrative information

Building Details

Address: Land to the West of Yapton Road,
Middleton-on-Sea,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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	34.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	34.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	32
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	0.2	0.26	FN000001:Surf[0]
Floor	0.25	0.12	0.12	SS000000:Surf[0]
Roof	0.25	0.12	0.12	DY000002:Surf[0]
Windows***, roof windows, and rooflights	2.2	1.85	1.85	BD000040:Surf[2]
Personnel doors	2.2	1.8	1.8	HS000000:Surf[2]
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 -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	3

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	>0.95

1- Hot water system / natural ventilation / HP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.2	0	-
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- Hot water system / HP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	-	0.2	0	-
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.					

3- Air conditioning ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3	1.25	0	0	-
Standard value	2.5*	0.7	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"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Assisted Bathroom		-	100	-	71
Assisted Bathroom		-	100	-	66
Bed		-	100	-	88
Bed		-	100	-	87
Bed		-	100	-	88
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	85
Bed		-	100	-	81
Bed		-	100	-	83
Bed		-	100	-	84
Bed		-	100	-	92
Bed		-	100	-	83

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Bed		-	100	-	88
Bed		-	100	-	83
Bed		-	100	-	81
Bed		-	100	-	86
Bed		-	100	-	82
Bed		-	100	-	81
Bed		-	100	-	90
Bed		-	100	-	87
Bed		-	100	-	91
Bed		-	100	-	89
Bed		-	100	-	84
Bed		-	100	-	87
Bed		-	100	-	100
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	91
Bed		-	100	-	100
Bed		-	100	-	106
Bed		-	100	-	93
Bed		-	100	-	95
Bed		-	100	-	85
Bed		-	100	-	87
Bed		-	100	-	86
Bed		-	100	-	84
Bed		-	100	-	81
Bed		-	100	-	84
Bed		-	100	-	84
Bed		-	100	-	81
Bed		-	100	-	94
Bed		-	100	-	87
Bed		-	100	-	94
Bed		-	100	-	93
Bed		-	100	-	91
Bed		-	100	-	87
Bed		-	100	-	92
Bed		-	100	-	93
Bed		-	100	-	92
Bed		-	100	-	92
Bed		-	100	-	88
Bed		-	100	-	97
Bed		-	100	-	92
Bed		-	100	-	95
Bed		-	100	-	86

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Bed	-	100	-	82
Bed	-	100	-	82
Bed	-	100	-	79
Bed	-	100	-	90
Bed	-	100	-	90
Bed	-	100	-	90
Bed	-	100	-	93
Bed	-	100	-	90
Bed	-	100	-	93
Bed	-	100	-	91
Comms	50	-	-	40
Dayroom 100m2	-	100	-	405
Dayroom 100m2	-	100	-	391
Dayroom 50m2	-	100	-	194
Dayroom 80m2	-	100	-	325
Drugs	50	-	-	56
Ensuite	-	100	-	32
Ensuite	-	100	-	33
Ensuite	-	100	-	29
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	31
Ensuite	-	100	-	31
Ensuite	-	100	-	33
Ensuite	-	100	-	24
Ensuite	-	100	-	27
Ensuite	-	100	-	29
Ensuite	-	100	-	31
Ensuite	-	100	-	31
Ensuite	-	100	-	24
Ensuite	-	100	-	26
Ensuite	-	100	-	24
Ensuite	-	100	-	27
Ensuite	-	100	-	31
Ensuite	-	100	-	26
Ensuite	-	100	-	30
Ensuite	-	100	-	26
Ensuite	-	100	-	26
Ensuite	-	100	-	31
Ensuite	-	100	-	30
Ensuite	-	100	-	31

