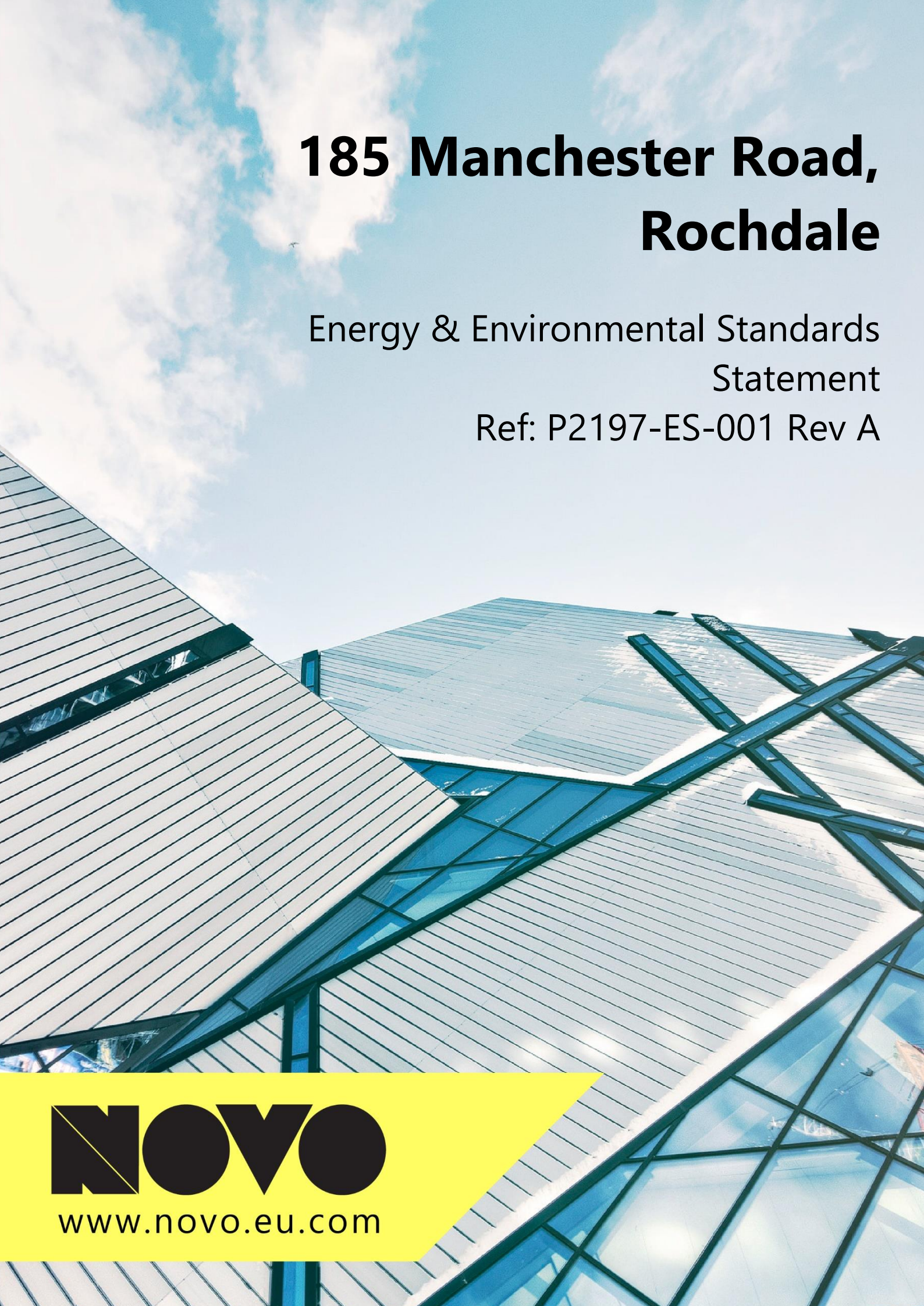


185 Manchester Road, Rochdale

Energy & Environmental Standards
Statement

Ref: P2197-ES-001 Rev A



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REVISION	DESCRIPTION	DATE	AUTHOR	CHECKED
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Appendix A – BRUKL Report

1 EXECUTIVE SUMMARY

The proposed development 185 Manchester Road Rochdale will adhere to policies detailed in the Rochdale Core Strategy. This report will directly address Building Regulations Part L 2021 and Rochdale Policies G2 and G3.

This report will utilise the Energy Hierarchy to prove the current design has considered fabric efficiency, feasibility of connection to district heating and various LZC technologies.

The proposed fabric specification is described in Tables 1 below.

Table 1 Building Fabric Specification

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	0.13
External Walls	0.26	0.18	0.16
Roof	0.18	0.15	0.11
Windows	1.60	1.40	1.30
Doors	1.60	1.90	1.60
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	3.0

As can be seen above, proposed fabric U-Values are to exceed notional/limiting standards in all aspects, this will passively reduce heating demand ahead of low carbon systems being implemented. Other passive considerations include orientation with many occupied spaces being southeast-southwest facing therefore benefiting from natural solar gain and lighting.

Regarding the systems used, the development will utilise low carbon Air Source Heat Pump technology to provide both heating and cooling to communal areas, occupant rooms will also have heating from ASHP's via HIUs and radiators which will also be supplemented with MVHR for ventilation and heat recovery. Hot water demand will also be serviced by ASHP's and also supplemented with a standard electric boiler.

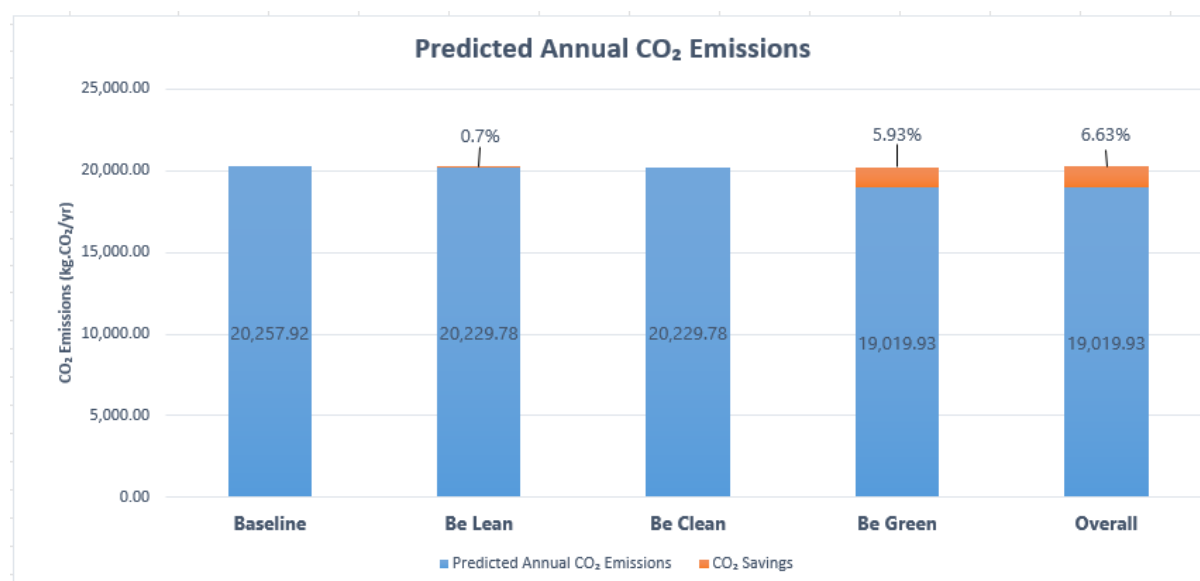
In addition to efficient systems, consideration has been given to the reduction of mains potable water usage through efficient water fixtures. This is further detailed in section 4.5 however potable water demand is to be reduced to <16 litres/person/day as per the requirement within Building Regulations.

Table 2 below displays the CO₂ and Primary Energy Demand results within Part L 2021 Building Regulations.

Table 2 Building Regulations Part L 2021 Results

Target Emission Rate vs Building Emission Rate	
Target Carbon Dioxide Emission Rate (TER)	7.24 kgCO ₂ /m ² .yr
Building Carbon Dioxide Emission Rate (BER)	6.76 kgCO ₂ /m ² .yr
% Reduction	6.63%
Target Primary Energy Rate vs Building Primary Energy Rate	
Target Primary Energy Rate (TPER)	79.12 kWh/m ²
Building Primary Energy rate (BPER)	73.02 kWh/m ²
% Reduction	7.71%

Figure 1 Overall Energy Hierarchy CO₂ Results



2 INTRODUCTION

2.1 PURPOSE

NOVO Integration Ltd has been appointed as Energy Consultants to produce an Energy and Environmental Standards Statement for the 185 Manchester Road Development, Rochdale.

This is to support the scheme design process, demonstrate Building Regulations Part L compliance and to achieve the applicable planning policies set out in the Rochdale Core Strategy.

Figure 2: 185 Manchester Road



This report will outline the following:

1. Assess the proposed development site's estimated CO₂ emissions, it will look into the feasibility of Low Zero Carbon technologies, examining the following aspects relative to LZC/renewable technologies:
 - Energy generated by Renewable/Low Zero Carbon Technologies (LZC)
 - Feasibility assessment for each Renewable/Low Zero Carbon Technologies (LZC)
 - Local Planning Requirements
2. The proposed building fabric and Low Zero Carbon (LZC) design strategy and analysis calculations, with respect to the Simplified Building Energy Model (SBEM). Demonstration of how the design is compliant against Part L 2021 Building Regulations.

