



HARNISS
CONSULTING



ENERGY STRATEGY REPORT
PROPOSED 64-BED CARE HOME DEVELOPMENT, COW-
PLAIN FOR FRONTIER ESTATES



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Contents

1.0 Executive Summary 3

2.0 Introduction 4

2.1 Thermal modelling..... 4

2.3 Local Planning Policies 5

2.4 Building Regulations 5

3.0 Description of Development..... 6

4.0 Use Less Energy (Be Lean) 7

4.1 Building Fabric / Fabric First Approach..... 7

4.2 Energy Use in the Built Environment 8

4.3 Summary Of Key Input Data 8

4.4 Results without Renewables..... 9

5.0 Heating Infrastructure 9

6.0 Low Carbon and Renewable Technology 10

7.0 Ground Source Heat Pump 11

7.1 Photovoltaic System (PV)..... 11

8.0 Results with Renewable Technology (Be green) 12

9.0 Life Costing Cycle—Air Source Heat Pump 13

9.1 Life Costing Cycle—Photovoltaic Array 13

Appendix A—BRUKL Documentation 14

Appendix B—G-Value Amendments 15

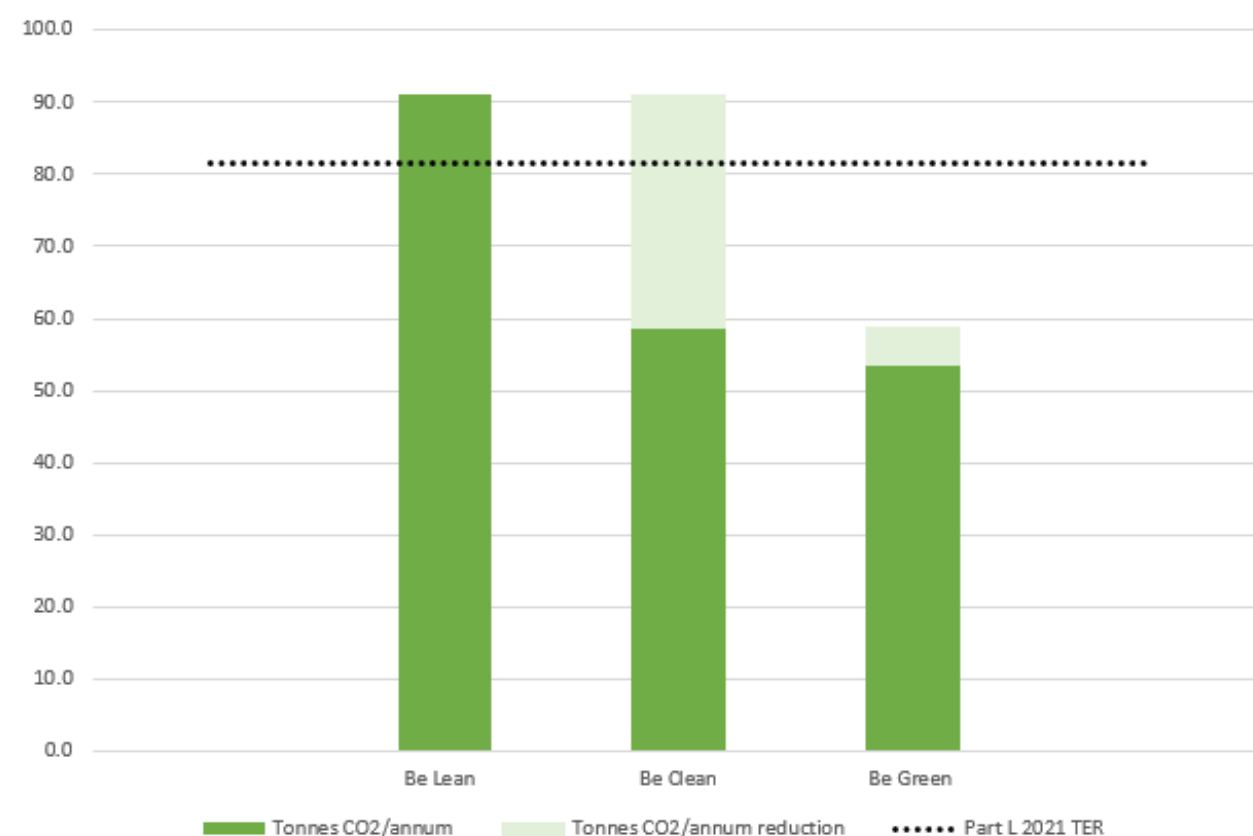


1.0 Executive Summary

This document details the intended energy and for the proposed care home based along Hart Plain Avenue, Waterloo. The development briefly comprises of the construction of a new 64 bed care home (Use Class C2) on the site and the associated works including car parking, access, landscaping, and associated engineering. This report has been prepared by Harniss Consulting on behalf of Frontier Estates.

The ethos for the design of the proposed development follows the recognised energy hierarchy to “Be Lean, Be Clean, Be Green”, i.e. to minimise the building’s energy usage before applying renewable technologies to the design.

By following the energy hierarchy, the building wasn’t found to be compliant with Building Regulations Approved Document Part L2:2021 however with the use of an Air source heat pump pre heat system being utilised for the hot water demand of the building in addition to 200m2 of photovoltaic array situated on the roof of the building. The improvement beyond building regulations is illustrated below, resulting in an overall saving of 37.7 tonnes of carbon dioxide per year, as calculated by the EDSL TAS using the Part L2 2021 methodology.



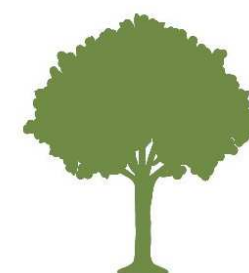
Summary

The following summarises the key drivers of the energy strategy for the development:

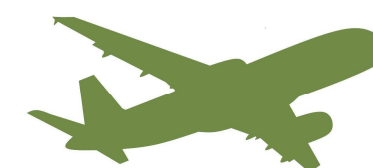
- Enhanced building fabric performance has been targeted through improved thermal performance and reduced air permeability.
- Energy efficient heating, domestic hot water, cooling, ventilation, and lighting systems throughout.
- Energy efficient controls for HVAC and lighting to minimise building in-use energy.
- An initial desk top study was undertaken to assess the most viable low zero carbon technologies for proposed implementation to achieve compliance with the local planning policy.
- An Air source heat pump in addition to a photovoltaic array on the roof of the building was found to be the most feasible source of low carbon technology for the care home on this project on the findings based in section 9, whole life cycle cost, spatial considerations and impact to the local population / building aesthetics.

The conclusion of the conceptual design stage energy strategy is that the local planning policy requirements have been met through the energy hierarchy of Be Lean, Be Clean and Be Green which includes ASHP technology providing the building’s hot water demand plus an additional 200m2 Photovoltaic array which provides Part L:2021 compliance

The strategy outlined in this report would result in the same impact as the following (553 tonnes of CO² saved over 20 years):



9220 trees
Grown for 10 years



938 Flights
From London to New York
(Per Passenger)



50,292 Train Journeys
From London to Paris
(Per Passenger)



2.0 Introduction

The report has been prepared in accordance with Part L2:2021 of the building regulations with the assessment showing compliance with all applicable criteria.

The strategy for the development takes into account the recognised energy hierarchy to “Be Lean, Be Clean, Be Green”, i.e. to minimise the energy usage within each building before applying renewable technologies to the design.



Further work will be required at later stages in the detailed design process to ensure that the requirement to comply with the above targets and that all statutory guidelines or local planning enforcement requirements are met.

