



ELEMENT
SUSTAINABILITY

THE FORMER DUCIE ARMS, MANCHESTER

ENVIRONMENTAL STANDARDS AND ENERGY STATEMENT

OCTOBER 2021

REF: 2021.005



ELEMENT SUSTAINABILITY – ISSUE NOTES

Project No: 2021.005

Title: Environmental Standards and Energy Statement

Site: The Former Ducie Arms, Manchester

Client: Dr. Noman Ehsan

Status: Final

Version:	1.0		
Date:	4 th October 2021		
Prepared by:	Checked by:	Approved by:	
			
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Version	Version Details	Date Issued	Issued
0.0	Draft for client comment	2 nd September 2021	KH
1.0	Final version issued – no comments from client	4 th October 2021	KH



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Appendix A – SAP: Block Compliance Report

Appendix B – SBEM: BRUKL Report



1. INTRODUCTION

Element Sustainability have been commissioned by Dr. Noman Ehsan to review the sustainability performance of the proposed mixed-use development at The Former Ducie Arms public house (hereafter referred to as The Ducie Arms) in Manchester.

The purpose of this Statement is to summarise the relevant policy background and requirements of Manchester City Council (hereafter referred to as the council) and demonstrate the ways in which the design team have sought to address these aims through the scheme proposals, ensuring measures have been taken in order to provide a sustainable development at this site.

This statement reviews the sustainable design features and appraises the energy strategy of the proposed extension at the site. Details of the design attributes, specifications and characteristics of the scheme are appraised in order to demonstrate how the proposals contribute to sustainable development in Manchester and seek to mitigate the environmental impacts of the scheme.



2. DEVELOPMENT PROPOSALS

2.1 Development Site Description

The application site is located at the site of the former Ducie Arms public house at 424 Stockport Road, Longsight, Manchester. The previously developed site is currently vacant and sits adjacent to the A6 (Stockport Road), approximately 1.6 miles to the southeast of Manchester city centre. The triangular plot of land is bound by Stockport Road to the northeast, Hayley street to the west and Plymouth Grove to the south (see Figure 2.1).

The wider area is characterised largely by residential houses and apartment blocks as well as some community, health and educational uses nearby including the New Bank Health Centre. The proposed development site is not located within a conservation area.

Figure 2.1 – Pre-development Site



2.2 Development Proposals

The proposals seek to deliver a mixed-use, three-storey development creating a purpose-built medical centre with residential accommodation on the upper floors. The development proposals include for associated car parking with 14No. of parking bays served with electric car charging ports and resident amenity space. The proposed scheme provides separate bin and cycle storage for the medical centre and for residential use as well as a lift and plant room. The area schedule is presented in Table 2.1.



Table 2.1 – Accommodation Schedule

Apartment Type	No. Units	Area (m ²)
1B/1P	2	42
1B/2P	2	58
2B/3P (Duplex)	1	68
2B/3P	2	64
2B/4P	1	73
Total	8	469
Medical Centre		Area (m ²)
Ground Floor	1	175
First Floor		54
Total		229

The proposed site plan and elevations are displayed in Figures 2.2 to 2.7 below.

Figure 2.2 – Proposed Ground Floor Layout



Figure 2.3 – Proposed First Floor Layout*Figure 2.4 – Proposed Second Floor Layout*

Figure 2.5 – Proposed Roof Layout*Figure 2.6 – Proposed Elevation**Figure 2.7 – Proposed Elevation*

3. POLICY REVIEW

3.1 Local Planning Policy

3.1.1 Manchester Core Strategy

Manchester's Core Strategy (CS) was adopted on 11th July 2012 and is the key Development Plan Document in the Local Development Framework (LDF).

CS Policy DM 1 - Development Management requires all development to have regard to a number of development principles. Subject to scheme viability, developers will be required to demonstrate that new non-domestic development to achieve a BREEAM Rating of 'Very Good' or for domestic development to achieve the Code for Sustainable Homes standard¹.

CS Policy EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development requires all development to follow the principle of the Energy Hierarchy, being designed:

- To reduce the need for energy through design features that provide passive heating, natural lighting and cooling;
- To reduce the need for energy through energy efficient features such as improved insulation and glazing; and,
- To meet residual energy requirements through the use of low or zero carbon energy generating technologies.

Further details of the building regulation requirements are provided in the section below.

CS Policy EN 5 - Strategic Areas for low and zero carbon decentralised energy infrastructure include:

- The Regional Centre, which also includes the Oxford Road Corridor and Eastlands;
- District Centres and associated major development sites;
- Airport Strategic Site;
- Strategic housing location; and,
- Strategic employment locations.

Within these areas new development, regeneration and retrofit projects, will be expected to take place in the context of more detailed proposals for decentralised low and zero carbon energy infrastructure in the form of energy proposals plans.

CS Policy EN 6 - Target Framework For CO₂ Reductions From Low or Zero Carbon Energy Supplies requires applications for residential development of ten or more units and all other development over 1,000m² to meet, as a minimum, the targets shown in the tables below, unless unviable.