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Ensuite		-	100	-	27
Ensuite		-	100	-	28
Ensuite		-	100	-	29
Ensuite		-	100	-	31
Ensuite		-	100	-	31
Ensuite		-	100	-	30
Ensuite		-	100	-	31
Ensuite		-	100	-	33
Ensuite		-	100	-	26
Ensuite		-	100	-	26
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	32
Ensuite		-	100	-	33
Ensuite		-	100	-	32
Ensuite		-	100	-	33
Ensuite		-	100	-	32
Ensuite		-	100	-	27
Ensuite		-	100	-	31
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	28
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	31
Ensuite		-	100	-	33
Ensuite		-	100	-	29
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	27
Ensuite		-	100	-	33
Ensuite		-	100	-	24
Ensuite		-	100	-	24
Family Dining		-	100	-	88
Hairdress		-	100	15	306
Hallway		-	100	-	1007
Hoists		50	-	-	34
Lift		-	100	-	29
Lift		-	100	-	25

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Linen		50	-	-	30
Linen		50	-	-	37
Linen		50	-	-	40
Linen		50	-	-	26
Linen		50	-	-	62
Linen/store		50	-	-	33
Linen/store		50	-	-	30
Linen/store		50	-	-	30
Linen/store		50	-	-	30
Linen/store		50	-	-	56
Linen/store		50	-	-	33
Nurse		50	-	-	128
Nurse		50	-	-	140
Office		50	-	-	183
Office		50	-	-	230
Sluice		50	-	-	49
Sluice		50	-	-	55
Stairwell		-	100	-	60
Stairwell		-	100	-	65
Store		50	-	-	31
Store		50	-	-	38
Store		50	-	-	36
Store		50	-	-	40
Store		50	-	-	37
Store		50	-	-	61
Store		50	-	-	55
Store		50	-	-	56
Store		50	-	-	31
Store		50	-	-	33
WC		-	100	-	60
WC		-	100	-	53
WC		-	100	-	56
WC		-	100	-	53
WC		-	100	-	51
WC		-	100	-	61
Laundry basement		-	100	-	521
Staff Room basement		50	-	-	271
Function Room		-	100	15	525
Ground - stairwell		-	100	-	71
Lift - Ground		-	100	-	38
Goods receiving/escape		-	100	-	107
Bistro/lounge		-	100	-	721
Plant - basement		50	-	-	145

General lighting and display lighting		Luminous efficacy [lm/W]			
Zone name		Luminaire	Lamp	Display lamp	General lighting [W]
	Standard value	60	60	22	
Maintenance basement		-	100	-	35
Stairwell basement		-	100	-	55
Lift basement		-	100	-	38
Hall basement		-	100	-	118
Kitchen basement		-	100	-	658
Store basement		50	-	-	40
COMMS basement		50	-	-	41
COSSH basement		50	-	-	41
Training room basement		50	-	-	335
M Staff Change basement		50	-	-	62
F Staff Change basement		50	-	-	62
Store basement		50	-	-	44
K Staff Change basement		50	-	-	44
First - stairwell		-	100	-	45
Sluice		50	-	-	29
Lift first floor		-	100	-	28
Hallway		-	100	-	1265
Dayroom 40m2		-	100	-	185
Ensuite		-	100	-	36
Bed		-	100	-	113
Ensuite		-	100	-	35
Bed		-	100	-	104