2.1 Thermal Modelling

Analysis for the building has been undertaken utilising EDSL Tas software version 9.5.4. EDSL Tas is industry leading NCM accredited thermal modelling software which carries out dynamic hourly simulations of the anticipated energy usage and compares it against the notional benchmarks set under AD Part L2 of the building regulations. The software was initially used to determine a baseline carbon emissions using fabric performance values as discussed with the development team (as detailed in the body of the report) without contribution from additional renewable technologies.

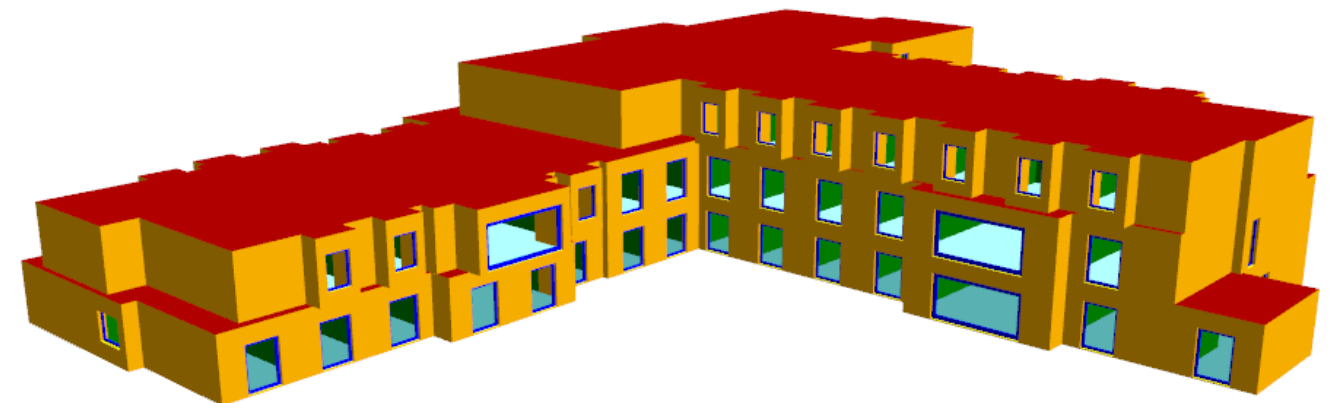


Figure 1— EDSL TAS Model Screenshot



2.3 Energy Statements & Local Planning Policies

Policy CS14 Efficient Use of Resources states:

Planning permissions will be granted for development that:

2. Locally contributes to the delivery of the PUSH target of 100MW of renewable energy by 2020 for the whole of the PUSH area. Major areas of development must ensure that their on-site renewable energy production is maximised and resource efficiency is maximised.

3. On Completion, unless proven to be financially or technically unviable, meets the following standards:

Residential development—Level 3 of the code for sustainable Homes

Multi occupation homes and non-residential development over 500sq.m—BREEAM standard 'Very Good'

The development is required to achieve BREEAM very good under planning condition CS14. To achieve this the Energy strategy needs to achieve at least one ENE01 credit, to do this the development will utilise an ASHP system to pre heat the Domestic hot water in addition to this a 200m² Photovoltaic array has been included. As well as these low carbon and renewable technologies, highly efficient boilers to provide the heating demand, power factor correction and monitoring systems have been included to achieve compliance with Part L2:2021.

2.4 Building Regulations (Part L)

All areas of the proposed development will need to meet Energy Performance Standards which are set for non-domestic by Building Regulations Approved Document Part L2, Conservation of Fuel and Power in New Buildings other than Dwellings.

The role of Part L of the Building Regulations is to set a minimum target for the regulation carbon dioxide emissions and is defined by the Target Emission Rate (TER) which relates to a 'Notional Building' and is automatically generated as part of the Simplified Building Energy Model (SBEM) toolkit.

The resulting Building Emission Rate (BER) must be less than the Target Emission Rate (TER) in order to prove compliance with the Building Regulations.

This energy assessment demonstrates a route to compliance with Approved Document Part:L2 of the building regulations, with this publication being valid at the time of the assessment.

The NCM modelling guide has been released for the 2021 Part L which details an emphasis on reducing carbon dioxide emission, a strong opposition to using fossil fuels and reducing building primary energy usage. The reduction in primary energy shall be assessed through a new additional benchmark, the Target Primary Energy Rate (TPER), following the same format as the existing Target Emissions Rate (TER). In order to achieve compliance with the proposed new regulations both the Building Emissions Rate (BER) and Building Primary Energy Rate (BPER) must be below the Target Emissions Rate (TER) and the Target Primary Energy Rate (TPER), respectively.



3.0 Description of Development

The proposed development consists of a new 64 bed care home (Use Class C2) with a GIA of 3258m² located along Hart Plain Avenue, Waterloo, briefly comprising of:

- 64 bed care home with dedicated en-suites
- Community spaces including
 - * Main reception area
 - * Kitchen and Restaurant Café
 - * Lounges
 - * Dining Rooms
 - * Activity Areas
- Plantroom domestic hot water generating plant and associated ancillaries

Our assessment has been based on the following architectural AutoCAD drawings, produced by WR Dunn:

4528-WRD-00-ZZ-DR-A-0500_P14 Proposed Site Plan
4528-WRD-XX-00-DR-A-0200_P09 Proposed Ground Floor Plan
4528-WRD-XX-01-DR-A-0201_P08 Proposed First Floor Plan
4528-WRD-XX-02-DR-A-0202_P08 Proposed Second Floor Plan
4528-WRD-XX-03-DR-A-0203_P01 Proposed Roof Plan
4528-WRD-XX-ZZ-DR-A-0300_P08 Proposed Elevations