¹ On the 25th March 2015 the Government issued a Written Ministerial Statement setting out the conclusion of the Housing Standards Review. The statement set out a new policy on the application of technical housing standards that applied immediately to all local planning authorities and qualifying bodies. This had a direct effect on the application of existing Code policies, and the setting of new Code policies. The Government elected to remove the Code for Sustainable Homes and incorporate new additional optional Building Regulations on water and access, and a new national space standard.



Developments smaller than the above threshold but involving the erection of a building or substantial improvement to an existing building will also be expected to meet the minimum target, where viable.

Table 3.1 – Policy EN6 CO₂ Emissions Reduction Targets; Domestic

Target	% Minimum Requirements
Target One: Network development area	CHP/District heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target Two: Electricity intense buildings	+15% increase on Part L 2010
Target Three: Micro generation area	+15% increase on Part L 2010

Table 3.2 – Policy EN6 CO₂ Emissions Reduction Targets; Non-Domestic

Target	% Minimum Requirements
Target One: Network development area	CHP/District heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target Two: Electricity intense buildings	+10% increase on Part L 2010
Target Three: Micro generation area	+15% increase on Part L 2010

The proposed development site is deemed to be **located within Target 3: Micro generation area** and must comply with Part L1A (2013).

The emission reductions targeted within policy EN6 relate to Building Regulation Part L 2010. As a consequence of the reduction in emission rates required by current building regulations (Part L 2013) relative to Part L 2010, the revised equivalent target CO₂ emission reductions for the residential scheme is presented below:

- Residential - 9% dwelling emission rate reduction over Part L 2013; and,
- Non-domestic - 6% building emission rate reduction over Part L 2013.

Further details of the building regulation requirements are provided in the section below.

CS Policy EN 8 – Adaption to Climate Change requires all new development to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:

- Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rainwater permeability;
- Reduction in urban heat island effect through the use of Green Infrastructure such as green roofs, green walls, increased tree cover and waterways;
- The need to control overheating of buildings through passive design; and,
- The opportunity to provide linked and diverse green space to enhance natural habitats which will assist species adaptation.

CS Policy T 1 – Sustainable Transport aims to deliver a sustainable, high quality, integrated transport system to encourage modal shift away from car travel to public transport, cycling and walking, to support the needs of



residents and businesses and to prepare for carbon free modes of transport, the Council will support proposals that:

- Improve choice by developing alternatives to the car;
- Promote regeneration and economic vitality by relieving traffic congestion and improving access to jobs and services, particularly for those most in need and for those without a car;
- Improve access to transport services and facilities in order to enable disabled people and people with mobility impairments to participate fully in public life;
- Improve pedestrian routes and the pedestrian environment;
- Improve and develop further Manchester's cycle network (for example the Manchester Cycleway and the Trans Pennine Trail); and,
- Facilitate modes of transport that reduce carbon emissions e.g by incorporating charging points for electric vehicles, subject to their appropriate design and location.

3.1.2 Guide to Development in Manchester, Supplementary Planning Document

The Core Strategy requires that all new residential developments should accord with the design guidance set out in the Supplementary Planning Documents (SPD). The Guide to Development in Manchester SPD was adopted on 11th April 2007 and supports and enhances the ongoing shaping of the City by providing a set of reasoned principles which will guide developers, designers and residents. These principles include a number of environmental standards, and includes the following categories which are identified in the SPD:

- | | |
|--|----------------------------|
| • Energy efficiency; | • Waste management; |
| • Renewable energy; | • Construction management; |
| • Environmental design; | • Biodiversity; and, |
| • Water management and weather resilience; | • Waterways. |

3.1.3 Manchester Residential Quality Guidance

This document provides guidance for building new build dwellings in Manchester. The residential quality guidance demands design excellence in all new housing built in the city, sets minimum space standards, and ensures high environmental standards. The guidance includes nine components:

Make it Manchester – developers must understand the city's unique character, heritage old and new, density and scale in various parts of the city and appreciate how new homes will fit in to what's already there.

Make it bring people together – new homes must encourage a sense of community and neighbourliness, offering a mix of tenures to promote a mix of people.

Make it animate streets and spaces – understand the relationship between new homes and its environment and create public space.

Make it easy to get around – make sure developments have good transport links, along with good walking and cycling provision.

Make it work with the landscape – development should improve the connection with the local environment with improved biodiversity, as well as greening and water schemes.



Make it practical – dealing with waste, car parking, bike storage and visitors should be made as easy as possible.

Make it future proof – design must anticipate the impacts of climate change and extreme weather with efficient design and adaptability.

Make it a home – sufficient space, natural light, privacy and storage are essential for people to settle down and flourish.

Make it happen – ensuring proposals are delivered to a high quality, with high design standards and high sustainability.

3.1.4 Manchester's Great Outdoors

A **Green and Blue Infrastructure Strategy for Manchester** aims to invest in the city's Green and Blue infrastructure over the next 10 years (by 2025). Four objectives have been established to enable the vision to be achieved:

1. Improve the quality and function of existing green and blue Infrastructure, to maximise the benefits it delivers.
2. Use appropriate green and blue infrastructure as a key component of new developments to help create successful neighbourhoods and support the city's growth.
3. Improve connectivity and accessibility to green and blue infrastructure within the city and beyond.
4. Improve and promote a wider understanding and awareness of the benefits that green and blue infrastructure provides to residents, the economy and the local environment.