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?
Bed	NO (-67.7%)	NO
Bed	NO (-52.3%)	NO
Bed	NO (-70.2%)	NO
Bed	NO (-79.7%)	NO
Bed	NO (-80.5%)	NO
Bed	NO (-65.8%)	NO
Bed	NO (-67.6%)	NO
Bed	NO (-65.4%)	NO
Bed	NO (-54.7%)	NO
Bed	NO (-74.9%)	NO
Bed	NO (-68.6%)	NO
Bed	NO (-68%)	NO
Bed	NO (-69.6%)	NO
Bed	NO (-66.7%)	NO
Bed	NO (-68%)	NO
Bed	NO (-68.3%)	NO
Bed	NO (-66.9%)	NO
Bed	NO (-66%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Bed	NO (-83.4%)	NO
Bed	NO (-82.6%)	NO
Bed	NO (-58.1%)	NO
Bed	NO (-62.4%)	NO
Bed	NO (-89.3%)	NO
Bed	NO (-82.5%)	NO
Bed	NO (-77.6%)	NO
Bed	NO (-74%)	NO
Bed	NO (-70.8%)	NO
Bed	NO (-75.9%)	NO
Bed	NO (-79%)	NO
Bed	NO (-88.1%)	NO
Bed	NO (-80%)	NO
Bed	NO (-74%)	NO
Bed	NO (-78.4%)	NO
Bed	NO (-88%)	NO
Bed	NO (-79.7%)	NO
Bed	NO (-79.3%)	NO
Bed	NO (-82.4%)	NO
Bed	NO (-80%)	NO
Bed	NO (-70.2%)	NO
Bed	NO (-54.1%)	NO
Bed	NO (-45.7%)	NO
Bed	NO (-56.9%)	NO
Bed	NO (-56.9%)	NO
Bed	NO (-46.8%)	NO
Bed	NO (-44.5%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-48.5%)	NO
Bed	NO (-62.3%)	NO
Bed	NO (-69.1%)	NO
Bed	NO (-66.2%)	NO
Bed	NO (-65%)	NO
Bed	NO (-50.9%)	NO
Bed	NO (-77%)	NO
Bed	NO (-89%)	NO
Bed	NO (-71.6%)	NO
Bed	NO (-85.8%)	NO
Bed	NO (-68.8%)	NO
Bed	NO (-56.8%)	NO
Bed	NO (-46.4%)	NO
Bed	NO (-58.9%)	NO
Bed	NO (-44.5%)	NO
Bed	NO (-48.4%)	NO
Bed	NO (-55.4%)	NO
Dayroom 100m2	NO (-42.8%)	NO
Dayroom 100m2	NO (-59.4%)	NO
Dayroom 50m2	NO (-51.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Dayroom 80m2	NO (-70.2%)	NO
Drugs	NO (-100%)	NO
Family Dining	NO (-69.6%)	NO
Hairdress	NO (-55.2%)	NO
Nurse	NO (-100%)	NO
Nurse	N/A	N/A
Office	N/A	N/A
Office	NO (-86.8%)	NO
Staff Room basement	N/A	N/A
Function Room	NO (-86.1%)	NO
Bistro/lounge	NO (-57%)	NO
Training room basement	N/A	N/A
Dayroom 40m2	NO (-78.8%)	NO
Bed	NO (-84.3%)	NO
Bed	NO (-81.5%)	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?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	3649.5	3649.5
External area [m ²]	5997.9	5997.9
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	1511.54	2193.94
Average U-value [W/m ² K]	0.25	0.37
Alpha value* [%]	10	10

* 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
100 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	12.68	16.74
Cooling	11.29	1.68
Auxiliary	1.59	1.59
Lighting	15.9	15.95
Hot water	31.12	32.85
Equipment*	57.6	57.6
TOTAL **	72.59	68.83

* 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	9.17	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]	151.15	177.17
Primary energy* [kWh/m ²]	348.41	354.47
Total emissions [kg/m ²]	32	34.8

* 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 SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Single room cooling system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	65.4	151.7	9.8	59.3	0	1.86	0.71	3	1	
Notional	71.2	120.8	7.7	8.9	0	2.56	3.79	----	----	
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	145.8	0	14.4	0	2.2	2.82	0	3	0	
Notional	191.4	0	20.8	0	2.2	2.56	0	----	----	
[ST] Central heating using water: radiators, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
Actual	128.1	0	12.6	0	1.8	2.82	0	3	0	
Notional	160.5	0	17.4	0	1.8	2.56	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 Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.15	PL000002:Surf[1]
Floor	0.2	0.12	SS000000:Surf[0]
Roof	0.15	0.12	SS000001:Surf[0]
Windows, roof windows, and rooflights	1.5	1.6	BD000009:Surf[2]
Personnel doors	1.5	1.8	HS000000:Surf[2]
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-Typ} = Typical individual element U-values [W/(m²K)]		U _{i-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	3

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