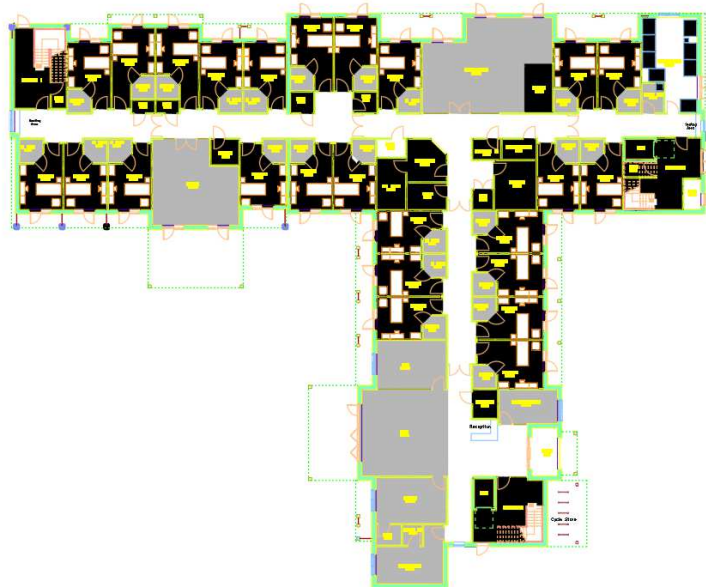


Figure 2— WR Dunn Floor Plan

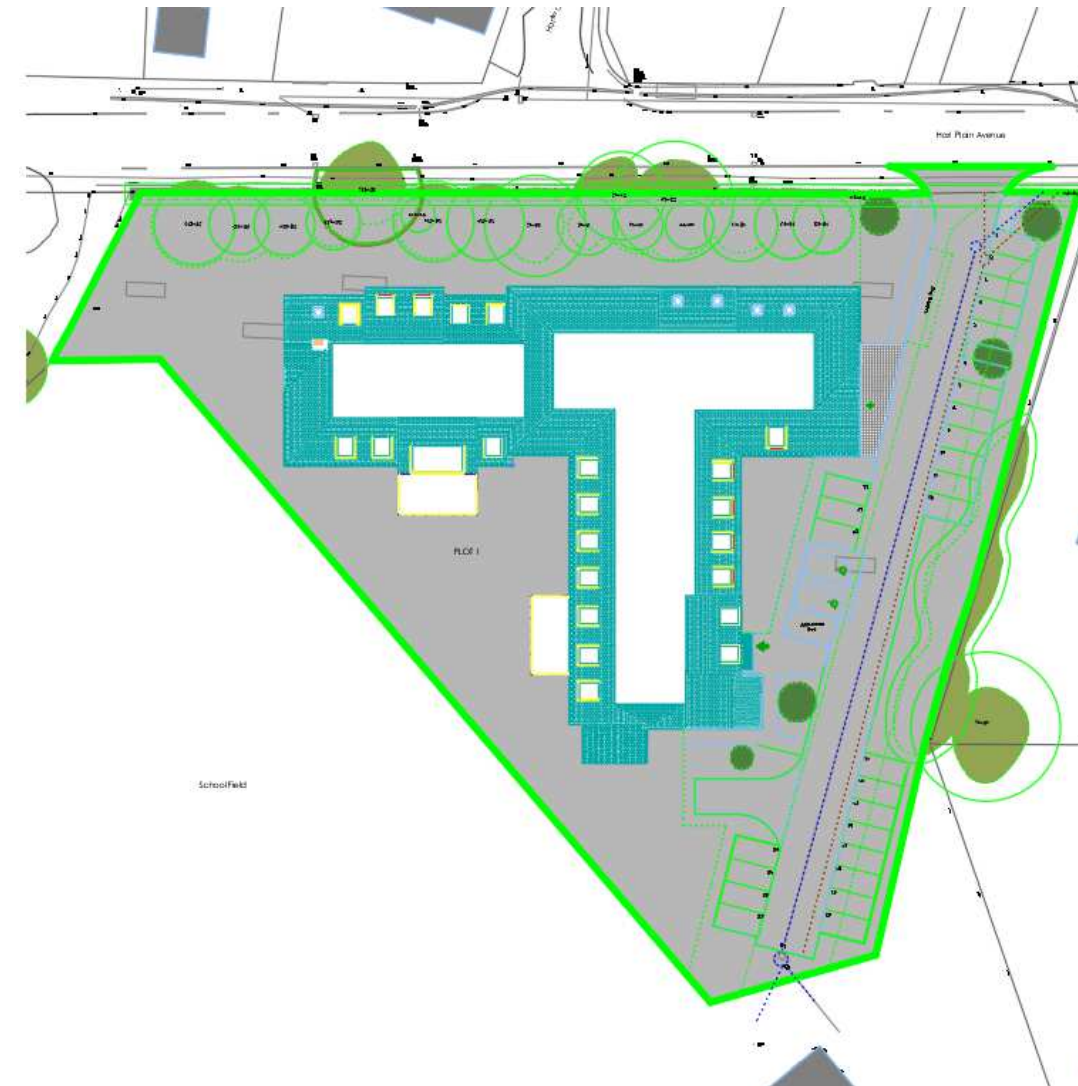


Figure 3—WR Dunn Site Plan



4.0 Use Less Energy (Be Lean)

The proposed development and the energy strategy detailed herein has low-energy use at its core with significant passive and energy efficient measure having been specified, these include: -

- A significant improvement over limiting U-values within Building Regulations. The thermal performance of the building envelope has been maximised to its fullest within the constraints of a traditional-build with 100mm cavity.
- Air permeability improved of 50% over the limiting value. The target will be to improve yet further on the air permeability during the construction phase but given the relatively small percentage of total energy that the heating system contributes to, any further gain will result in minimal actual reduction against the Target Emission Rate calculated under Approved Document Part L.
- Improved SFP's for ventilation systems including high efficiency heat recovery.
- Improved efficacy lighting specified which reduces primary energy usage.
- Automatic lighting controls used throughout, where appropriate for care i.e. proximity infrared used throughout in en-suites, bathrooms, stores, etc. timeclocks utilised for corridor night-time set back.

To this end, the proposed design promotes reducing the CO₂ emissions from delivered energy consumption by minimising operational energy demand through passive and best-practice measures. With these measures incorporated, then the addition of a renewable energy system will have a greater impact – renewable energy sources should not be used as an alternative to a well-designed building.

4.1 Building Fabric / Fabric First Approach

A preliminary thermal energy model has been constructed of the care home EDSL Tas software version 9.5.4. The software was used to determine a baseline performance utilising the employer's requirements including the project specifications, room data sheets and good industry custom and practice.

The model was produced using constructions advised by the project architect which were:

Building Fabric Parameter	Value
Air permeability (m ³ /(m ² .h) @ 50Pa)	5.0
External Wall U-value (W/m ² .K)	0.21
Roof U-value (W/m ² .K)	0.13
Ground Floor U-value (W/m ² .K)	0.15
Glazing U-value (W/m ² .K)	1.4
Glazing G-value	0.4

Equally, uncontrolled ventilation losses should be controlled, and the new building constructed to meet stringent air permeability targets. Whilst Part L minimum requirements are 10m³/m²/hr at 50Pa, the notional building used for analysis includes a significantly lower rate (3m³/m²/hr at 50Pa), therefore it would be advantageous for the project to target a better air permeability. A rate of 5.0m³/m²/hr at 50Pa has been assumed for the purpose of this analysis which would be easily achieved with traditional construction.



4.2 Energy Use in the Built Environment

In line with the recognised energy hierarchy of intervention to “Be Lean, Be Clean, Be Green”, the fixed building services for the development should be designed with energy efficiency at the forefront, with plant and systems selected to have efficiencies in excess of those required by legislation, to maximise carbon reduction.

It is proposed that the care home’s heating and domestic hot water generation shall be provided by gas fired boilers to meet the buildings space heating, and ventilation requirements, complete with weather compensation and local thermostatic control.

Mechanical ventilation shall be provided by a series of high efficiency heat recovery units serving day spaces, corridors and ancillary areas with day space including demand-led Co2 control

Extract ventilation of vitiated air from en-suites, WC’s, kitchenettes, sluice rooms, bathrooms, etc., shall be provided in accordance with the employer’s requirements and MEP performance specification, via local extract fans operating in trickle and boost modes responding to occupancy. The systems will provide continuous extract with a ‘boost’ activated upon presence detection.

Cooling systems shall be provided to reception/café, some day spaces, drugs stores and the communications room. The Contractor shall develop the proposals and may use individual heat pump systems or utilise VRV/VRF systems to serve multiple indoor units from a single external unit. Units shall be heating and cooling type in all spaces. The communications room shall be fed from a separate DX system.

Electrical services specification to be developed as part of the detailed design stage with particular assumptions being included such as LED lighting through with the lighting controls being: -

1. Back of house areas all PIR
2. Day spaces and offices with absence for general lighting
3. Bathrooms / ensuite / WC’s all PIR

4.3 Summary of Key Input Data

As well as the U-values and design air permeability previously indicated, the following information summarises the key input information used for this analysis detailing the enhanced building services:

Weather File	Southampton TRY
LTHW Heating System	
Heat Source	Direct Fired Gas Boilers
Fuel Type	Natural Gas
Seasonal Efficiency	97%
Circulation Pump	Variable speed, pressure control across pump
System Controls	Central time control, Weather compensation control
Pre heat DHWS System	
Heat Source	Air Source heat Pump
Fuel Type	Grid Supplied Electricity
Seasonal Efficiency	350%
Load	50%
In addition to	
Heat Source	Direct Fired Gas Boilers
Fuel Type	Natural Gas
Seasonal Efficiency	97%
Load	50%
Ventilation Systems	
Overall supply & extract SFP	1.6W/l/s
Min. heat recovery efficiency	80%
Overall extract SFP	0.3 W/l/s
Kitchen Extract SFP	1.0W/l/s
Lighting	
Lumens / circuit watt	95 (average)



4.4 Results without renewables

In line with the first stage of the recognised energy hierarchy of intervention to “Be Lean, Be Clean, Be Green”, it is essential to ensure that an efficient building and building services systems have been designed and proposed, prior to the consideration of application of LZC technologies.