3.1.5 Climate Emergency

A **Climate Emergency** was declared by Manchester City Council on the 10th July 2019 in response to the findings of the Intergovernmental Panel on Climate Change (IPCC) report. The City Council believe that there is serious risk to Manchester's people of climate change affecting economic, social and environmental well-being, supply chains – including food security, financial systems and local weather, among many others. Therefore, the target for becoming a zero-carbon city has been accelerated by 12 years, setting 2038 as the new target for the city.

Manchester Climate change Framework 2020 – 25 is Manchester's high-level strategy for meeting their commitment on climate change that builds on the **Draft Manchester Zero Carbon Framework 2020-38**, which was published in February 2019, and Manchester City Council's declaration of a climate emergency in July 2019. This was endorsed by MCC at the Executive meeting in March 2020 and will develop over the next five years, in line with changes in policy, climate science, rate of progress and other factors. The framework contains the following relevant objectives:

Objective 2 – Climate adaptation and resilience will require the adaption of the city's buildings, infrastructure and natural environment to the changing climate and increasing the climate resilience of our residents and organisations. This includes:

- Increase the amount of urban green infrastructure cover, aiming for a 10% increase by 2038 from 2018 levels, in line with the Greater Manchester aim.



Objective 3 – Health and wellbeing aims to improve the health and wellbeing of everyone in Manchester through actions that also contribute to objectives for CO₂ reduction and adaption and resilience:

- Adapt the city's built and natural environment and prepare residents to become more resilient to these changes. Increasing the amount and quality of green space to enable residents to benefit from the improved physical and mental health that will come as a result.
- Improving the energy efficiency of the city's homes and providing access to affordable, secure supplies of renewable energy, which are essential to help get 38,000 Manchester households out of fuel poverty.

Objective 4 – Inclusive, zero carbon and climate resilient economy looks to ensure that Manchester establishes an inclusive, zero carbon and climate resilient economy where everyone can benefit from playing an active role in decarbonising and adapting the city to the changing climate.

Priority Areas

Six priority areas have been established in order to help meet the above objectives and include:

1. Buildings (existing and new)
2. Renewable energy
3. Transport and flying
4. Food
5. The things we buy and throw away
6. Green infrastructure and nature-based solutions

Urgent Climate Change Framework Actions Identified to Help Meet the Commitments:

- New Buildings – To ensure that new developments in the city don't eat into the limited carbon budgets and add to the already significant retrofit challenge developments need to be built and operated to zero carbon standards as soon as possible.
 - The ideal way to do this is through UK Government *establishing a national zero carbon definition* and methodology for its implementation, and for Manchester City Council to implement this standard as quickly as possible through the local planning system.
 - This should include applying zero carbon standards to all developments where the Council has additional influence, with a view to all new development needing *to be zero carbon from 2023 at the latest*.
- Renewable Energy – The National Grid has been decarbonising in recent years; we need this to continue but at an accelerated rate, with a view to being fully decarbonised as soon as possible.
 - At least 50% of all homes should have the equivalent of 16m² of solar PV panels by 2024.
- Gas – The following actions are needed to help reduce the reliance on natural gas:
 - Improve the energy efficiency of our buildings as far as possible to reduce our demand for gas.



- Replace our natural gas-based heating systems with renewable energy-based heating technologies as soon as possible.
- Work with Government to ensure that moving to electricity-based heating systems is affordable and doesn't push even more people into fuel poverty.

3.2 Emerging Policies

The previous **Draft Greater Manchester Spatial Framework 2020** is currently on hold following Stockport Council's decision to withdraw from the GMSF in December 2020. The **Draft 'Places for Everyone' Plan** is a new long-term plan of nine Greater Manchester districts (Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan) for jobs, new homes, and sustainable growth. It has been prepared by the GMCA on behalf of the nine districts.

The Draft Plan will determine the kind of development that takes place across the city-region, maximising the use of brownfield land and urban spaces while protecting green belt land from the risk of unplanned development.

It will also ensure all new developments are sustainably integrated into Greater Manchester's transport network or supported by new infrastructure.

A final period of public consultation is taking place with regards to the Draft 'Places for Everyone' Plan between 9 August 2021 and 3 October 2021. Following this there is an intention to submit the Plan to the Secretary of State. It is therefore considered that the Plan is in an advanced stage of preparation and will hold some weight in the determination of planning applications within Greater Manchester.

3.3 National Planning Policy

In addition to the local planning policies, the **National Planning Policy Framework (NPPF) 2021** is a material consideration. The NPPF (amended July 2021) replaces all previous PPSs and PPGs.

The NPPF states that the planning system should play an active role in guiding development to sustainable solutions. There are three dimensions to sustainable development, as stated within the NPPF: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:

An economic role – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;

A social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high-quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and

An environmental role – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

These roles should not be undertaken in isolation, because they are mutually dependent. Economic growth can secure higher social and environmental standards, and well-designed buildings and places can improve the lives



of people and communities. Therefore, to achieve sustainable development, economic, social and environmental gains should be sought jointly and simultaneously through the planning system.

Pursuing sustainable development requires careful attention to viability and costs in plan-making and decision-taking. To ensure viability, the costs of any requirements likely to be applied to development, such as requirements for affordable housing, standards, infrastructure contributions or other requirements should, when taking account of the normal cost of development and mitigation, enable the development to be deliverable.