2.2 BACKGROUND POLICY DOCUMENTS

The following statements and regulatory guidelines form the policy background to this energy strategy:

- The Kyoto Protocol at the United Nations.
- Framework Convention on Climate Change as negotiated in December 1997 has come into effect on 16 February 2005 following the ratification of the agreement by Russia on 18 November 2004. The Burden Sharing Agreement of the EU mandates a 12.5% reduction in greenhouse gas emissions for the UK by 2008 - 12.
- The Department of Transport and Industry White Paper, titled "Our Energy Future - Creating a Low Carbon Economy", spells out a target for 10% of electricity to be from renewable sources nationally by 2010 and twice this by 2020.
- National Policy Objectives in regard to renewable energy Planning Policy Statement 22: Renewable energy guidance for local governing bodies concerning implementation of renewable energy technologies through appropriate planning.
- The United Kingdom has made commitments that extend beyond this requirement. National Targets are for a reduction to 20% below 1990 CO₂ levels by 2010 and a 60% reduction by 2050.
- Integrating renewable energy into new developments: Toolkit for planners, developers and consultants, September 2004.
- National Planning Policy Framework (July 2021)
The National Planning Policy Framework is a key part of our reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. In particular point A of paragraph 16 which states the following:

Plans should:

- a) be prepared with the objective of contributing to the achievement of sustainable development.*
- b) be prepared positively, in a way that is aspirational but deliverable*
- c) be shaped by early, proportionate, and effective engagement between plan makers and communities, local organisations, businesses, infrastructure providers and operators and statutory consultees*
- d) contain policies that are clearly written and unambiguous, so it is evident how a decision maker should react to development proposals*
- e) be accessible through the use of digital tools to assist public involvement and policy presentation; and*
- f) serve a clear purpose, avoiding unnecessary duplication of policies that apply to a particular area (including policies in this Framework, where relevant).*

Another key point of the NPPF is paragraph 8, point C which states the following:

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth,*

innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

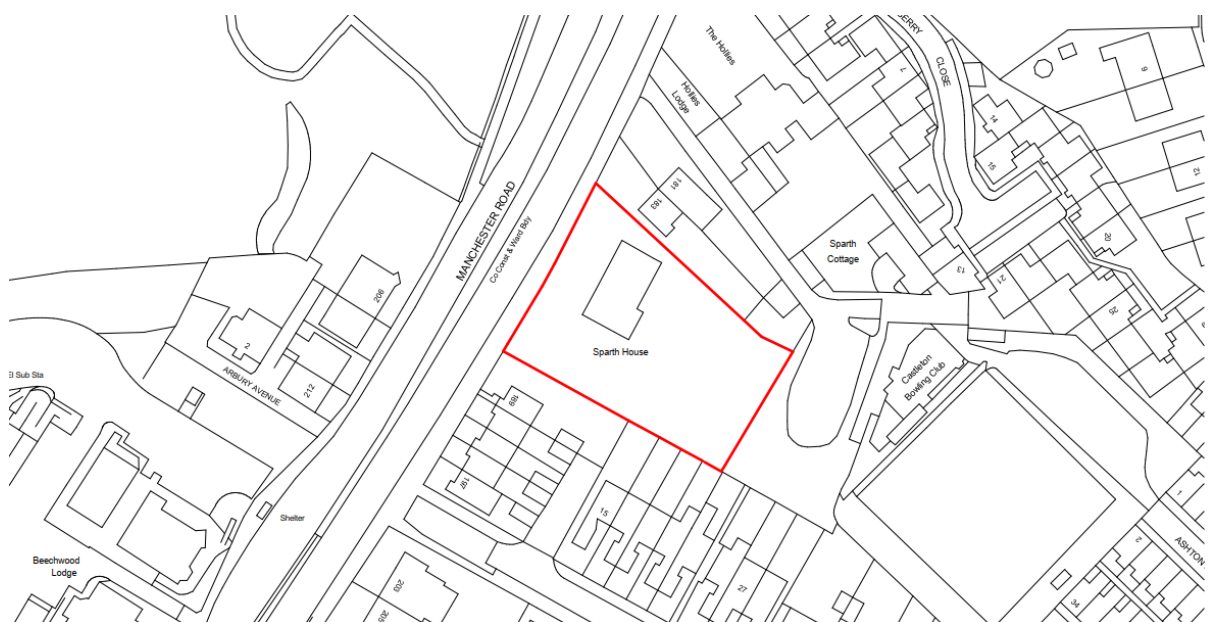
- b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*
- c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

- Rochdale Core Strategy 2016
- Guide to Development in Manchester SPD (2007)
- Manchester City Council Climate Change Framework (2020-2025)
- SAP 10 Technical Paper S10TP-15 CO2 and Primary Energy for SAP
- Approved Document Part L Volume 2: Buildings other than dwellings 2021

2.3 SITE DESCRIPTION

The site is located in Rochdale on the Sparth House site, the surrounding area is predominantly low-rise domestic in nature and would therefore experience minimal to no impact from albedo and urban heat island effect that would impact loads/thermal comfort levels.

Figure 3: Ariel View



2.4 PLANNING POLICY

2.4.1 Local Policy

The locality of the development site means it falls under the jurisdiction of Rochdale Council. As such the policies adopted by Rochdale Council must be adhered to.

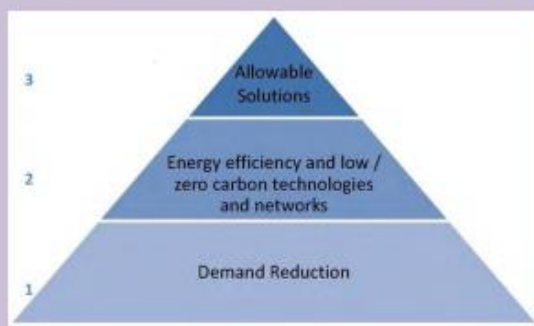
The document that details Rochdale's strategy for development is the Rochdale Core Strategy 2016. As the appointed Energy Assessor, the primary policies covered by this report are G2 and G3. G1 will also be complied with as far as the "new development" expectations is concerned however G2/3 are the primary focus.

G2 - Energy and new development

Reducing carbon emissions from new buildings will not only help to tackle climate change, it will also help to alleviate fuel poverty in the borough and contribute to the country's fuel security.

G2 - Energy and new development

All new development will be expected to adhere to the following energy hierarchy to the extent that policy G2 reflects national policy, targets and requirements for that type of development:



1. **Demand Reduction** – Achieve the maximum possible reduction in demand for energy through building design (i.e. the use of passive systems). At the design stage of new developments, every effort should be made to ensure that buildings use as little energy as possible throughout their lifetimes, using siting, orientation, layout, construction and landscaping to optimise use of natural passive systems such as solar gain and natural lighting, shading, ventilation and cooling to minimise heating, cooling and lighting demands. Green roofs and green walls should be incorporated into developments wherever feasible.
2. **Energy efficiency and low / zero carbon technologies and networks** – Design to maximize energy efficiency, and use on-site or linked low or zero carbon technologies or

direct connection to a low or zero carbon heat source (not necessarily on-site).

3. **'Allowable solutions'** – use wider energy efficiency / CO2 reduction measures, which could include developer contributions, to compensate for 'residual emissions' not addressed by 1 or 2 above.

G3 - Renewable and low carbon energy developments

The Council will promote renewable, low and zero carbon energy generating developments, including wind power, biomass, Combined Heat and Power (CHP), hydro and heat pumps in order to help meet CO2 reduction targets and contribute towards energy security for Greater Manchester and the North West.

Any proposal and associated infrastructure must avoid harm to the health and safety of the public, including through nuisance or adverse impact on highway safety by conflict with or undue distraction to road users. Any harm to the following must be minimised and appropriately mitigated:

- The visual character and quality of the landscape or townscape and the physical record of the historic and cultural evolution of the landscape;
- The setting of heritage assets including Scheduled Ancient Monuments, Conservation Areas and Listed Buildings;
- Local residents and their amenity;
- Biodiversity including protected species, statutory and locally designated sites and important habitats, and geodiversity;
- The value of the borough's peatlands as an ecological and hydrological resource and as a carbon sink;
- The value of the surrounding area for relaxation and recreation;
- Water quality;
- Land which is used for water catchment purposes and which is critical to the delivery of water supply; and
- Highway safety.

Any proposal must demonstrate the best use of location, topography, siting, design and colour to minimise its visual and other impacts, including any cumulative impacts. Any ancillary structures and access roads should employ sensitive design and the use of local materials to respect the character and appearance of the setting. The visual impact of infrastructure associated with renewable energy developments should be satisfactorily addressed, including by routing power lines underground wherever possible. All proposals should seek to minimise the length of cable connection in order to reduce the visual impact of such structures when sited above ground. It must be demonstrated that the proposal will not result in electro-magnetic interference with local television reception and specialist radio communication networks.

All the above issues, where relevant, will have to be addressed in a detailed statement of environmental effects submitted with the application.

Planning permission will be subject to a condition that if a wind turbine generator, or other redundant plant or infrastructure, is not producing electricity for six months or more, it shall be removed and the site fully restored to a use and condition appropriate to its surroundings in accordance with this plan.

In the case of wind power developments, in addition to the above criteria the following will also apply.

Planning permission will only be granted if:

- The development site is in an area identified as suitable for wind energy development in

Policy G2 requires the following of a specific Energy Hierarchy, this report will use the nationally recognised Energy Hierarchy using the Be Lean, Be Clean and Be Green stages as a vehicle for addressing Policy G2 as it follows the same ethos.

Policy G3 encourages the use of low carbon/renewable energy systems, various technologies of this nature are assessed and incorporated into the current design at the Be Green stage to support this policy.

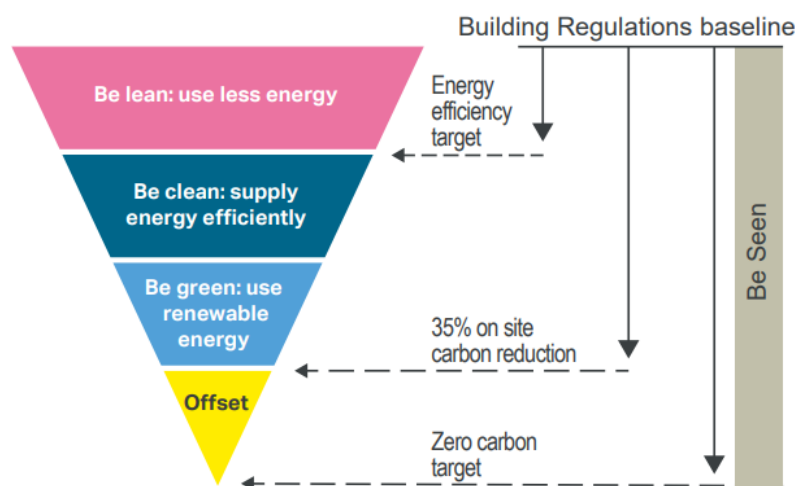
2.4.2 Energy Hierarchy

As part of the Sustainability and Energy analysis of the development Energy Hierarchy has been used as a means of structuring the sustainable design process.