Target Emissions Rating (TER)	24.98 kgCO ₂ /m ² .annum
Building Emissions Rating (BER)	27.94 kgCO ₂ /m ² .annum

Energy Performance Certificate Non-Domestic Building



Land at Cowplain Community School
Hart Plain Avenue
Waterlooville
PO8 8RY

Certificate Reference Number:
8928-5392-8991-7791-3029

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



A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G over 150

Less energy efficient

27

This is how energy efficient
the building is.

5.0 Heating Infrastructure (Be Clean)

The second stage of the recognised energy hierarchy of ‘Be Lean, Be Clean, Be Green’ is to exploit local energy resources such as secondary heat to reduce the developments carbon emissions. From reviewing online heat maps from the Department for Business, Energy, & Industrial Strategy there are no available heat networks to readily connect to in the local vicinity of the proposed development. Due to there being no local heat network that can be capitalised upon there are no associated carbon emission savings at this stage. However, this does not preclude a future heat network connection, should one become operational locally.



6.0 Low Carbon and Renewable Technology

This section provides a brief overview of available renewable and low/zero carbon technologies (LZC). The technical feasibility of installing each LZC technology at the proposed care home has been assessed in order to discount any unsuitable options at an early stage. A summary of the feasibility process is presented in the following table discusses the advantages and disadvantages that are specific to the project:

Technology	Brief Description	Benefits	Issues/Limitations	Feasible for site
Solar Photovoltaic	Photovoltaic panels convert solar radiation into electrical energy	Low maintenance. No moving parts. Easily integrated into building design.	Any overshadowing affects panel performance. Large area required for installation. Panels ideally inclined and facing southerly direction.	Yes
Solar Thermal	Solar thermal energy can contribute towards space heating and hot water requirements.	Low maintenance.	Must be sized for the building base load hot water requirements. Panels ideally inclined at around 30 degrees and facing southerly direction	Yes
Wind Turbine	Wind generation equipment operates on the basis of wind turning a propeller, which is used to drive an alternator to generate electricity. Small scale (1kW – 15kW) wind turbines can be pole or roof	Low maintenance/ On-going cost. Excess electricity can be exported to the grid.	Planning issues. Aesthetic impact. Background noise Space limitations on site. Minimum wind speed requirements. Wind survey to be undertaken to verify 'local' viability.	No
Biomass	Modern wood-fuel boilers are highly efficient, clean and almost carbon	Stable long-term running costs. Potential good CO ₂ saving.	Large area needed for fuel delivery and storage. Reliable fuel supply chain required. Regular maintenance required Significant plant space required. Air pollution / Clean Air Act limits use.	No
Ground Source Heat Pump (GSHP)	GSHP systems tap into the earth's considerable energy store to provide both heating and cooling to buildings.	Minimal maintenance. Unobtrusive technology. Flexible installation options to meet available site footprint.	Large area required for horizontal pipes Full ground survey required to determine geology. More beneficial to the development if cooling is required. Integration with piled foundations must be done at an early stage. The lack of space to locate the underground pipework loops and the associated plant around the site.	Yes

Technology	Brief Description	Benefits	Issues/Limitations	Feasible
Air Source Heat Pump	Electric air source heat pumps extract thermal energy from the surrounding air and transfer it to the working fluid (air or water).	Efficient use of fuel. Relatively low capital costs.	Specialist maintenance. Some additional plant space required. External proximity to boundary and noise generation with units cycling. Impact of the required external plant and associated noise within the domestic setting can be a nuisance to residents.	Yes
Combined Heat and Power	A Combined Heat and Power (CHP) installation is effectively a mini on-site power plant providing both electrical power and thermal heat. CHP is strictly an energy efficiency measure rather than a renewable energy technology.	Potential high CO ₂ saving available. Efficient use of fuel. Excess electricity can be exported to the grid	Maintenance intensive. Sufficient base thermal and electrical demand required. Additional plant space required. Noise and air quality constraints.	No
Earth Ducts	Passive pre-treatment of fresh air	Low cost Free energy	Requires significant air loads and riser space	No

To achieve building regulations compliance and attain the targeted credits under BREEAM 2018 assessment, a combination of Air source heat Pump (ASHP) and Photovoltaic array (PV) has proved to be the most feasible option. The ASHP solution will provide pre-heat to the domestic hot water generation and the PV will comprise a c.200sq.m array, subject to final panel assessment, configuration and efficiency.

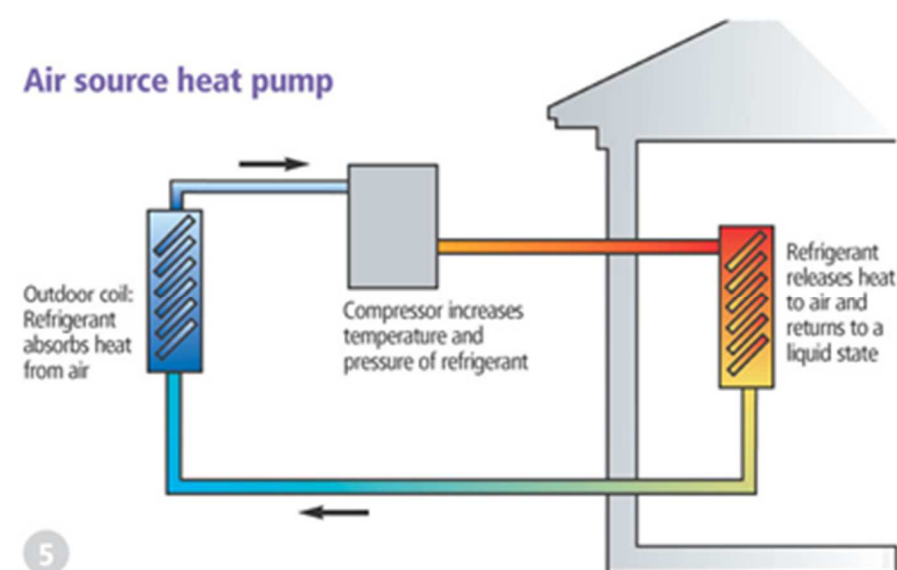


7.0 Heat Pumps

Heat pumps take a low grade source of heat e.g. a lake or external air, and through a process similar to that of a domestic refrigerator, “upgrade” the heat for use in a heating system, or for domestic hot water generation.

Reverse-cycle heat pumps can also use the same process in reverse to provide cooling if required. For the purposes of this report, given the nature of the development and typical servicing strategy it is assumed that any heat pumps installed will only operate in heating mode. Although there are several day spaces that will require cooling, the typical servicing arrangement would suggest these are best fed from local plant rather than the introduction of multiple heat pump units, chilled water pipework and equipment etc.

Air source heat pumps operate on the same principle as ground source heat pumps, but instead of using the earth as a heat source, they extract heat from external air. Heat pumps that generate significant amounts of heat will require external plant areas.