At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development** - for decision-taking this means approving development proposals that accord with the development plan without delay.

3.4 Regulatory Framework

3.4.1 Building Regulations

Building Regulations, Part L - Conservation of Fuel and Power sets the compliance standards for energy demand and carbon dioxide emissions from buildings:

Approved Document L1A addresses the conservation of fuel and power in new dwellings. The proposed development is registered against Building Regulations, Part L (2013) which requires all newly constructed dwellings need to comply with 5 criteria set out in Approved Document L1A unless exempted through the transitional provisions:

- I. The predicted rate of carbon dioxide emissions from the dwelling (the Dwellings Emission Rate DER) is not greater than the Target Emissions Rate (TER). Additionally, the Dwelling Fabric Energy Efficiency (DFEE) is not greater than the Target Fabric Energy Efficiency (TFEE);
- II. The performance of the building fabric and fixed building services should be no worse than the design limits set out in Table 2 of the Approved Document;
- III. The dwelling has appropriate passive control measures to limit the effect of solar gains on indoor temperatures in summer;
- IV. The performance of the dwelling as built is consistent with the DER, including site checking that the air permeability is within reasonable limits; and
- V. The necessary provisions for energy efficient operation of the dwelling are put in place including operating and maintenance instructions aimed at achieving economy in the use of fuel and power in a way that householders can understand.

Approved Document L2A addresses the conservation of fuel and power in new non-domestic buildings, which the proposed medical centre is understood to be. The proposed development will be registered against Building Regulations, Part L (2013) which requires all newly constructed buildings to comply with the 5 criteria set out in Approved Document L2A:

- I. Achievement of an acceptable Building CO₂ Emission Rate. i.e. the BER is less than the TER (target emission rate for a notional building);
- II. Limits on design flexibility - including U-values, air permeability, air handling plant efficiency, duct leakage, insulation, lighting system efficiency;



- III. Limiting solar gains in summer;
- IV. Construction quality and commissioning - The BER must be recalculated as constructed; and,
- V. Provision of information - Information must be provided to the building operator.

Approved Document L1A (2021) standards will come into effect in June 2022. It is understood that all energy efficiency targets stipulated under local planning policy will still apply to the proposed development under the prevailing Building Regulations (subject to transitional arrangements). Key dates in the implementation of upcoming Building Regulations are as follows:

- December 2021 – Interim uplift Part L, F and Overheating Regulations are published
- June 2022 – Interim uplift Part L, F and Overheating Regulations come into legislation
- Spring 2023 – Consultation on Future Homes Standard
- 2024 – Future Buildings Standard published
- 2025 – Future Buildings Standard comes into force

3.5 Applicable Targets

Based upon a review of relevant planning policy requirements, legislative drivers, and client priorities, the following list provides a brief precis of the key criteria that should be targeted for this development:

- **CS Policy EN 4** – Following the principles of the Energy Hierarchy to reducing CO₂ Emissions;
- **CS Policy EN 5** - Strategic Areas for low and zero carbon decentralised energy infrastructure;
- **CS Policy EN 6** - Target Framework For CO₂ Reductions From Low or Zero Carbon Energy Supplies;
 - Residential - 9% dwelling emission rate reduction over Part L 2013;
 - Non-domestic - 6% dwelling emission rate reduction over Part L 2013;
- **CS Policy EN 8** – Adaption to Climate Change;
- **CS Policy T 1** – Sustainable Transport; and
- **Approved Document L1A and L2A** will guide the compliance standards for energy demand and carbon dioxide emissions from this building.



4. ENVIRONMENTAL PERFORMANCE

This section provides an appraisal of the development proposals and details the specific approach, design features and specifications which will contribute to reducing the environmental impact of the proposed extension. This section outlines those commitments that have been made by the client to ensure this development contributes to sustainable development, meets the council's current policies, and examines the following categories identified in the Guide to Development in Manchester, Supplementary Planning Document (SPD):

- Energy efficiency;
- Renewable energy;
- Environmental design;
- Water management and weather resilience;
- Waste management;
- Construction management;
- Biodiversity; and,
- Waterways.

The key specifications, site characteristics and design measures of the proposed development are considered below. They will mitigate the environmental impact of the scheme throughout both the construction stage and the future occupation of the development.

4.1 Energy

In order to limit energy demand and carbon dioxide (CO₂) emissions from the operation of the new development the following design features will be integrated within the scheme. These will enable the occupants to lead a low-impact lifestyle:

4.1.1 Energy Efficiency Strategy

- The proposed approach to emissions reduction at this site will be through a fabric led energy strategy and efficient servicing in accordance with the principles of the Energy Hierarchy;
- The proposed heating strategy for the building will be provided by a high efficiency, full electric system to meet the limited space heating energy loads generated by the apartments and non-domestic zones;
- The proposed energy strategy will provide improvements in the energy performance of the building above national building regulations Part L1A (2013) and Part L2A (2013) criteria in relation to heating energy demand, primary energy consumption and carbon dioxide and will incorporate the following measures:
 - Enhanced building fabric specification; and,
 - Renewable energy technology including photovoltaics panels and heat pumps.