We have taken this approach in order to properly address the Rochdale Core Strategy Policies which promote low carbon design, assessment of connection to CHP and consideration of other low – zero carbon technologies.

An overview of the Energy Hierarchy is provided below:

Figure 4: Energy Hierarchy Diagram

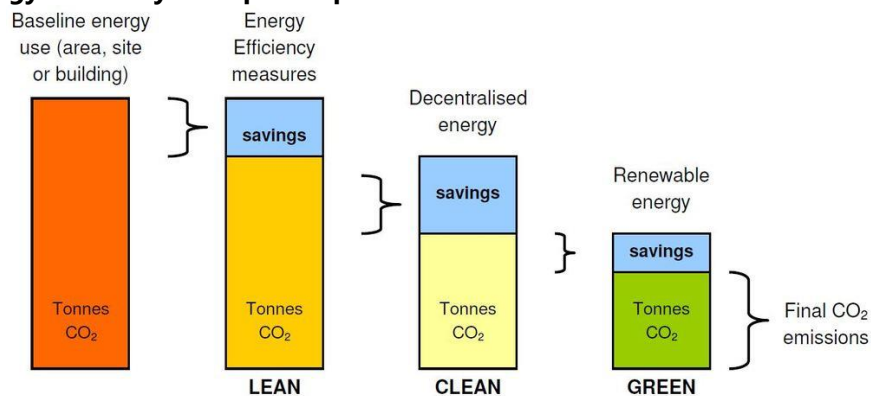


- Using less energy, in particular by adopting sustainable design and construction measures.
- Supplying energy efficiency, in particular by prioritising decentralised energy generation; and
- Using renewable energy.

The development Energy strategy has adopted the following design ethos:

- **BE LEAN** – By using less energy and taking into account the further energy efficiency measure in comparison to the baseline building.
- **BE CLEAN** – By supplying energy efficiently. The clean building looks at further carbon dioxide emission savings over the lean building by taking into consideration the use of decentralise energy via CHP.
- **BE GREEN** – By integrating renewable energy into the scheme which can further reduce the carbon dioxide emission rate.

Figure 5: Energy Hierarchy Example Graph



2.5 BUILDING REGULATIONS

For this development, Part L 2021 Vol 2: Buildings other than dwellings is applicable.

To comply with this document 2nr compliance metrics must be met, these are:

- 1) The Building Emission Rate must be lower than the Target Emission Rate
- 2) The Building Primary Energy Rate must be lower than the Target Primary Energy Rate

The non-domestic regulations do not have a fabric efficiency target in the same vein as the domestic regulations however, a set of limiting fabric u-values must be achieved as a minimum.

The following are some key extracts from ADL2 detailing the requirements of the regulations, for full details please refer to Part L Volume 2 2021: Buildings other than dwellings.

Regulations

Methodology of calculation of the energy performance

- 24.** (1) The Secretary of State shall approve—
- (a) a methodology of calculation of the energy performance of buildings, including methods for calculating asset ratings and operational ratings of buildings; and
 - (b) ways in which the energy performance of buildings, as calculated in accordance with the methodology, shall be expressed.
- (2) In this regulation—
- “asset rating” means an energy performance indicator determined from the amount of energy estimated to meet the different needs associated with a standardised use of the building; and
- “operational rating” means an energy performance indicator determined from the amount of energy consumed during the occupation of a building over a period of time and the energy demand associated with a typical use of the building over that period.

Minimum energy performance requirements for new buildings

- 25.** Minimum energy performance requirements shall be approved by the Secretary of State, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, for—
- (a) new buildings (which shall include new dwellings), in the form of target CO₂ emission rates;
 - (b) new dwellings, in the form of target fabric efficiency rates, and
 - (c) new buildings in the form of target primary energy rates.

Nearly zero-energy requirements for new buildings

- 25B.** Where a building is erected, it must be a nearly zero-energy building.

CO₂ emission rates for new buildings

- 26.** Where a building is erected, it shall not exceed the target CO₂ emission rate for the building that has been approved pursuant to regulation 25, applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.

Target primary energy rates for new buildings

- 26C.** Where a building is erected it must not exceed the target primary energy rate for the building which has been approved pursuant to regulation 25(c), applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.

Regulation continued

CO₂ emission rate calculations

- 27.** (1) This regulation applies where a building is erected and regulation 26 applies.
- (2) Not later than the day before the work starts, the person carrying out the work shall give the local authority a notice which specifies—
- (a) the target CO₂ emission rate for the building, calculated and expressed in accordance with the methodology approved pursuant to regulation 24,
 - (b) the CO₂ emission rate for the building as designed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, and
 - (c) a list of specifications to which the building is to be constructed.
- (3) Not later than five days after the work has been completed, the person carrying out the work shall give the local authority—
- (a) a notice which specifies—
 - (i) the target CO₂ emission rate for the building, calculated and expressed in accordance with the methodology approved pursuant to regulation 24,
 - (ii) the CO₂ emission rate for the building as constructed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, and
 - (iii) whether the building has been constructed in accordance with the list of specifications referred to in paragraph (2)(c), and if not a list of any changes to those specifications; or
 - (b) a certificate of the sort referred to in paragraph (4) accompanied by the information referred to in subparagraph (a).
- (4) A local authority are authorised to accept, as evidence that the requirements of regulation 26 have been satisfied, a certificate to that effect by an energy assessor who is accredited to produce energy performance certificates for that category of building.
- (5) In this regulation, “specifications” means specifications used for the calculation of the CO₂ emission rate.

Target primary energy rate calculations for new buildings

- 27C.** (1) This regulation applies where a building is erected.
- (2) Not later than the day before the work starts, the person carrying out the work must give the local authority a notice which specifies—
- (a) the target primary energy rate for the building calculated and expressed in accordance with the methodology approved pursuant to regulation 24;
 - (b) the calculated target primary energy rate for the building as designed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24; and
 - (c) the list of specifications to which the building is to be constructed.
- (3) Not later than five days after the work has been completed, the person carrying out the work must give the local authority—
- (a) a notice which specifies—
 - (i) the target primary energy rate for the building calculated and expressed in accordance with the methodology approved pursuant to regulation 24;
 - (ii) the calculated target primary energy rate for the building as constructed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24; and
 - (iii) whether the building has been constructed in accordance with the list of specifications referred to in paragraph (2)(c), and if not a list of any changes to those specifications; or
 - (b) a certificate of the sort referred to in paragraph (4) accompanied by the information referred to in subparagraph (a).
- (4) A local authority is authorised to accept, as evidence that the requirements of regulation 26C have been satisfied, a certificate to that effect by an energy assessor who is accredited to produce energy performance certificates for that category of building.
- (5) In this regulation, “specifications” means specifications used for the calculation of the target primary energy rate.

3 DESIGN PARAMETERS

3.1 METHODOLOGY

For non-domestic areas Approved Document Part L Volume 2 is applicable which sets the standard for carbon emissions for new buildings other than dwellings.

As the development incorporates a listed building and is located within a conservation area, it is exempt from conventional energy efficiency requirements. The below details what would be required in the event the current strategy changes and is for information only.

(i) *The CO₂ emission and Primary Energy Rates must not exceed the targets*

To demonstrate compliance the actual buildings emission rate is compared to the national buildings emission rate and must be at least equal to or less than the target emission rate. The same applies with primary energy demand.

The actual buildings emission rate is calculated when the building is modelled using approved software and the proposed construction values are detailed, for example, u-values, efficiency of M&E plant, etc. following this exercise the software will generate a notional building, the notional building has the same layout as the actual building, but the construction values and energy performance of the M&E equipment is pre-set, this allows the software to generate a target emission rate (TER) for the actual building, the TER is the anticipated emission rate from the notional building.

The same process is applied to how the Target Primary Energy Rate (TPER) is generated which the actual Building Primary Energy rate must achieve (BPER).

The BER/BPER is then compared to the TER/ TPER and if it is equal to or lower than then the building is deemed to comply with Part L 2021 Building Regulations.

This process needs to be completed and issued to Building Control at the "As-Designed" Stage to demonstrate to Building Control that the proposals for the building comply with the criteria.

(ii) *Limits on Design Flexibility*

Each element of the construction has pre-set performance limits within the document; these are generally split into 2 categories, an average value and an upper limit value which cannot be exceeded.

To demonstrate compliance with this element then the CO₂ and Primary Energy Rate must be achieved with no individual element exceeding the upper limit set for performance.

(iii) *Limiting the Effects of Solar Gains in Summer*

It is a requirement to demonstrate that solar gains have been limited during the summer period to either reduce the need for air conditioning; or to reduce the installed capacity of any air conditioning system that is installed.

To demonstrate compliance an assessment of the solar gains must be undertaken, the actual building results are then compared to a pre-defined standard and if the performance of the actual building is no worse than that of the pre-defined building then it is deemed to comply.

(iv) *Provisions for Energy-Efficient Operation of the Building*

The owner of the building should be provided with sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

This is generally achieved by production of a building logbook.

3.2 ARCHITECTURAL DRAWINGS BY BCAE ARCHITECTS

The following drawings have been used to produce the Energy Model.