Picture 1—Air Source Heat Pump

7.1 Photovoltaic System (PV)

A PV system uses layers of semi-conductor material to produce electricity generated directly from sunlight. Several types of PV are available with varying costs and performance.

The efficiency ranges around 20% for high performance panels, based on peak output under ideal conditions. For the panels to function effectively, they must be installed in an unshaded location, and correctly orientated based on the site latitude.

The PV panel system proposed requires a large roof area of 200m². PV panels are mounted on a metal racking system which are typically angled at between 5 and 30 degrees to improve the energy capture, for maintenance the system requires access paths, provided with man safe system where required. Visual impact has to be taken in consideration, PV solar system installation will be prevented on a sloping roof and therefore will be visible. The intermittency and unpredictability of solar energy due to weather is an element which can dictate that the system is not used at full potential. A further consideration is the additional structural provisions to support the photovoltaic panels and metal racking system which for a system of this size is considerable.



Picture 1 —Roof mounted PV panels



Picture 2—Frame mounted PV on flat roof



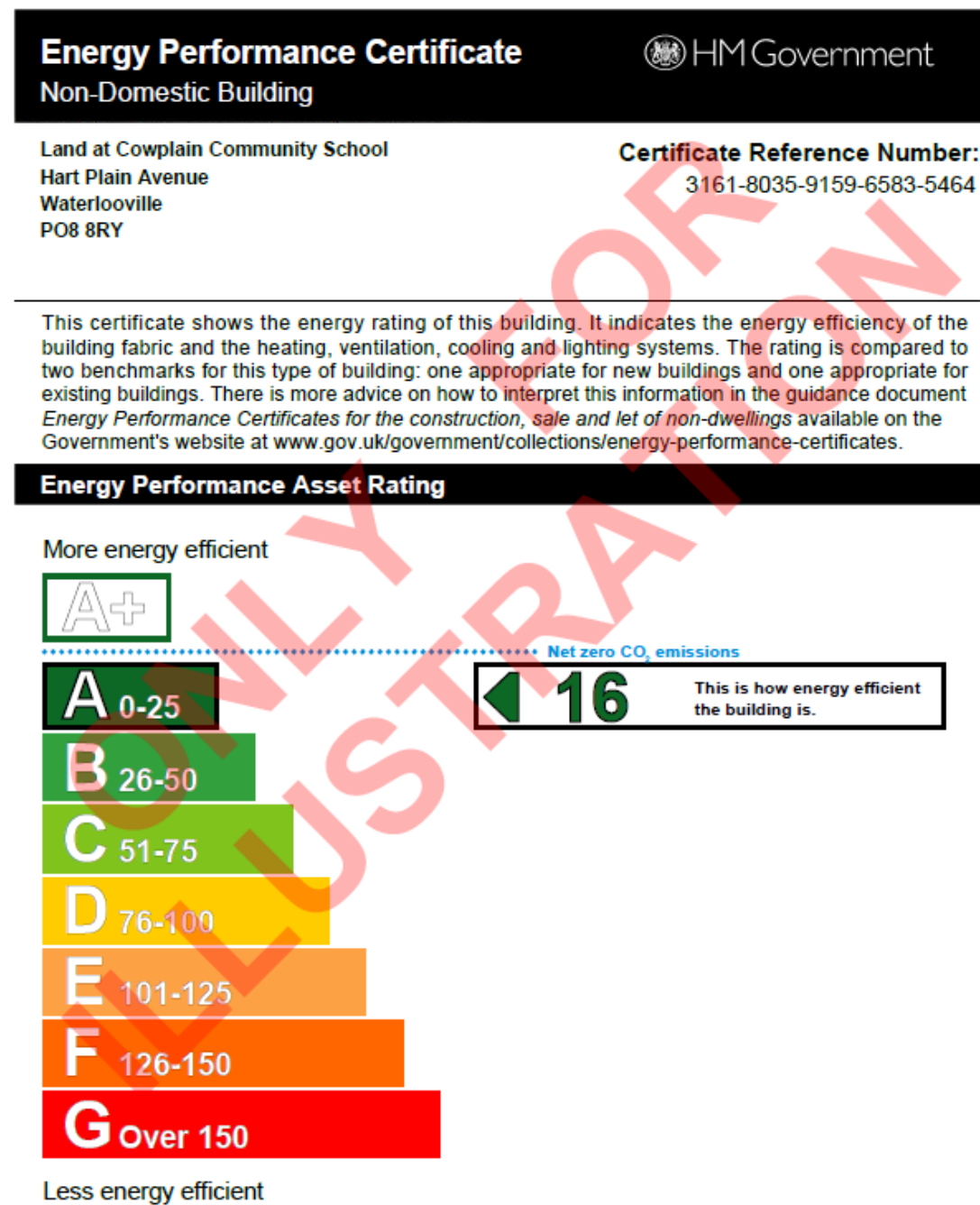
8.0 Result with Renewable Technology (Be green)

With the inclusion of an ASHP to provide a pre heat on the hot water for the development in addition to a PV array on the roof of 200m² provides a route to compliance with Part L2:2021 Regulations.

Target Emissions Rating (TER)	16.96 kgCO ₂ /m ² .annum
Building Emissions Rating (BER)	16.49 kgCO ₂ /m ² .annum

As calculated under Part L2 requirements the solar photovoltaic panels are required to generate a minimum of 40,627.26 kWh of electricity per annum. Based on a panel efficiency of 20% this equates to 200m² of PV on the roof.

A copy of the BRUKL output document is provided in Appendix A for information.





9.1 Life Cycle Costing—Air Source Heat Pump

In order to establish the life cycle cost for the renewable systems the report will need to establish costing for Energy Consumption, Energy Generation, Maintenance and Estimated Fuel Tariffs.

For the basis of this study the following estimated fuel costs shall be used:

PAYBACK

Fuel	Cost (£/kWh)
Electricity	£0.149
Gas	£0.045

DHW Generator (Gas Fired)	Heat Energy Re-quired (kWh)	Generator Efficiency (%)	Total Energy Con-sumed (kWh)	Fuel Cost (Gas) (£)	Fuel Cost (Electric) (£)
Boiler	320,392	97%	330,301	£14,864	£0
ASHP	-	350%	-	£0	£0
			Cost Difference	£14,864	£0

DHW Generator (Pre-Heat)	Heat Energy Re-quired (kWh)	Generator Efficiency (%)	Total Energy Con-sumed (kWh)	Fuel Cost (Gas) (£)	Fuel Cost (Electric) (£)
Boiler	179,255	97%	184,799	£8,316	£0
ASHP	141,137	350%	40,325	£0	£6,008
			Cost Difference	£8,316	£6,008

DHW Generator	Cost for Gas Consumption (£)	Cost for Electrical Consumption (£)	Total Fuel Cost (£)
Gas Fired	£14,864	£0	£14,864
ASHP Pre-Heat	£8,316	£6,008	£14,324
		Cost Difference	£539

Cost of ASHP unit inc. Installation / Commissioning (£)	Total Annum Sav-ings after Mainte-nance (£/annum)	Year to Payback
£25,000	-£46	N/A

Cost of ASHP unit inc. Installation / Commissioning (£)	Total Annum Sav-ings after Mainte-nance x 20 Years (£)	Total Savings over 20 Years
£25,000	-£916	-£25,916

9.2 Life Cycle Costing—Photovoltaic Array

In order to establish the life cycle cost for the renewable systems the report will need to establish costing for Energy Consumption, Energy Generation, Maintenance and Estimated Fuel Tariffs.