Further details of the proposed approach to reducing the energy demand and associated carbon dioxide emissions of the medical centre and residential units are presented in the Sections 5 (Energy Strategy) and Section 6 (Climate Emergency).



4.1.2 General Principles

- White goods are graded on a scale from G (the least efficient) up to A++ (the most efficient) under the EU energy efficiency labelling scheme. There will be the provision of A and A+ rated white goods (where applicable);
- Provision of EU energy efficiency labelling scheme details to assist in the purchasing of energy efficient white goods;
- 100% low energy and/or LED internal lighting;
- All external space lighting to be provided by dedicated energy efficient fittings and controls; and,
- To encourage the use of sustainable modes of transport:
 - On-site, secure cycle storage will be provided separately for both the residents (1 space per apartment) and the medical centre to encourage the use of sustainable modes of transport; and,
 - There will also be capacity for three out of the fourteen parking bays to feature active, electric vehicle (EV) fast charging points.

4.2 Water

The new dwellings will be designed to reduce mains/potable water consumption and will include water efficient devices and equipment.

- A water efficiency strategy will be determined for the development. This will include 'A' rated appliances (where provided);
- Specification of efficient water fixtures throughout the scheme (low flow taps and showers, dual flush WCs and low volume baths);
- In order to reduce the demand, the sanitary fixtures will be specified to achieve a calculated daily consumption of <110litres/person/day; and,
- It is anticipated that the landscaped areas of the development will be irrigated by precipitation and with water from individual water butts to further reduce potable water consumption and promote the recycling of rainwater.

4.3 Resource Management and Pollution

4.3.1 Efficient Use of Land

- The proposals include for the redevelopment of a previously developed site as promoted by national and local planning policy; and,
- The re-use of land in a highly accessible, urban location will provide much-needed homes and a purpose-built medical centre which will help to support a growing, sustainable community.



4.3.2 Pollution Control

To reduce emissions of gases with high global warming potential (GWP) and nitrogen oxide (NOx) into the atmosphere, the new building will be specified with:

- Insulating materials that have a GWP of less than 5 throughout the development to reduce the construction phase impact of this scheme upon climate change.

Additionally, the following measures will be implemented:

- Pollution Prevention Guidance will be adhered to in respects of air (dust) and water (ground and surface) pollution during the demolition and construction phase;
- External light fittings will be controlled through a time switch, or daylight sensor, to prevent operation during daylight hours to limit the impact of artificial lighting for the development's residents and surrounding environment;
- Where necessary, temporary drainage and pollution prevention measures will be in place on site, this may include, for example, bunded areas and spill kits to prevent harmful chemicals/materials from draining to natural watercourses; and silt traps to ensure that suspended solids are removed from the drainage water;
- Dust suppression measures will also be put in place as part of the contractor's Environmental Management Plan, such that any potential risks to watercourses or the neighbouring properties are minimised; and,
- Sound insulation will be specified to achieve Building Regulation Part E compliance standard (this will be verified by pre-completion testing) in addition to meeting the requirements of the council.

4.3.3 Materials

This development will contribute towards making more efficient use of non-renewable material resources and to reducing the lifecycle impact of materials used in construction. This is demonstrated by the selection of:

- Materials with low environmental impact throughout their lifecycle will be selected;
- Materials responsibly sourced from suppliers operating an Environmental Management System or procuring timber verified by either the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification standard (PEFC); will be prioritised;
- There is no dominant architectural style within the vicinity of the application site, therefore, the construction materials will be locally sourced where feasible. Proposed cladding materials have been chosen to enhance the aesthetics of the local area and provide the development with a modern/contemporary touch; and,
- Robust materials will be utilised for hard landscaping including grasscrete in the parking areas to soften the appearance of the development and minimising the frequency of replacement.