Table 3 Architects Drawing Schedule

Drawing Number	Drawing Contents
57.22 – 185 Manchester Road – Dementia CareScheme-E00	Location Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P001	Site Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P002	Levels Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P100	Ground Floor Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P110	First Floor Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P120	Second Floor Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P130	Third Floor Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P140	Roof Plan
57.22 – 185 Manchester Road – Dementia CareScheme-P200	Elevations Sheet 1
57.22 – 185 Manchester Road – Dementia CareScheme-P210	Elevations Sheet 2
57.22 – 185 Manchester Road – Dementia CareScheme-P300	Sections

3.3 FUEL

Table 5 Fuel Factors SAP 2012 and SAP 10

kgCO ₂ /kWh	SAP 2012	SAP 10.1
Gas:		
mains gas	0.216	0.210
bulk LPG	0.241	0.241
bottled LPG	0.241	0.241
bottled LPG (no contract)	0.241	0.241
LPG subject to Special Condition 18	0.241	0.241
biogas (including anaerobic digestion)	0.098	0.024
Liquid fuel:		
heating oil	0.298	0.298
biodiesel from any biomass source	0.123	0.038
biodiesel from vegetable oil only	0.083	0.018
appliances able to use mineral oil or biodiesel	0.298	0.298
B30K	0.245	0.220
bioethanol from any biomass source	0.140	0.105
Solid fuel:		
house coal	0.394	0.395
anthracite	0.394	0.395
manufactured smokeless fuel	0.433	0.366
wood logs	0.019	0.028
wood pellets (in bags for secondary heating)	0.039	0.053
wood pellets (bulk supply for main heating)	0.039	0.053
wood chips	0.016	0.023
dual fuel appliance (mineral and wood)	0.226	0.087
Electricity:		
standard tariff	0.519	0.136
7-hour tariff (high rate)	0.519	0.136
7-hour tariff (low rate)	0.519	0.136
10-hour (high rate)	0.519	0.136
10-hour (low rate)	0.519	0.136
18-hour (high rate)	0.519	0.136
18-hour (low rate)	0.519	0.136
24-hour heating tariff	0.519	0.136
electricity exported to grid	0.519	0.136
electricity, any tariff	0.519	0.136
Community heating schemes:		
heat from boilers - mains gas	0.216	0.210
heat from boilers - LPG	0.241	0.241
heat from boilers - oil	0.331	0.335
heat from boilers that can use mineral oil or biodiesel	0.331	0.335
heat from boilers using biodiesel from any biomass source	0.123	0.038
heat from boilers using biodiesel from vegetable oil only	0.083	0.018
heat from boilers - B30D	0.269	0.269
heat from boilers - coal	0.380	0.375
heat from electric heat pump	0.519	0.136
heat from boilers - waste combustion	0.047	0.074
heat from boilers - biomass	0.031	0.029
heat from boilers - biogas (landfill or sewage gas)	0.098	0.024
waste heat from power station	0.058	0.015
geothermal heat source	0.041	0.011
heat from CHP	as above	0.011
electricity generated by CHP	0.519	0.136
electricity for pumping in distribution network	0.519	0.136

3.4 BASELINE CO₂ EMISSIONS

For the purpose of this report the baseline energy use and CO₂ emissions are calculated based on the 'Notional Dwelling' requirements specified in the National Calculation Methodology 2021. Please note that the notional/baseline building under 2021 Building Regulation always includes PV, this is produced by the calculation software and cannot be removed for a fair fabric only comparison between the baseline calculation and the Be Lean stage calculation of the Energy Hierarchy.

Table 4 Non-Domestic Baseline Building Fabric

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	-
External Walls	0.26	0.18	-
Roof (Flat)	0.18	0.15	-
Roof (Pitched)	0.18	0.15	-
Windows	1.60	1.40	-
Doors	1.60	1.90	-
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	-

The following table details the notional baseline area weighted CO₂ regulated emissions for the development. The target emission rates (TER's) in the above figures combined with the total floor area was used to produce the baseline CO₂ emissions below.

Table 5 Estimated Baseline Carbon Emissions Part L 2021 Building Regulations

Building Services	Baseline CO ₂ Emissions (kg CO ₂ /m ² /yr)	Baseline CO ₂ Emissions for overall development (kg CO ₂ / yr)
Total regulated emissions (heating, hot water, lighting, fans & pumps)	7.24	20, 257.92

By using low u-values and high-performance materials to reduce greenhouse emissions and improve energy efficiency; the Be Lean stage of this report addresses Policy G2 of the Rochdale Core Strategy and is in accordance with Paragraph 8 of the National Planning Policy Framework (NPPF) by reducing CO₂ emissions and supporting a low carbon economy.

4 ENERGY STRATEGY

4.1 ENERGY EFFICIENT DESIGN

This section outlines the design energy efficient measures taken to minimise the building's energy demand and therefore reduce energy use and CO₂ emissions further than the baseline notional building, often referred to as the 'Fabric First' approach.

The energy efficient measures include:

- a) Inclusion of better U-values than the minimum U-values set in the ADL1/2A
- b) Designing for a buildings air permeability exceeding ADL1/2A target values
- c) Utilising the highly efficient heating and hot water systems
- d) Utilising low energy efficient lighting such as LED lighting
- e) Inclusion of mechanical ventilation with heat recovery

The table below outlines the improvements made to the building fabric elements compared against both the Building Regulations limiting U-values and the 'Notional Dwelling' U-values which the baseline is derived from. Owing to the grade 2 listed status of the building and location within a conservation area, only the limiting fabric elements are the primary focus for compliance however the existing listed aspect of the development is exempt.

Table 6 Building Fabric Specification

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	0.15
External Walls	0.26	0.18	0.18
Roof (Flat)	0.18	0.15	0.15
Windows	1.60	1.40	1.40
Doors	1.60	1.90	1.60
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	3.0

4.1.1 Heating, Cooling, Ventilation and Hot Water Demand

The heating energy demand will be reduced by providing high performance insulation of the building envelope as well as a low Air Permeability Target to minimise heat losses. Low carbon technology in the form of air source heat pumps to HIU's will provide heating to occupant rooms and circulation, cooling will be present in communal areas such as lounges, reception and staff areas. Mechanical ventilation with heat recovery (MVHR) will provide a ventilation solution which will further reduce the heating load by recovering heat that would otherwise be expelled to atmosphere. The heat recovery efficiency of the MVHR unit will be around 80% (final efficiencies may change as the design develops). Hot water will also be provided by ASHP's, low carbon technology is therefore present in all major systems.

4.1.2 Lighting

The proposed light fittings will be low energy efficient fittings, in this instance LED fittings only throughout.

4.1.3 Embodied Carbon

All materials used within the construction of the development will have embodied carbon within them, taking into consideration manufacturing processes and supply chains. It is assumed that the developer will seek to procure materials and construction elements with appropriate sustainable accreditations, for example FSC for timber, ISO:140001 accreditations where applicable etc, to minimise the use of high embodied carbon within the building.

4.2 CO₂ REDUCTIONS AFTER FABRIC FIRST APPROACH

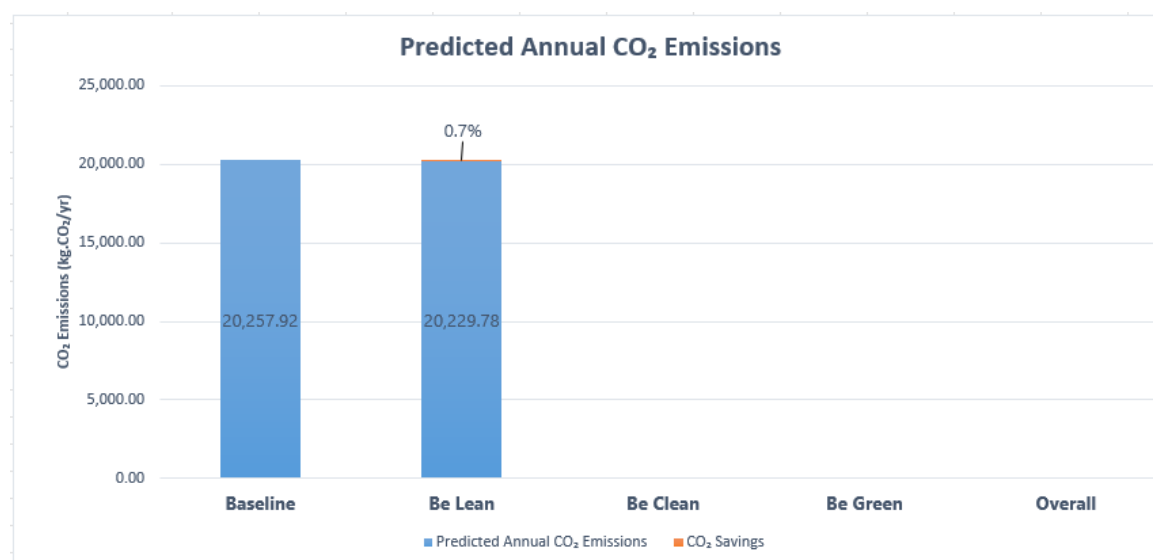
The following table demonstrates the reduction in CO₂ emissions based on an area weighted average calculation utilising a fabric first approach please note, as stated earlier, the SAP 10 baseline calculation now always includes PV, a fair comparison cannot be made against the fabric first result which does not include any PV.

Table 7: Fabric First Results CO₂ Whole Building 2021 Building Regulations

Regulated Emissions	Baseline CO ₂ Emissions	Fabric Building Emissions	First CO ₂	CO ₂ Emission Savings	Part L 2021 % reduction in CO ₂ Emissions
Kg of CO ₂ /m ² /yr	7.24	7.19		0.05	0.7%
kg of CO ₂ /yr	20,257.92	20,229.78		28.14	

Through the proposed fabric efficiency measures a 0.7% reduction has been achieved at the Be Lean Stage of the Energy Hierarchy. It is worth noting that the Be Lean result is watered down due to the presence of PV in the baseline emissions which cannot be removed, the baseline CO₂ would therefore perform worse against the fabric first result in reality.

Figure 6 Be Lean Stage CO₂ Emission Results



4.3 CLEANER ENERGY - CHP & DECENTRALISED ENERGY NETWORKS

The Energy Hierarchy encourages the use of a CHP system and/or the connection to District Heating system to reduce CO₂ emissions further.