For the basis of this study the following estimated fuel costs shall be used:

PAYBACK

Fuel	Cost (£/kWh)
Electricity	£0.149

Electricity Generator	Electrical Energy Required (kWh)	Fuel Cost (Electric) (£)
Grid	40,627	£6,053
PV	40,627	£0
	Cost Difference	£6,053

Cost of PV	Total Annum Savings after Mainte-nance (£/annum)	Years to Payback
£48,000	£6,053	7.9

Cost of PV	Total Annum Savings after Mainte-nance x 20 Years (£)	Total Savings over 20 Years (£)
£48,000	£158,599	£110,599



Appendix A - BRUKL Documentation

The following pages detail the predicted BRUKL output and Part L compliance information for the proposed care home building based on the solution as described elsewhere in this report.

This analysis demonstrates feasibility only. The contractor shall be responsible for developing a holistic solution in conjunction with the detailing architect to achieve compliance.

Project name

2101 - Cowplain School Development - Be Green

As designed

Date: Mon Aug 15 13:47:11 2022

Administrative information

Building Details

Address: Land at Cowplain Community School, Hart Plain Avenue, Waterloo, PO8 8RY

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.5.4"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.5.4

BRUKL compliance check version: v6.1.b.0

Foundation area [m²]: 1086.02The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	16.96
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	16.49
Target primary energy rate (TPER), kWh/m ² annum	111.31
Building primary energy rate (BPER), kWh/m ² annum	108.76
Do the building's emission and primary energy rates exceed the targets?	BER ≤ TER BPER ≤ TPER

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

Fabric element	U _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.21	0.21	External Wall
Floors	0.18	0.15	0.15	Ground Floor
Pitched roofs	0.16	0.13	0.13	Roof
Flat roofs	0.18	-	-	No flat roofs in project
Windows** and roof windows	1.6	1.45	1.45	ED.05 - 1.022x2.4
Rooflights***	2.2	-	-	No rooflights in project
Personnel doors^	1.6	-	-	No personnel doors in project
Vehicle access & similar large doors	1.3	-	-	No vehicle access or similar large doors in project
High usage entrance doors	3	-	-	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)] * 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. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m ² K 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	Limiting standard	This building
m ³ /(h.m ²) at 50 Pa	8	5

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Rad Heat/Nat vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.97	-	-	-	-
Standard value	0.93*	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 gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

2- Rad Heat/Extract (88 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.97	-	-	-	-
Standard value	0.93*	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 gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					

3- VRF/Mech Vent (6 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	-	-	1.1	0.8
Standard value	2.5*	N/A	N/A	2^	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.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

4- VRF/Nat Vent (4 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	-	-	-	-
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.					

5- Kitchen (2 - Kitchen 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.97	-	-	1	-
Standard value	0.93*	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

6- laundry (2 - Laundry 1)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0	-	-	1.4	0.8
Standard value	N/A	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

7- Rad heat/Mech Vent (24 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.97	-	-	1.1	0.8
Standard value	0.93*	N/A	N/A	1.5^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES
* Standard shown is for gas single boiler systems <=2 MW output and overall for multi-boiler systems. For single boiler systems >2 MW or any individual boiler in a multi-boiler system, limiting efficiency is 0.88.					
^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.					

1- ASHP Pre heat

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1.52	0
Standard value	2*	N/A
* Standard shown is for all types except absorption and gas engine heat pumps.		

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
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 balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	SFP [W/(l/s)]										HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		Zone	Standard
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1			
0 - Ensuite 1	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 2	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 3	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 4	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 5	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 6	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 7	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 8	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 9	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 10	0.3	-	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 11	0.3	-	-	-	-	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
0 - Ensuite 12		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 13		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 14		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 15		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 16		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 17		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 18		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 19		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 20		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 21		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 22		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 23		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 24		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Ensuite 25		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Dining Room 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Lounge 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - WC 1		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - WC 2		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - WC 3		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Nurse Station 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Sluice 1		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Assisted Bath 1		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Housekeeping St 1		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Hoist 1		0.3	-	-	-	-	-	-	-	-	-	N/A
0 - Hair 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Cafe 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Cinema 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Corridor 1		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Corridor 2		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Corridor 3		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Corridor 4		-	-	-	1.1	-	-	-	-	-	-	N/A
0 - Corridor 5		-	-	-	1.1	-	-	-	-	-	-	N/A
1 - Ensuite 1		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 2		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 3		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 4		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 5		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 6		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 7		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 8		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 9		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 10		0.3	-	-	-	-	-	-	-	-	-	N/A
1 - Ensuite 11		0.3	-	-	-	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard	
1 - Ensuite 12	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 13	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 14	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 15	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 16	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 17	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 18	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 19	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 20	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 21	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 22	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 23	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 24	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 25	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 26	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 27	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 28	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Ensuite 29	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Assisted Bath 1	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Dining Room 1	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Lounge/Dining 1	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Lounge/Dining 2	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Assisted WC 1	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Assisted WC 2	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Assisted WC 3	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Sluice 1	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Nurse Base 1	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Housekeeping 1	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Hoist 1	0.3	-	-	-	-	-	-	-	-	-	N/A	
1 - Quiet Lounge 1	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Corridor 1	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Corridor 2	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Corridor 3	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Corridor 4	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Corridor 5	-	-	-	1.1	-	-	-	-	-	-	N/A	
1 - Corridor 6	-	-	-	1.1	-	-	-	-	-	-	N/A	
2 - Ensuite 1	0.3	-	-	-	-	-	-	-	-	-	N/A	
2 - Ensuite 2	0.3	-	-	-	-	-	-	-	-	-	N/A	
2 - Ensuite 3	0.3	-	-	-	-	-	-	-	-	-	N/A	
2 - Ensuite 4	0.3	-	-	-	-	-	-	-	-	-	N/A	
2 - Ensuite 5	0.3	-	-	-	-	-	-	-	-	-	N/A	
2 - Ensuite 6	0.3	-	-	-	-	-	-	-	-	-	N/A	
2 - Ensuite 7	0.3	-	-	-	-	-	-	-	-	-	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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
2 - Ensuite 8		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Ensuite 9		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Ensuite 10		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Sluice 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Nurse Base 1		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Male Change 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Female Change 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Laundry 1		-	-	-	1.4	-	-	-	-	-	-	N/A
2 - Kitchen 1		-	-	-	-	-	-	-	-	1	-	N/A
2 - Housekeeping 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Chef Change 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Chef Office 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Cleaners Store 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Assisted Bath 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Hoist 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Assisted WC 1		0.3	-	-	-	-	-	-	-	-	-	N/A
2 - Dining 1		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Lounge 1		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Corridor 1		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Corridor 2		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Corridor 3		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Corridor 4		-	-	-	1.1	-	-	-	-	-	-	N/A
2 - Corridor 5		-	-	-	1.1	-	-	-	-	-	-	N/A