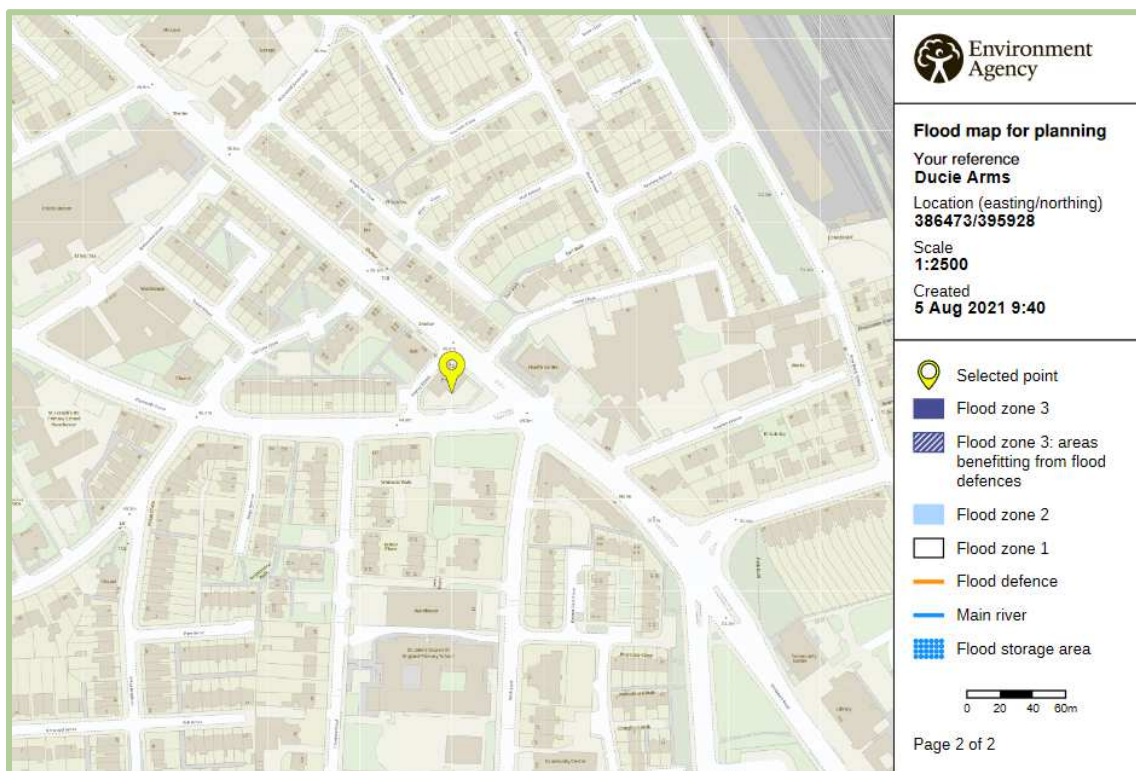


4.4 Surface Water Run-off

4.4.1 Flood Risk

The proposed site is located within Flood Risk Zone 1 and therefore, has a low probability of flooding. Data provided on the Environment Agency website confirms the Flood Risk Zone classification for the site (see Figure 4.1).

Figure 4.1 – Flood Risk Map



4.4.2 On Site Surface Water Management

To minimise the risk and impact of localised flooding on and off-site, watercourse pollution and other environmental damage, a site-specific Drainage Strategy Report has been prepared by Ridge Limited which confirms the following:

- The proposed development will be designed in order to reduce the post development surface water run-off to at least 50% of the existing surface-water brownfield runoff rates. The surface water runoff will be restricted to 5.5l/s;
- The drainage strategy will incorporate Sustainable Drainage Systems (SuDS), where appropriate, throughout the site to include features such as permeable surfacing and geocellular storage. Furthermore, to reduce the impermeable footprint of the developed site, soft landscape verges will be included within the car park; and,
- The drainage strategy will be designed to withstand a 1 in a 100-year storm event plus a 40% allowance for climate change.



4.5 Waste Management

4.5.1 Construction Waste

Best practice techniques to prevent and minimise waste arising during the design and construction phases of the development will be adopted, as follows:

- A target of >85% of waste to be diverted away from landfill will be established for the construction phase of the development; and,
- This scheme will promote the minimisation of waste on site and seek to maximise the use of recycled materials in construction.

4.5.2 Domestic Waste

The development will provide infrastructure and facilities that meet the need of the residents for segregated waste storage, thereby optimising the ability to recycle waste:

- A waste management strategy will be developed, ensuring that adequately sized bin storage areas for the dwelling will be designed into the development at an early stage of the design; and,
- Private bin storage provisions will enable residents to make full use of Local Authority recycling services. The strategy will allow for storage of general waste, recyclable materials and food waste in order to optimise the recycling rates achieved by Manchester City Council.

4.6 Health and Wellbeing

To enable the occupants of the proposed development to lead lower impact lifestyles and enhance their quality of life, the following measures will be delivered:

- Good levels of natural daylighting will be achieved within the dwelling. This will reduce the need for energy to artificially light the dwelling;
- All dwellings will comply with National Space Standards, to ensure that all dwellings are of a sufficient size, provide flexibility and comfort for the future occupants; and,
- The security needs of the development will be considered, and the site will adopt crime prevention measures to assist in reducing the opportunity for, and fear of crime.

4.7 Management

In order to minimise the impact of the development during construction and operation whilst providing a safe place to live, the proposals include for the following provision:

- Construction site impacts will be minimised and measures implemented to protect water courses, as well as to prevent impacts upon the local area in terms of dust and noise pollution during construction works.



4.8 Biodiversity and Land Use

Land Use -

The proposal includes the redevelopment of a previously developed site and represents a very efficient use of land. Furthermore, apartments are an inherently efficient form of construction, and the proposed development makes effective use of land in meeting the urgent need for homes.

Biodiversity -

The existing, mostly hardstanding development site is of low ecological value and the proposals will incorporate ecology enhancing features and measures within the development footprint.

A Tree Survey was conducted by Murray Tree Consultancy and concludes that the trees of the site were not found to be of major significance and due to the site constraints, it is considered more appropriate to remove and replace them within a new landscape scheme. The survey also confirms that the proposed plans within the application clearly show the potential for replacement planting that will enhance the development. Measures will include, but are not limited to:

- Grasscrete car parking areas;
- Vertical ivy planting;
- New tree planting; and,
- Soft landscape planting including shrubs and trees of local progeny.