4.3.1 CHP

The Energy Hierarchy identifies combined heat and power (CHP) as a method of producing heat and electricity with much lower emissions than separate heat and power. Also, it encourages the creation of district heating systems supplied by CHP.

The implementation of a CHP strategy should be decided according to good practice design. Key factors for the efficient implementation of the CHP system are:

- Development with high heating load for the majority of the year
- CHP operation based on maximum heat load for minimum 10 hours per day
- CHP operation at maximum capacity of 90% of its operating period

A CHP system will not be considered for this development due to the following reasons:

- Due to restrictions on site space would be limited for the level of plant required for a CHP system, which would require accumulators, additional boiler power, pumps, pressurisation units etc.
- Pollution discharged from the CHP unit may not be appropriate given the site locality and the number of people passing the site given its proximity to residential buildings.
- Noise pollution is a consideration given the function of the development and its proximity to other surrounding buildings.
- Economic viability is heavily dependent on the constant demand for heat and power, as well as the price of electricity and gas.
- A predominantly electric systems strategy has been used to take advantage of the updated fuel factors for grid electricity and provide some level of future proofing as grid electricity closes in on carbon neutrality over time.

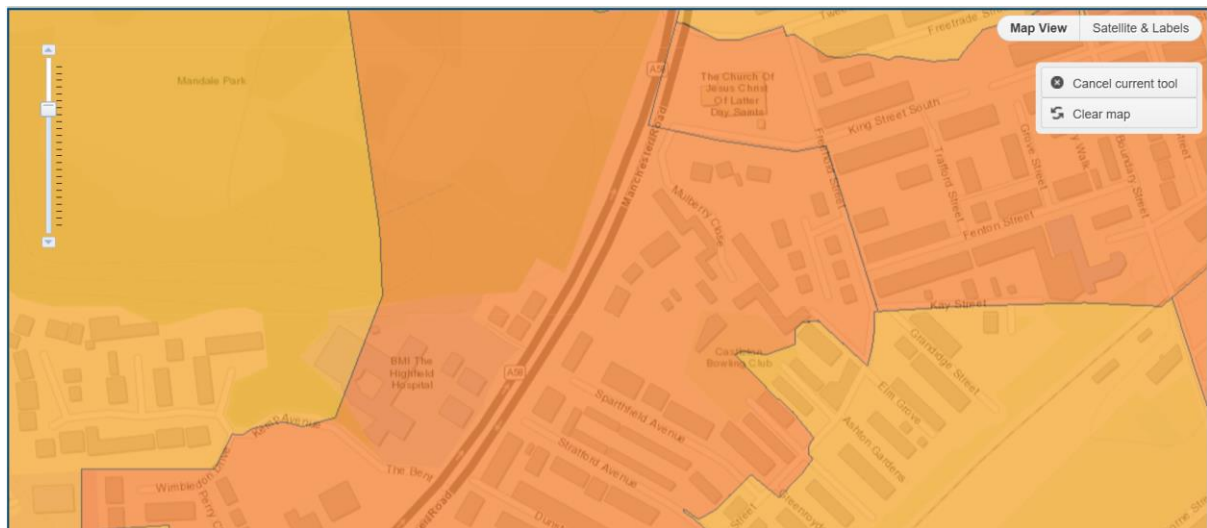
Hence, the implementation of a CHP strategy is not recommended for this development.

As a result, no CO₂ reduction can be achieved as part of the Be Clean section of the Energy Hierarchy.

4.3.2 Decentralised Energy Network

The feasibility of connecting into an existing heating network or providing the building with its own combined heat and power plant has been assessed through the use of UK CHP Development Map, for Rochdale as for a District Heating network.

Figure 7: CHP Development Map – Local Heat Loads



Presently heat loads for area in general are low to medium however is no heat network in close proximity to the site to connect to. Should a District Heating Network evolve into an all-electric system and the infrastructure for such be provided then connection could be considered in the future.

Heat networks are best suited to large developments with appropriate plant space for buffer vessel, plate heat exchangers and manifold positions, meters, furthermore the pipework required for connection to the development makes this option financially unviable.

As such no additional CO₂ reduction can be observed at the Be Clean stage of the Energy Hierarchy.

Figure 8 Be Clean Stage CO₂ Results

4.4 LOW & ZERO CARBON TECHNOLOGIES

4.4.1 General

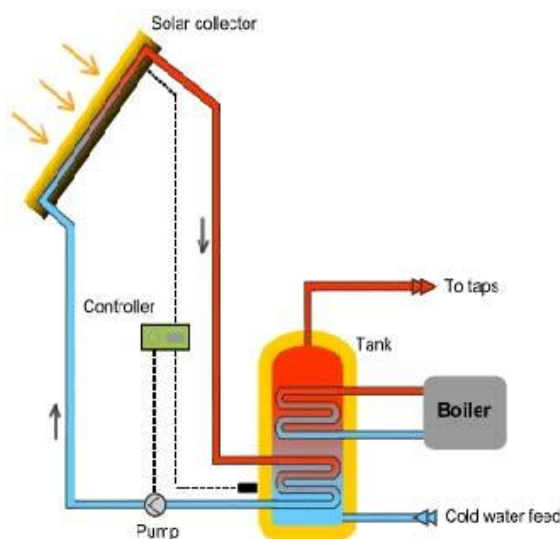
Low and zero carbon (LZC) technologies are systems that generate energy with either zero or reduced CO₂ emissions when compared against traditional energy generation methods.

The alternative LZC technologies have been assessed in relation to the development and their viability assessed. Some of the LZCs are intrinsically unsuitable due to the development type and location whereas others are potentially viable.

4.4.2 Solar Water Heating

Solar thermal panels utilise the sun energy to generate hot water for use within the building. The panels are commonly provided in either flat plate or evacuated tube arrangements. The panels are ideally located facing south at an approximate 30° inclination angle in areas where they are not subjected to shade.

Figure 9: Solar Thermal Diagram



This system alone would not generate a large enough CO₂ reduction in proportion to other comparable technologies. This technology has also been discounted due to the inflated cost of installation with regards additional pipe runs, maintenance requirements and the significant roof area that would be required.

4.4.3 Wind Turbines

Wind turbines generate electrical energy derived from kinetic energy provided by the local wind resource. The performance of wind turbines depends greatly on the wind speed and turbulence that in turn is influenced by the terrain and installation height.

Figure 10: Typical Small Scale 6kW Wind Turbine



The use of wind turbines on the development will also have a significant visual impact on the neighbouring area, as well as low frequency noise source and hence it is likely to meet opposition within the local area.

Space for such a large technology on this development site cannot be considered. For the reasons detailed above wind turbines are not considered viable for the development.

4.4.4 Photovoltaic Cells (PV)

Photovoltaic (PV) panels utilise the sun's energy to generate electricity. The optimum location for PV panels is south facing at an approximate 30-45° inclination angle in areas where they are not subjected to shade.

Figure 11: PV Examples



PV technology is viable for this development and is included in this strategy in the form of a 50m² array which will supply renewable energy to the building. Final size of the array may change as the design develops.

4.4.5 Source Heating and Cooling

The Air Source Heat Pumps can be linked with indoor units to heat and cool the space. These could be either ceiling mounted cassette units, wall mounted units or floor mounted units. This option therefore has good flexibility in terms of installation. The outdoor units can be located anywhere and are not dependant on orientation. They need to be externally mounted and in a local compound to be safe.

ASHP technology has been included within the design to provide heating and hot water throughout, communal areas will also have cooling. ASHP's benefit from a simple installation process and low maintenance, furthermore they are very efficient with respect to energy produced vs energy used, for every 3-4 units of energy produced only 1 unit of energy is used. This technology has been chosen for its excellent carbon performance which best addresses the requirements of Part L and the Rochdale Core Strategy.

4.4.6 Biomass Boiler

Biomass is considered to be a renewable fuel source as the CO₂ absorbed during the growth period is assessed as being approximately equal to the CO₂ emitted during combustion and hence deemed "carbon neutral". Biomass for boilers is typically wood either in chip or pellet form.

Biomass boilers require fuel storage together with associated transportation and delivery to the store location.

Figure 12: Biomass Example



With the minimal plant areas available for a biomass generator combined with the logistics and increase in pollution from wood pellet deliveries/transportation, biomass generators have not been included in this Energy Strategy.

For the above reasons, the use of a biomass boiler plant is not considered viable for the development.

4.4.7 Fuel Cell

The fuel cell technology essentially converts chemical energy into both electrical and heat energy. The cell needs to be continually supplied with hydrogen (derived from either a piped or storage source) and oxygen (derived from air) that are combined and the chemical reaction produce electrical energy, heat energy and water vapour.

The fuel cell requires a hydrogen fuel source that can either be from a piped source (not currently available) or from stored gas. However, the more usual approach currently in the UK is to use natural gas in order to generate the hydrogen required to operate the fuel cell.

Fuel cells have various commercial and technical limitations. There is a high initial capital cost together with there being few established suppliers and a very limited specialist design, installation, and maintenance capabilities.

Certain fuel cell elements require regular replacement imposing a significant on-going cost implication. The fuel cells themselves are generally large, heavy and require fresh air ventilation.

Due to the initial capital cost, space requirements and on-going maintenance costs fuel cells are not considered viable for this development.

4.5 WATER

The development will be designed to reduce mains/potable water and include water efficient devices and equipment. This will comprise of efficient water fixtures (low flow taps and showers, dual flush WCs and low volume baths) to reduce potable water demand to < 16 litres/person/day as per the requirement within Building Regulations.

This will be done using low flow rate sanitaryware and the use of flow restrictors throughout the development.