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
	Standard value	95	80	0.3
0 - Bedroom 1		-	-	-
0 - Bedroom 2		-	-	-
0 - Bedroom 3		-	-	-
0 - Bedroom 4		-	-	-
0 - Bedroom 5		-	-	-
0 - Bedroom 6		-	-	-
0 - Bedroom 7		-	-	-
0 - Bedroom 8		-	-	-
0 - Bedroom 9		-	-	-
0 - Bedroom 10		-	-	-
0 - Bedroom 11		-	-	-
0 - Bedroom 12		-	-	-
0 - Bedroom 13		-	-	-
0 - Bedroom 14		-	-	-
0 - Bedroom 15		-	-	-
0 - Bedroom 16		-	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
0 - Bedroom 17		-	-	-
0 - Bedroom 18		-	-	-
0 - Bedroom 19		-	-	-
0 - Bedroom 20		-	-	-
0 - Bedroom 21		-	-	-
0 - Bedroom 22		-	-	-
0 - Bedroom 23		-	-	-
0 - Bedroom 24		-	-	-
0 - Bedroom 25		-	-	-
0 - Ensuite 1		-	-	-
0 - Ensuite 2		-	-	-
0 - Ensuite 3		-	-	-
0 - Ensuite 4		-	-	-
0 - Ensuite 5		-	-	-
0 - Ensuite 6		-	-	-
0 - Ensuite 7		-	-	-
0 - Ensuite 8		-	-	-
0 - Ensuite 9		-	-	-
0 - Ensuite 10		-	-	-
0 - Ensuite 11		-	-	-
0 - Ensuite 12		-	-	-
0 - Ensuite 13		-	-	-
0 - Ensuite 14		-	-	-
0 - Ensuite 15		-	-	-
0 - Ensuite 16		-	-	-
0 - Ensuite 17		-	-	-
0 - Ensuite 18		-	-	-
0 - Ensuite 19		-	-	-
0 - Ensuite 20		-	-	-
0 - Ensuite 21		-	-	-
0 - Ensuite 22		-	-	-
0 - Ensuite 23		-	-	-
0 - Ensuite 24		-	-	-
0 - Ensuite 25		-	-	-
0 - Stairs 1		-	-	-
0 - Stairs 2		-	-	-
0 - Stairs 3		-	-	-
0 - Refuse Store 1		100	-	-
0 - Comms 1		100	-	-
0 - Dining Room 1		-	-	-
0 - Lounge 1		-	-	-
0 - Store 1		100	-	-
0 - Store 2		100	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
0 - Store 3		100	-	-
0 - Store 4		100	-	-
0 - Store 5		100	-	-
0 - Store 6		100	-	-
0 - WC 1		-	-	-
0 - WC 2		-	-	-
0 - WC 3		-	-	-
0 - Med Store 1		100	-	-
0 - Nurse Station 1		100	-	-
0 - Sluice 1		100	-	-
0 - Assisted Bath 1		-	-	-
0 - Housekeeping St 1		100	-	-
0 - Store 7		100	-	-
0 - Hoist 1		100	-	-
0 - Hair 1		-	-	-
0 - Managers Office 1		100	-	-
0 - Cafe 1		-	-	-
0 - Cinema 1		-	-	-
0 - Admin Office 1		100	-	-
0 - Lobby 1		-	-	-
0 - Corridor 1		-	-	-
0 - Corridor 2		-	-	-
0 - Corridor 3		-	-	-
0 - Corridor 4		-	-	-
0 - Corridor 5		-	-	-
1 - Bedroom 1		-	-	-
1 - Bedroom 2		-	-	-
1 - Bedroom 3		-	-	-
1 - Bedroom 4		-	-	-
1 - Bedroom 5		-	-	-
1 - Bedroom 6		-	-	-
1 - Bedroom 7		-	-	-
1 - Bedroom 8		-	-	-
1 - Bedroom 9		-	-	-
1 - Bedroom 10		-	-	-
1 - Bedroom 11		-	-	-
1 - Bedroom 12		-	-	-
1 - Bedroom 13		-	-	-
1 - Bedroom 14		-	-	-
1 - Bedroom 15		-	-	-
1 - Bedroom 16		-	-	-
1 - Bedroom 17		-	-	-
1 - Bedroom 18		-	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
1 - Bedroom 19		-	-	-
1 - Bedroom 20		-	-	-
1 - Bedroom 21		-	-	-
1 - Bedroom 22		-	-	-
1 - Bedroom 23		-	-	-
1 - Bedroom 24		-	-	-
1 - Bedroom 25		-	-	-
1 - Bedroom 26		-	-	-
1 - Bedroom 27		-	-	-
1 - Bedroom 28		-	-	-
1 - Bedroom 29		-	-	-
1 - Ensuite 1		-	-	-
1 - Ensuite 2		-	-	-
1 - Ensuite 3		-	-	-
1 - Ensuite 4		-	-	-
1 - Ensuite 5		-	-	-
1 - Ensuite 6		-	-	-
1 - Ensuite 7		-	-	-
1 - Ensuite 8		-	-	-
1 - Ensuite 9		-	-	-
1 - Ensuite 10		-	-	-
1 - Ensuite 11		-	-	-
1 - Ensuite 12		-	-	-
1 - Ensuite 13		-	-	-
1 - Ensuite 14		-	-	-
1 - Ensuite 15		-	-	-
1 - Ensuite 16		-	-	-
1 - Ensuite 17		-	-	-
1 - Ensuite 18		-	-	-
1 - Ensuite 19		-	-	-
1 - Ensuite 20		-	-	-
1 - Ensuite 21		-	-	-
1 - Ensuite 22		-	-	-
1 - Ensuite 23		-	-	-
1 - Ensuite 24		-	-	-
1 - Ensuite 25		-	-	-
1 - Ensuite 26		-	-	-
1 - Ensuite 27		-	-	-
1 - Ensuite 28		-	-	-
1 - Ensuite 29		-	-	-
1 - Stairs 1		-	-	-
1 - Stairs 2		-	-	-
1 - Stairs 3		-	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
1 - Assisted Bath 1		-	-	-
1 - Dining Room 1		-	-	-
1 - Lounge/Dining 1		-	-	-
1 - Lounge/Dining 2		-	-	-
1 - Store 1		100	-	-
1 - Store 2		100	-	-
1 - Store 3		100	-	-
1 - Store 4		100	-	-
1 - Store 5		100	-	-
1 - Store 6		100	-	-
1 - Assisted WC 1		-	-	-
1 - Assisted WC 2		-	-	-
1 - Assisted WC 3		-	-	-
1 - Med Store 1		100	-	-
1 - Sluice 1		100	-	-
1 - Nurse Base 1		100	-	-
1 - Housekeeping 1		100	-	-
1 - Hoist 1		100	-	-
1 - Quiet Lounge 1		-	-	-
1 - Corridor 1		-	-	-
1 - Corridor 2		-	-	-
1 - Corridor 3		-	-	-
1 - Corridor 4		-	-	-
1 - Corridor 5		-	-	-
1 - Corridor 6		-	-	-
2 - Bedroom 1		-	-	-
2 - Bedroom 2		-	-	-
2 - Bedroom 3		-	-	-
2 - Bedroom 4		-	-	-
2 - Bedroom 5		-	-	-
2 - Bedroom 6		-	-	-
2 - Bedroom 7		-	-	-
2 - Bedroom 8		-	-	-
2 - Bedroom 9		-	-	-
2 - Bedroom 10		-	-	-
2 - Ensuite 1		-	-	-
2 - Ensuite 2		-	-	-
2 - Ensuite 3		-	-	-
2 - Ensuite 4		-	-	-
2 - Ensuite 5		-	-	-
2 - Ensuite 6		-	-	-
2 - Ensuite 7		-	-	-
2 - Ensuite 8		-	-	-