An Assessment in Relation to Bats and Breeding Birds was carried out by Tyrer Ecological Consultants Ltd and recommends the implementation of reasonable actions for the protection of fauna such as roosting bats, nesting birds and commuting/foraging bats associated with the site. Furthermore, the redevelopment at the site will provide an opportunity to secure ecological enhancement for wildlife to provide a net gain in biodiversity. The statement recommends:

- Native species use on the green walls;
- A green/brown roof that provides a foraging and potential nest area for protected Black Redstart, priority Grey Wagtail and other threatened urban associated species; and,
- Integrated bat box.

4.9 Transport

The proposed development is located within 2.8 kilometres of Manchester city centre, which is one of the most sustainable locations in the northwest, particularly in relation to key pedestrian, rail and bus transport routes.

The site is well located in terms of non-car modes of transport with basic facilities all within easy walking distance of the site.

Transport Links -

- The site benefits from good sustainable access opportunities and is well connected by existing walking and cycling routes to key trip attractors. Buses can also be used to easily access the site:



- Bus – The nearest bus stops are located approximately 80m away from the site along Stockport Road. These bus stop provides regular services (approximately every 4 minutes) into Manchester City Centre, Stockport, Hazel Grove and Stepping Hill.
- Rail – The nearest train station is Ardwick and is located approximately 1.9km away from the site. This station provides services into Manchester Piccadilly and Rose Hill Marple. Belle Vue station is also within walking distance of the proposed development (just 24 minutes) and provides services to destinations such as Sheffield and New Mills Central.
- Cycle - The area is accessible by bike with particularly strong links to employment opportunities in the city centre areas such as Salford and Manchester which can be accessed easily via bus or bicycle. Cycle storage will also be provided in a secure, accessible location.
- Pedestrians – The site is in a sustainable location with basic facilities that can be accessed from the development via foot or public transport.
- The proposals include for 100% residential car parking provision car parking spaces including three, fast-charge, floor mounted electric vehicle charging units to facilitate the increasing, widespread transition to electric car usage and ultimately help to support a growing sustainable community.

Local Amenity Access -

- Residents are able to walk to local amenities and shops along Stockport Road; and,
- Local amenity space and recreational facilities are located close to the site, such as:
 - Recreational Space – Birchfields Park is located a 15-minute walk to the south of the site. This public space offers residents access to a playground, sports area and fruit garden. Furthermore, Crowcroft Park is also a 15-minute walk to the southeast of the site, providing alternative green space for residents to enjoy;
 - Education – There are a range of education facilities surrounding the proposed development site including St. John's Primary, St Joseph's RC Primary School, Tiny Turtles Nursery and St Peter's High School. All of these institutions are within 1km of the site and the various Universities homed within Manchester and Salford can be easily accessed via public transport links; and,
 - Cultural – The site is positioned only a short bus journey away from of a multiplicity of cultural institutions such as the Science and Industry Museum, numerous theatre and art venues and Manchester's City Library.

To further enhance the sustainable credentials of the proposals, a Transport Statement has been prepared by Mode Transport Planning Limited. The statement concludes that future residents and building occupants will have a variety of sustainable travel options that will reduce reliance on the car.



5. ENERGY STRATEGY

Details of the proposed energy strategy for The Ducie Arms development, which includes an enhanced fabric approach to dwelling emission rate reduction combined with efficient mechanical and electrical servicing, are reviewed below.

Priority is given to achieving a reduction in carbon emissions by means of on-site measures and applying the principles of the energy hierarchy.

5.1 Local Planning Policy Targets

Manchester's Core Strategy (CS) includes the following relevant policies:

CS Policy EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development requires all development to follow the principle of the Energy Hierarchy, being designed:

- To reduce the need for energy through design features that provide passive heating, natural lighting and cooling;
- To reduce the need for energy through energy efficient features such as improved insulation and glazing; and,
- To meet residual energy requirements through the use of low or zero carbon energy generating technologies.

CS Policy EN 6 - Target Framework For CO₂ Reductions From Low or Zero Carbon Energy Supplies requires applications for residential development of ten or more units and all other development over 1,000m² to meet, as a minimum, the targets shown in the tables below, unless unviable.

Developments smaller than the above threshold but involving the erection of a building or substantial improvement to an existing building will also be expected to meet the minimum target, where viable.

The emission reductions targeted within policy EN6 relate to Building Regulation Part L 2010. As a consequence of the reduction in emission rates required by current building regulations (Part L 2013) relative to Part L 2010, the revised equivalent target CO₂ emission reductions for the residential scheme is presented below:

- Residential - 9% dwelling emission rate reduction over Part L 2013; and,
- Non-domestic - 6% building emission rate reduction over Part L 2013.

5.2 Build Fabric and Thermal Performance

A combination of enhanced building fabric specification (significantly beyond the regulatory compliance standard), efficient mechanical and electrical systems, and controls, will achieve compliance with the emission reduction targets stipulated by Building Regulations Part L1A and L2A (2013).

The standard measurement of heat transfer through a given building material or construction type is the U-value (W/m²K). In buildings, heat loss generally occurs through the following areas and elements of the construction:



- Ground Floor;
- External Walls;
- Roofs;
- Doors and Windows;
- Thermal (cold) Bridging (heat loss through construction joints); and,
- Uncontrolled Ventilation.

The lower the U-value, the more slowly heat transfers and is lost out of a building. Table 5.1 presents the proposed material specification that could be incorporated to limit heat loss and ensure efficient operation of the dwellings and medical centre.