An example of the flow rates and capacities that could potentially be used are as follows. Please note these are a guide at this stage and actual figures may differ at the time of construction. However, they will fall within the required level:

- WC – Dual Flush – 6/3 Litre Flush capacity
- Wash hand basin taps – 5 L/min
- Kitchen sink taps – 7L/min
- Shower – 7L/min

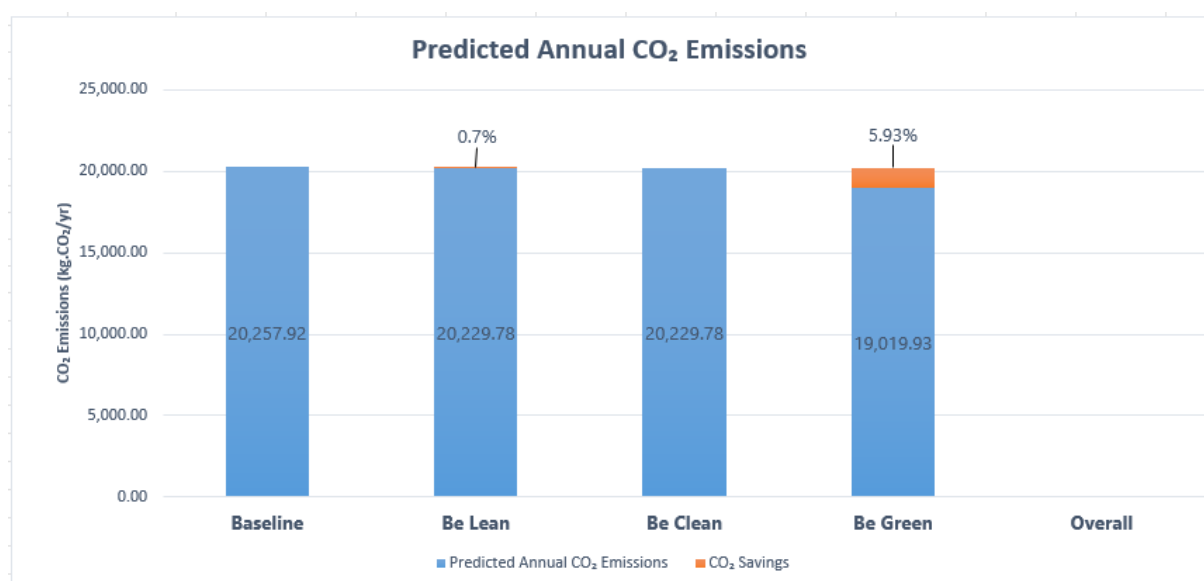
4.6 CHOSEN RENEWABLE SOLUTION

Following the above review of various LZC technology the chosen solution for this strategy is to utilise low carbon technology in the form of Air Source Heat Pumps and Photovoltaic Panels to supplement the fabric efficiency measures detailed earlier in this report.

Incorporating this technology into the design allows the development to meet its heating and cooling demand through a low carbon solution that also minimises the visual impact on the building and surrounding area

As ASHPs form part of the Be Lean stage results as well, the Be Green stage results demonstrate the impact of including the PV renewable technology and is illustrated in the graph below.

Figure 13 Be Green CO₂ Results



5 ENVIRONMENTAL STANDARDS STATEMENT

It is best practice to incorporate Environmental Standards within the design of such a development. Being mindful of the design standard issues often compliment the Energy Strategy and the Sustainability aspects of the design and this planning report.

Some elements described within the environmental standards section fall outside the remit of NOVO Integration Ltd and as such will be incorporated within other parties' appointments. This report will however summarise and reference other third-party reports where applicable to aid with addressing all applicable elements of the Environmental Standards.

The various topics covered within the environmental standards sections are as follows:

- Energy Efficiency
- Renewable Energy
- Environmental Design
- Water Management and Weather Resilience
- Waste Management
- Construction Management
- Waterways

Each element will be summarised how the development will achieve this, and any relevant third-party reports referenced accordingly.

Please note that where assumptions have been made of specific reports being carried out, confirmation of these reports from the developer will be required. Reference only is made within this report.

Any reports referenced within this section does not confirm that these reports are either required or have been or will be carried out and are assumptions of such only.

5.1 ENERGY EFFICIENCY

Section 4 Energy Strategy of this report details specifically how the proposed design of the development including the fabric, mechanical and electrical services will use passive, energy efficient and low carbon technologies throughout with emphasis on a fabric first approach to minimise the CO₂ emissions as far as practical given that the listed status of the building and surrounding conservation area exempts the development from conventional energy efficiency requirements. The focus in this case is to achieve limiting fabric u-value performance levels and ensure the predicted EPC is at C or above to future proof against MEES 2025 standards.

The Energy Strategy describes how the development follows the Energy Hierarchy approach which many local authorities advocate the use of.

5.2 RENEWABLE ENERGY

The Rochdale Core Strategy encourages the use of Low Zero Carbon technologies, this again follows the Hierarchical approach.

This is to encourage opportunities to reduce the energy demand via the use of onsite renewable technologies to improve energy security for occupants of the site and export of surplus energy back to the grid.

Various opportunities and different technologies should be investigated to determine the most viable and appropriate technology for the site in question.

Again section 4 of this report deals with the Energy Hierarchical approach to Energy and the use of renewable technology. Many different technology opportunities have been investigated and discounted where applicable and included where appropriate.

Following these in-depth reviews of varying renewable technologies, Air Source Heat Pump technology have been deemed viable and appropriate for the development.

5.3 ENVIRONMENTAL DESIGN

This element encourages developers to use the Building Research Establishment Assessment Method (BREEAM) to assess environmental performance. The project shall have a BREEAM assessment undertaken to attain the highest possible rating to suit the existing and listed nature of the property.

5.4 WATER MANAGEMENT AND WEATHER RESILIENCE

Thoughtful design to reduce the levels of pollution within the city's watercourses, as well as mitigating the effects of flooding should significant storms present themselves in the future should be considered.

As such a Flood Risk Assessment and Drainage Strategy Report will be produced to demonstrate the methodology as to how the development will manage excessive water in times of storms etc to minimise the risk of flooding to the development and surrounding areas.

It is anticipated that any excessive rainwater will be dealt with through the use of attenuation other methodologies falling line with SUDs techniques to improve flows and quality of the surface water run-off.

Water Usage has been covered earlier within this report under section 4.6 and describes how the development will utilise low flow / volume sanitaryware to reduce the amount of water consumed and comply with the Building Regulations Part G.

5.5 WASTE MANAGEMENT

It is understood that the Construction Waste Management Plan will be prepared to ensure that all aspects of waste production, deliveries, noise, dust pollution etc are all accounted for and reasonably mitigated.

There is potential for the Waste Management Strategy to be reviewed by Building Management during the lifetime of the building for opportunities to improve the procedures and will also review areas where reductions in waste, or an increase in recycling waste can be made. This will form part of a Construction Management Plan which will likely be required by a condition attached to any planning permission.

The design of designated areas for waste and recyclable waste once construction has been completed for the use of the occupants has and will be carefully considered, not only in terms of capacity but allowances made for access for collections.

These areas will have designated areas for recyclable waste which will encourage further responsibility to be taken by the occupiers to separate their own waste accordingly.

5.6 CONSTRUCTION MANAGEMENT

Best practices encourage environmentally friendly construction methods and materials which in effect reduces energy consumption.

This standard also encourages best practices during construction to prevent or limit damage to the environment and to make sure these measures are not being abused during the full construction phase.

It is assumed that the contractor will be responsible for providing a comprehensive construction management plan containing all procedures on site and methodologies for a safe, environmentally conscious, and efficient construction period.

6 CONCLUSIONS

The Energy Strategy for the proposed development 185 Manchester Road Rochdale has adopted a hierarchical approach of using passive and low energy design technologies to reduce the baseline energy demand and hence CO₂ emissions followed by the feasibility of the application of low and zero carbon technologies as appropriate.

This is supported by the SBEM Calculations to provide compliance in England with the Building Regulations Part L Volume 2 2021, the resulting as-designed BRUKL report can be found in Appendix A.

This is achieved by incorporation of the following elements:

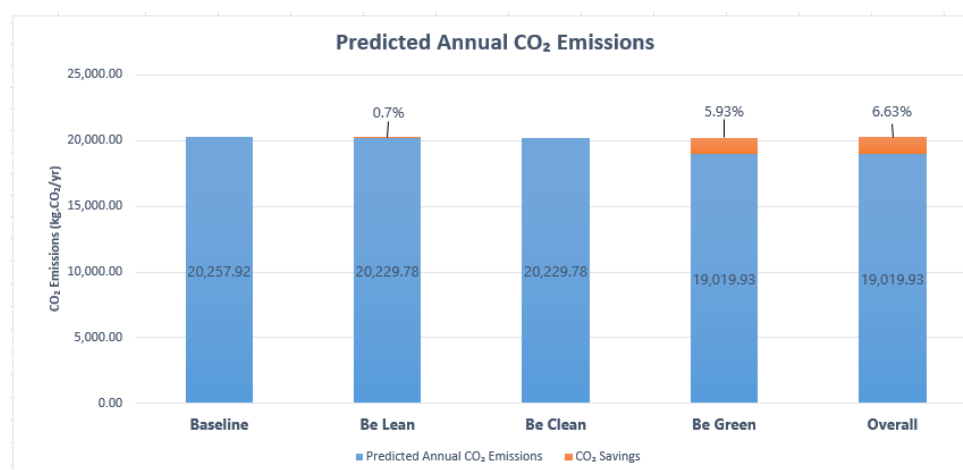
- Improved thermal transmittance U-valued as depicted.
- Mechanical Ventilation with Heat Recovery (circa 85% efficiency)
- Highly efficient low carbon Air Source Heat Pumps
- Low building air leakage rate (3.0 m³/h/m² at a pressure differential of 50 Pa)
- 100% Low energy lighting through the buildings
- Low flow aerated showerheads and basin tap inserts to reduce water consumption.
- Reducing mains/potable water via water efficient devices and equipment
- Low Carbon ASHP technology for heating/cooling and hot water
- MVHR mechanical ventilation with heat recovery
- Photovoltaic panels

The design ethos has followed the principles of the Energy Hierarchy required by the Rochdale Core Strategy as demonstrated by the table below which displays results against each stage.