General lighting and display lighting		General luminaire	Display light source	
Zone name		Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m ²]
	Standard value	95	80	0.3
2 - Ensuite 9		-	-	-
2 - Ensuite 10		-	-	-
2 - Sluice 1		100	-	-
2 - Nurse Base 1		100	-	-
2 - Med Store 1		100	-	-
2 - Male Change 1		-	-	-
2 - Female Change 1		-	-	-
2 - Laundry 1		-	-	-
2 - Kitchen 1		-	-	-
2 - Staircase 1		-	-	-
2 - Staircase 2		-	-	-
2 - Staff Room 1		-	-	-
2 - Housekeeping 1		100	-	-
2 - Chef Change 1		-	-	-
2 - Chef Office 1		100	-	-
2 - Cleaners Store 1		100	-	-
2 - Assisted Bath 1		-	-	-
2 - Hoist 1		100	-	-
2 - Assisted WC 1		-	-	-
2 - Dining 1		-	-	-
2 - Lounge 1		-	-	-
2 - Corridor 1		-	-	-
2 - Corridor 2		-	-	-
2 - Corridor 3		-	-	-
2 - Corridor 4		-	-	-
2 - Corridor 5		-	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0 - Bedroom 1	NO (-48%)	NO
0 - Bedroom 2	NO (-41%)	NO
0 - Bedroom 3	NO (-29%)	NO
0 - Bedroom 4	NO (-20%)	NO
0 - Bedroom 5	NO (-44%)	NO
0 - Bedroom 6	NO (-66%)	NO
0 - Bedroom 7	NO (-66%)	NO
0 - Bedroom 8	NO (-51%)	NO
0 - Bedroom 9	NO (-44%)	NO
0 - Bedroom 10	NO (-60%)	NO
0 - Bedroom 11	NO (-59%)	NO
0 - Bedroom 12	NO (-45%)	NO
0 - Bedroom 13	NO (-64%)	NO
0 - Bedroom 14	NO (-27%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
0 - Bedroom 15	NO (-23%)	NO
0 - Bedroom 16	NO (-32%)	NO
0 - Bedroom 17	NO (-29%)	NO
0 - Bedroom 18	NO (-20%)	NO
0 - Bedroom 19	NO (-18%)	NO
0 - Bedroom 20	NO (-22%)	NO
0 - Bedroom 21	NO (-15%)	NO
0 - Bedroom 22	NO (-16%)	NO
0 - Bedroom 23	NO (-17%)	NO
0 - Bedroom 24	NO (-17%)	NO
0 - Bedroom 25	NO (-2%)	NO
0 - Comms 1	N/A	N/A
0 - Dining Room 1	NO (-62%)	NO
0 - Lounge 1	NO (-46%)	NO
0 - Med Store 1	N/A	N/A
0 - Nurse Station 1	N/A	N/A
0 - Managers Office 1	NO (-24%)	NO
0 - Cafe 1	NO (-6%)	NO
0 - Cinema 1	NO (-18%)	NO
0 - Admin Office 1	NO (-75%)	NO
1 - Bedroom 1	NO (-81%)	NO
1 - Bedroom 2	NO (-47%)	NO
1 - Bedroom 3	NO (-41%)	NO
1 - Bedroom 4	NO (-27%)	NO
1 - Bedroom 5	NO (-19%)	NO
1 - Bedroom 6	NO (-41%)	NO
1 - Bedroom 7	NO (-44%)	NO
1 - Bedroom 8	NO (-66%)	NO
1 - Bedroom 9	NO (-69%)	NO
1 - Bedroom 10	NO (-75%)	NO
1 - Bedroom 11	NO (-72%)	NO
1 - Bedroom 12	NO (-77%)	NO
1 - Bedroom 13	NO (-78%)	NO
1 - Bedroom 14	NO (-68%)	NO
1 - Bedroom 15	NO (-64%)	NO
1 - Bedroom 16	NO (-59%)	NO
1 - Bedroom 17	NO (-65%)	NO
1 - Bedroom 18	NO (-30%)	NO
1 - Bedroom 19	NO (-18%)	NO
1 - Bedroom 20	NO (-11%)	NO
1 - Bedroom 21	NO (-7%)	NO
1 - Bedroom 22	NO (-21%)	NO
1 - Bedroom 23	NO (-22%)	NO
1 - Bedroom 24	NO (-18%)	NO
1 - Bedroom 25	NO (-18%)	NO
1 - Bedroom 26	NO (-10%)	NO
1 - Bedroom 27	NO (-6%)	NO
1 - Bedroom 28	NO (-36%)	NO
1 - Bedroom 29	NO (-35%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
1 - Dining Room 1	NO (-67%)	NO
1 - Lounge/Dining 1	NO (-23%)	NO
1 - Lounge/Dining 2	NO (-4%)	NO
1 - Med Store 1	N/A	N/A
1 - Nurse Base 1	N/A	N/A
1 - Quiet Lounge 1	NO (-70%)	NO
2 - Bedroom 1	NO (-60%)	NO
2 - Bedroom 2	NO (-62%)	NO
2 - Bedroom 3	NO (-58%)	NO
2 - Bedroom 4	NO (-60%)	NO
2 - Bedroom 5	NO (-60%)	NO
2 - Bedroom 6	NO (-60%)	NO
2 - Bedroom 7	NO (-60%)	NO
2 - Bedroom 8	NO (-57%)	NO
2 - Bedroom 9	NO (-59%)	NO
2 - Bedroom 10	NO (-59%)	NO
2 - Nurse Base 1	N/A	N/A
2 - Med Store 1	N/A	N/A
2 - Staff Room 1	NO (-80%)	NO
2 - Chef Office 1	N/A	N/A
2 - Dining 1	NO (-67%)	NO
2 - Lounge 1	NO (-83%)	NO

Regulation 25A: Consideration of high efficiency 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?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	3258	3258
External area [m ²]	4893	4893
Weather	SOU	SOU
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	1294	1537
Average U-value [W/m ² K]	0.26	0.31
Alpha value* [%]	29.58	14.58

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

Building Use

% Area Building Type

Retail/Financial and Professional Services
 Restaurants and Cafes/Drinking Establishments/Takeaways
 Offices and Workshop Businesses
 General Industrial and Special Industrial Groups
 Storage or Distribution
 Hotels

100 Residential Institutions: Hospitals and Care Homes

Residential Institutions: Residential Schools
 Residential Institutions: Universities and Colleges
 Secure Residential Institutions
 Residential Spaces
 Non-residential Institutions: Community/Day Centre
 Non-residential Institutions: Libraries, Museums, and Galleries
 Non-residential Institutions: Education
 Non-residential Institutions: Primary Health Care Building
 Non-residential Institutions: Crown and County Courts
 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	17.13	14.95
Cooling	1.13	2.37
Auxiliary	11.87	9.93
Lighting	15.25	11.55
Hot water	55.02	63.55
Equipment*	81.95	81.95
TOTAL **	100.4	102.36

* 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	12.47	11.99
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>12.47</i>	<i>11.99</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	81.43	89.17
Primary energy [kWh/m ²]	108.76	111.31
Total emissions [kg/m ²]	16.49	16.96

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	87.5	0	26.4	0	3	0.92	0	0.97	0	
Notional	63.7	0	20.6	0	1.9	0.86	0	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	119.6	0	36	0	8.6	0.92	0	0.97	0	
Notional	116.9	0	37.8	0	8.7	0.86	0	----	----	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	0	172.2	0	9.6	23.9	3.8	5	4	5	
Notional	0	332.4	0	21	14.9	0	4.4	----	----	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	0.1	160.5	0	8.9	0	3.8	5	4	5	
Notional	0	145	0	9.2	0	0	4.4	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	0.5	0	0.2	0	121.9	0.92	0	0.97	0	
Notional	0.6	0	0.2	0	49.5	0.86	0	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	0	0	0	0	12.6	0	0	0	0	
Notional	0	0	0	0	7.9	0	0	----	----	
[ST] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
Actual	10.8	0	3.3	0	17.7	0.92	0	0.97	0	
Notional	10.9	0	3.5	0	21.9	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