Table 8: Overall CO₂ Emissions Reduction

Regulated Emissions	Baseline CO ₂ Emissions	BE LEAN Stage CO ₂ Emissions	BE CLEAN Stage CO ₂ Emissions	BE GREEN Stage CO ₂ Emissions	CO ₂ Emission Savings	Part L 2021 % reduction in CO ₂ Emissions
Kg of CO ₂ /m ² /yr	7.24	7.19	7.19	6.76	0.48	6.63%
kg of CO ₂ /yr	20,257.92	20,229.78	20,229.78	19,019.93	1,237.99	

Figure 14 Overall Energy Hierarchy CO₂ Results



The analysis has shown that by incorporating passive and low energy design measures the development can comply with Rochdale Core Strategy Policies G2 and G3. The development reaches a total CO₂ reduction of 6.63%. This has been achieved through the inclusion of low carbon ASHP technology for heating/cooling and hot water therefore providing a low carbon solution for the dominant regulated energy usages throughout. Also supporting this CO₂ reduction is the mechanical ventilation strategy which will include heat recovery to passively heat up fresh air supply in winter months which reduces reliance on the main heating system. The final main contributor to the CO₂ reduction achieved is the inclusion of Photovoltaic panels which will provide renewable energy and is deemed the most suitable to this development following assessment of other technologies.

Through the passive design and mechanical design strategy, the requirements of Part L Building Regulations and Rochdale Policies G2/G3 have been met.

7 APPENDICES

Appendix A – BRUKL Report

Appendix A

BRUKL Report

Project name

P2197 - 185 Manchester Road Rochdale**As designed****Date:** Fri Jun 20 11:05:49 2025

Administrative information

Building Details

Address: 185 Manchester Road, Rochdale,

Certifier details

Name: Cairn Pearson**Telephone number:** 0113 257 7300**Address:** 7 Feast Field, Horsforth, Leeds, LS18 4TJ

Certification tool

Calculation engine: Apache**Calculation engine version:** 7.0.29**Interface to calculation engine:** IES Virtual Environment**Interface to calculation engine version:** 7.0.29**BRUKL compliance module version:** v6.1.e.1**Foundation area [m²]:** 606.39The 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	7.24
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	6.76
Target primary energy rate (TPER), kWh _{PE} /m ² annum	79.12
Building primary energy rate (BPER), kWh _{PE} /m ² annum	73.02
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	0.14	0.16	SP000000:Surf[2]
Floors	0.18	0.12	0.13	SP000000:Surf[0]
Pitched roofs	0.16	0.11	0.11	SP0000E1:Surf[2]
Flat roofs	0.18	0.11	0.11	SP0000AB:Surf[0]
Windows** and roof windows	1.6	1.3	1.3	SP000000:Surf[1]
Rooflights***	2.2	1.4	1.4	TF000003:Surf[2]
Personnel doors^	1.6	-	-	No personnel doors in building
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

NB: 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	3

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	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- Corridor HVAC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.82	-	0.2	-	-
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					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.42	5.44	0	-	0.85
Standard value	2.5*	5	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.					

3- Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

4- ASHP HIU

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.82	-	0.2	-	0.85
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					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

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

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		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
GF - Main Dining	-	-	-	1	-	-	-	-	-	-	N/A
GF - WC	-	-	0.3	-	-	-	-	-	-	-	N/A
GF - Medical Room	-	1	-	-	-	-	-	-	-	-	N/A
GF - Laundry Room	-	1	-	-	-	-	-	-	-	-	N/A
GF - Hairdressers	-	1	-	-	-	-	-	-	-	-	N/A
GF - Prayer Room	-	-	-	1	-	-	-	-	-	-	N/A
GF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Respite Room	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Respite Room	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Respite Room	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Respite Room	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Respite Room	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - WC	-	-	0.3	-	-	-	-	-	-	-	N/A
GF - Security Office	-	1	-	-	-	-	-	-	-	-	N/A
GF - Guest WC	-	-	0.3	-	-	-	-	-	-	-	N/A
GF - Shower/Changing	-	-	0.3	-	-	-	-	-	-	-	N/A
GF - Shower/Changing	-	-	0.3	-	-	-	-	-	-	-	N/A
GF - Staff Room	-	-	-	1	-	-	-	-	-	-	N/A
GF - Reception	-	-	-	1	-	-	-	-	-	-	N/A
FF - Dementia Lounge	-	-	-	1	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Staff Room	-	-	-	1	-	-	-	-	-	-	N/A
FF - Shower/Changing	-	-	0.3	-	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	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
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Assisted Dementia Lounge	-	-	-	1	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Dementia Room	-	-	-	0.9	-	-	-	-	-	-	N/A
FF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	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
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
SF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Ensuite	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Assisted Nursing Bathroom	-	-	0.3	-	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
GF - Visitor Lounge	-	-	-	1	-	-	-	-	-	-	N/A
SF - Nursing Open Lounge	-	-	-	1	-	-	-	-	-	-	N/A
SF - Medical Room	-	1	-	-	-	-	-	-	-	-	N/A
TF - Nursing Open Lounge	-	-	-	1	-	-	-	-	-	-	N/A
TF - Medical Room	-	1	-	-	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	N/A
TF - Nursing Room	-	-	-	0.9	-	-	-	-	-	-	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
GF - Store		91	-	-
GF - Corridor		130	-	-
GF - Main Dining		138	-	-
GF - Plant Room		105	-	-
GF - WC		125	-	-
GF - Sluice		104	-	-
GF - Medical Room		99	-	-
GF - Laundry Room		127	-	-
GF - Hairdressers		107	-	-
GF - Prayer Room		132	-	-
GF - Stairs		100	-	-
GF - Ensuite		129	-	-
GF - Respite Room		103	-	-
GF - Ensuite		124	-	-
GF - Respite Room		105	-	-
GF - Cleaners Cupboard		99	-	-
GF - Corridor		103	-	-
GF - Respite Room		103	-	-
GF - Ensuite		133	-	-
GF - Ensuite		133	-	-
GF - Respite Room		103	-	-
GF - Ensuite		134	-	-
GF - Respite Room		101	-	-
GF - Corridor		97	-	-
GF - Bin Store		126	-	-
GF - Store		105	-	-
GF - WC		141	-	-
GF - Corridor		106	-	-
GF - Stair		101	-	-
GF - Main Kitchen		104	-	-
GF - Stairs		102	-	-
GF - Security Office		128	-	-
GF - Guest WC		118	-	-
GF - Shower/Changing		141	-	-
GF - Shower/Changing		152	-	-
GF - Staff Room		108	-	-
GF - Lift Lobby		102	-	-
GF - Corridor		110	-	-
GF - Reception		108	85	1.588
FF - Store		108	-	-
FF - Corridor		103	-	-
FF - Corridor		99	-	-

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
FF - Corridor		105	-	-
FF - Dementia Lounge		103	-	-
FF - Corridor		104	-	-
FF - Corridor		98	-	-
FF - Stairs		101	-	-
FF - Ensuite		140	-	-
FF - Dementia Room		102	-	-
FF - Ensuite		138	-	-
FF - Dementia Room		103	-	-
FF - Corridor		102	-	-
FF - Dementia Room		102	-	-
FF - Ensuite		121	-	-
FF - Ensuite		123	-	-
FF - Dementia Room		104	-	-
FF - Dementia Room		105	-	-
FF - Ensuite		128	-	-
FF - Staff Room		116	-	-
FF - Shower/Changing		139	-	-
FF - Stairs		100	-	-
FF - Ensuite		125	-	-
FF - Dementia Room		104	-	-
FF - Ensuite		130	-	-
FF - Dementia Room		106	-	-
FF - Corridor		108	-	-
FF - Corridor		110	-	-
FF - Ensuite		123	-	-
FF - Dementia Room		102	-	-
FF - Dementia Room		103	-	-
FF - Ensuite		120	-	-
FF - Ensuite		123	-	-
FF - Dementia Room		100	-	-
FF - Stairs		101	-	-
FF - Dementia Room		103	-	-
FF - Ensuite		124	-	-
FF - Dementia Room		104	-	-
FF - Ensuite		132	-	-
FF - Dementia Room		106	-	-
FF - Ensuite		135	-	-
FF - Dementia Room		106	-	-
FF - Ensuite		134	-	-
FF - Dementia Room		106	-	-
FF - Ensuite		135	-	-
FF - Assisted Dementia Lounge		128	-	-

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
FF - Ensuite		128	-	-
FF - Dementia Room		106	-	-
FF - Ensuite		128	-	-
FF - Ensuite		131	-	-
FF - Dementia Room		106	-	-
FF - Dementia Room		107	-	-
FF - Ensuite		132	-	-
FF - Dementia Room		105	-	-
FF - Stairs		102	-	-
FF - Ensuite		125	-	-
FF - Dementia Room		104	-	-
FF - Dementia Room		119	-	-
FF - Ensuite		127	-	-
SF - Nursing Room		103	-	-
SF - Ensuite		127	-	-
SF - Nursing Room		105	-	-
SF - Ensuite		132	-	-
SF - Ensuite		130	-	-
SF - Ensuite		129	-	-
SF - Nursing Room		104	-	-
SF - Nursing Room		104	-	-
SF - Ensuite		128	-	-
SF - Nursing Room		105	-	-
SF - Ensuite		127	-	-
SF - Nursing Room		104	-	-
SF - Nursing Room		104	-	-
SF - Ensuite		130	-	-
SF - Corridor		105	-	-
SF - Nursing Room		104	-	-
SF - Ensuite		125	-	-
SF - Nursing Room		105	-	-
SF - Ensuite		132	-	-
SF - Stairs		101	-	-
SF - Assisted Nursing Bathroom		116	-	-
SF - Nursing Room		106	-	-
SF - Ensuite		128	-	-
SF - Nursing Room		104	-	-
SF - Ensuite		130	-	-
SF - Corridor		99	-	-
SF - Corridor		104	-	-
SF - Stairs		101	-	-
SF - Ensuite		123	-	-
SF - Ensuite		128	-	-

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
SF - Nursing Room		104	-	-
SF - Ensuite		130	-	-
SF - Nursing Room		105	-	-
SF - Ensuite		126	-	-
SF - Nursing Room		103	-	-
SF - Ensuite		122	-	-
SF - Nursing Room		103	-	-
SF - Ensuite		127	-	-
SF - Nursing Room		104	-	-
SF - Nursing Room		104	-	-
SF - Ensuite		128	-	-
SF - Ensuite		125	-	-
SF - Nursing Room		104	-	-
SF - Corridor		105	-	-
SF - Corridor		99	-	-
SF - Corridor		109	-	-
SF - Ensuite		136	-	-
SF - Ensuite		137	-	-
SF - Nursing Room		103	-	-
SF - Nursing Room		103	-	-
SF - Ensuite		128	-	-
SF - Ensuite		124	-	-
SF - Nursing Room		101	-	-
SF - Nursing Room		101	-	-
SF - Nursing Room		105	-	-
SF - Ensuite		121	-	-
TF - Ensuite		160	-	-
TF - Ensuite		158	-	-
TF - Ensuite		163	-	-
TF - Ensuite		166	-	-
TF - Ensuite		164	-	-
TF - Ensuite		167	-	-
TF - Ensuite		163	-	-
TF - Ensuite		166	-	-
TF - Ensuite		160	-	-
TF - Corridor		107	-	-
TF - Ensuite		159	-	-
TF - Ensuite		155	-	-
TF - Ensuite		148	-	-
TF - Nursing Room		115	-	-
TF - Ensuite		162	-	-
TF - Ensuite		155	-	-
TF - Nursing Room		118	-	-

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
TF - Ensuite		156	-	-
TF - Ensuite		157	-	-
TF - Ensuite		161	-	-
TF - Ensuite		180	-	-
TF - Ensuite		181	-	-
TF - Nursing Room		114	-	-
TF - Ensuite		152	-	-
TF - Nursing Room		113	-	-
TF - Ensuite		147	-	-
SF - Stairs		105	-	-
SF - Stairs		104	-	-
SF - Corridor		106	-	-
SF - Nursing Room		104	-	-
TF - Nursing Room		110	-	-
TF - Ensuite		109	-	-
TF - Stairs		113	-	-
TF - Nursing Room		118	-	-
TF - Corridor		119	-	-
TF - Ensuite		107	-	-
TF - Nursing Room		93	-	-
TF - Corridor		121	-	-
TF - Stairs		112	-	-
TF - Nursing Room		128	-	-
TF - Corridor		115	-	-
TF - Corridor		105	-	-
TF - Nursing Room		116	-	-
TF - Nursing Room		113	-	-
TF - Nursing Room		111	-	-
TF - Assisted Nursing Bathroom		95	-	-
TF - Nursing Room		117	-	-
TF - Stairs		125	-	-
TF - Corridor		115	-	-
TF - Nursing Room		111	-	-
TF - Nursing Room		116	-	-
TF - Nursing Room		115	-	-
TF - Nursing Room		115	-	-
TF - Nursing Room		115	-	-
TF - Nursing Room		113	-	-
TF - Nursing Room		111	-	-
TF - Nursing Room		115	-	-
TF - Nursing Room		121	-	-
TF - Stairs		119	-	-
TF - Nursing Room		114	-	-

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
TF - Corridor		113	-	-
GF - Visitor Cafe		112	-	-
GF - Visitor Lounge		139	-	-
SF - Nursing Open Lounge		108	-	-
SF - Sluice		132	-	-
SF - Medical Room		105	-	-
TF - Nursing Open Lounge		112	-	-
TF - Sluice		174	-	-
TF - Medical Room		122	-	-
TF - Nursing Room		113	-	-
TF - Nursing Room		117	-	-

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?
GF - Main Dining	NO (-27.9%)	NO
GF - Medical Room	NO (-56%)	NO
GF - Hairdressers	NO (-59.8%)	NO
GF - Prayer Room	NO (-40.6%)	NO
GF - Respite Room	NO (-34.2%)	NO
GF - Respite Room	NO (-35%)	NO
GF - Respite Room	NO (-60.2%)	NO
GF - Respite Room	NO (-49.1%)	NO
GF - Respite Room	NO (-78.8%)	NO
GF - Security Office	N/A	N/A
GF - Staff Room	NO (-81.2%)	NO
GF - Reception	YES (+18.6%)	NO
FF - Dementia Lounge	YES (+39.7%)	NO
FF - Dementia Room	NO (-20%)	NO
FF - Dementia Room	NO (-17.1%)	NO
FF - Dementia Room	NO (-77.9%)	NO
FF - Dementia Room	NO (-46.5%)	NO
FF - Dementia Room	NO (-56.2%)	NO
FF - Staff Room	NO (-61.1%)	NO
FF - Dementia Room	NO (-21%)	NO
FF - Dementia Room	NO (-14.9%)	NO
FF - Dementia Room	NO (-45.4%)	NO
FF - Dementia Room	NO (-57.9%)	NO
FF - Dementia Room	NO (-78.5%)	NO
FF - Dementia Room	NO (-4%)	NO
FF - Dementia Room	NO (-39%)	NO
FF - Dementia Room	NO (-14.1%)	NO
FF - Dementia Room	NO (-14.7%)	NO
FF - Dementia Room	NO (-65.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
FF - Assisted Dementia Lounge	N/A	N/A
FF - Dementia Room	NO (-16%)	NO
FF - Dementia Room	NO (-15.6%)	NO
FF - Dementia Room	NO (-65.6%)	NO
FF - Dementia Room	NO (-15.3%)	NO
FF - Dementia Room	NO (-72%)	NO
FF - Dementia Room	NO (-70.9%)	NO
SF - Nursing Room	NO (-22.2%)	NO
SF - Nursing Room	NO (-66.3%)	NO
SF - Nursing Room	NO (-17.6%)	NO
SF - Nursing Room	NO (-19.2%)	NO
SF - Nursing Room	NO (-66.5%)	NO
SF - Nursing Room	NO (-19%)	NO
SF - Nursing Room	NO (-18.6%)	NO
SF - Nursing Room	NO (-43.6%)	NO
SF - Nursing Room	NO (-39%)	NO
SF - Nursing Room	NO (-37.7%)	NO
SF - Nursing Room	NO (-39.1%)	NO
SF - Nursing Room	NO (-21.2%)	NO
SF - Nursing Room	NO (-18.1%)	NO
SF - Nursing Room	NO (-43.9%)	NO
SF - Nursing Room	NO (-58%)	NO
SF - Nursing Room	NO (-14.9%)	NO
SF - Nursing Room	NO (-14.1%)	NO
SF - Nursing Room	YES (+52.7%)	NO
SF - Nursing Room	NO (-18.3%)	NO
SF - Nursing Room	NO (-17.9%)	NO
SF - Nursing Room	NO (-78.1%)	NO
SF - Nursing Room	NO (-47.4%)	NO
SF - Nursing Room	NO (-57.8%)	NO
TF - Nursing Room	NO (-66.6%)	NO
TF - Nursing Room	NO (-18.1%)	NO
TF - Nursing Room	NO (-19.9%)	NO
TF - Nursing Room	NO (-68.2%)	NO
SF - Nursing Room	NO (-77.8%)	NO
TF - Nursing Room	NO (-85.3%)	NO
TF - Nursing Room	NO (-63.8%)	NO
TF - Nursing Room	NO (-85.2%)	NO
TF - Nursing Room	NO (-66.8%)	NO
TF - Nursing Room	YES (+59.3%)	NO
TF - Nursing Room	NO (-17.7%)	NO
TF - Nursing Room	NO (-19%)	NO
TF - Nursing Room	NO (-16.7%)	NO
TF - Nursing Room	NO (-60.7%)	NO
TF - Nursing Room	NO (-5%)	NO
TF - Nursing Room	NO (-4.2%)	NO
TF - Nursing Room	NO (-4.9%)	NO
TF - Nursing Room	NO (-5.5%)	NO
TF - Nursing Room	NO (-8.3%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
TF - Nursing Room	NO (-60.2%)	NO
TF - Nursing Room	YES (+4.7%)	NO
TF - Nursing Room	NO (-53.9%)	NO
TF - Nursing Room	NO (-57.9%)	NO
GF - Visitor Lounge	NO (-2%)	NO
SF - Nursing Open Lounge	NO (-67.3%)	NO
SF - Medical Room	N/A	N/A
TF - Nursing Open Lounge	NO (-71.3%)	NO
TF - Medical Room	N/A	N/A
TF - Nursing Room	NO (-62.3%)	NO
TF - Nursing Room	NO (-57.5%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

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

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m ²]	2813.6	2813.6
External area [m ²]	3666.8	3835.5
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	3
Average conductance [W/K]	999.34	1384.43
Average U-value [W/m ² K]	0.27	0.36
Alpha value* [%]	27.9	10

* 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	5.95	6.99
Cooling	2.42	1.98
Auxiliary	9.47	5.3
Lighting	8.93	12.05
Hot water	25.8	26.86
Equipment*	59.56	59.56
TOTAL **	52.57	53.19

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	3.24	0.39
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>3.24</i>	<i>0.39</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	86.82	99.51
Primary energy [kWh _{PE} /m ²]	73.02	79.12
Total emissions [kg/m ²]	6.76	7.24

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] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	199.6	0	22	0	5.3	2.52	0	2.82	0	
Notional	237.2	0	24.9	0	2.5	2.65	0	----	----	
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	5	226.7	0.4	16.3	12	3.19	3.86	3.42	5.44	
Notional	1.2	222.2	0.1	13.3	4.4	2.78	4.63	----	----	
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
Actual	24.6	0	2.7	0	12.5	2.52	0	2.82	0	
Notional	38.6	0	4	0	5.2	2.65	0	----	----	
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
Actual	8.6	0	3	0	12.3	0.8	0	1	0	
Notional	4.7	0	0.9	0	16.3	1.41	0	----	----	
[ST] No Heating or Cooling										
Actual	0	0	0	0	0	0	0	0	0	
Notional	0	0	0	0	0	0	0	----	----	

Key to terms

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