Table 5.1 – Proposed Building Specification

Item	Residential Specification	Non-domestic Specification
External Wall	U=0.16W/m ² K (Masonry construction)	U=0.16W/m ² K (Masonry construction)
Separating Wall between Residential and Commercial Zones	U=0.16W/m ² K (Masonry construction)	U=0.16W/m ² K (Masonry construction)
Wall to Circulation	-	U=0.41W/m ² K
Party wall	U=0.0W/m ² K (Full fill and seal)	U=0.0W/m ² K (Full fill and seal)
Ground Floor	U=0.10W/m ² K	U=0.10W/m ² K
Exposed Floor over Air	U=0.18W/m ² K	U=0.18W/m ² K
Exposed Floor over Medical Centre	U=0.18W/m ² K (Plus shelter factor)	U=0.18W/m ² K (Plus shelter factor)
Roof	U=0.10W/m ² K	U=0.10W/m ² K
Windows	U=1.4W/m ² K; g=0.72 (Metal Frame, double glazed, low-E)	U=1.4W/m ² K; g=0.38 (Metal Frame, double glazed, low-E)
Solid Doors	U=1.4W/m ² K;	U=1.8W/m ² K;
Air Permeability	4.0m ³ /hm ² (@50Pa.)	4.0m ³ /hm ² (@50Pa.)
Cold Bridge	Accredited Construction Details	Default

These specifications and design attributes will provide the following benefits:

- **High performance thermal insulation** will ensure low U-values for all heat loss elements;
- **Thermally efficient, double-glazed windows** will be specified with argon gas fill and low emissivity coatings to limit heat loss through the panes. Thermal breaks will be incorporated within the frame to further limit heat loss. The glazing g-Value will be specified to optimise beneficial solar gains but limit the propensity for the medical centre and dwellings to overheat;
- **Low air permeability** of 4.0m³/hm² (@50Pa.) is targeted for the whole building in order to minimise uncontrolled ventilation. This will reduce heat losses and provide high levels of occupant comfort. Focus on the quality of the build is vital to deliver airtight buildings;



- **Attention to cold bridging junctions** including the provision of insulation to reduce heat and limit heat losses that occur at the junctions between building elements and around openings and will significantly improve the emission rate of the development; and,
- **Efficient form** - apartments are an inherently efficient form of construction, both in terms of the materials required to build the dwellings and the ongoing heat energy demand. This is a result of relatively low areas of external heat loss elements, associated with layouts which enhance the energy efficiency of the dwellings and guarantees low energy demand throughout their occupation.

This specification will help to deliver an energy efficient development that achieves an emission rate reduction and fabric energy efficiency performance beyond the requirements set by Building Regulation Part L (2013).

5.3 Building Services Specification

Table 5.2 presents the current proposed mechanical and electrical specification that is anticipated to be part of the design to ensure efficient and comfortable operation of the apartments and medical centre.

Table 5.2 – Proposed Mechanical and Electrical Specification

Item	Residential Specification	Non-domestic Specification
Ventilation	Natural ventilation	Natural ventilation
Lighting	100% 'Low E' or LED	100% 'Low E' or LED (At least 130 L/cW)
Space Heating	Electric panel heaters	Split system, Variable Refrigerant Flow Air Source Heat Pump (SEER = 3.5, SCOP = 5.0)
Heating Controls	Programmer and appliance thermostat	Local Controls
Water Heating	High efficiency immersion heaters (150l. / 1.13 kWh/day standing losses)	High efficiency immersion heater
Renewables	9.65kWp photovoltaic array (south facing, 30° tilt)	0.35kWp photovoltaic array (south facing, 30° tilt)

In combination with the build fabric, these specifications will deliver an energy efficient development that achieves a carbon dioxide emission rate reduction and fabric energy efficiency performance beyond the requirements set by Building Regulation (Part L, 2013). The specifications will provide the following benefits:

- **No mechanical cooling** is required for the dwelling as they are not considered to be at risk from overheating due to the orientation of the building and openable windows;
- **Low energy and LED lighting** will be specified throughout the scheme in order to maximise operational efficiencies and lifespan of the fittings. LEDs operate with an estimated energy efficiency of up to 90% when compared to traditional lighting and conventional light bulbs. This means that about c.90% of the electrical energy is converted to light, rather than wasted heat as in conventional bulbs;
- **Split system heat pumps** benefit from high seasonal efficiencies for both heating and cooling modes and are proposed for the medical centre. Additionally, these systems allow precise control of the necessary refrigerant circulation amount required according to the system load facilitating a comfortable environment in the non-domestic zones by use of smooth capacity control;



- **Sophisticated heating controls** including appliance programmer and room thermostats will ensure the efficient delivery of heat from electric panel heaters to further reduce the dwellings' energy demand;
- **High efficiency hot water storage** will be specified within the building with immersion cylinders providing low standing losses to reduce energy demand from the systems. To further limit energy demand for hot water, dwellings would be provided with water-efficient fixtures and fittings, to limit overall water consumption to <110 liters per person per day; and,
- **PV panels** harness solar energy and convert it into zero carbon electricity which can then be used within the building to reduce the (CO₂) emission rate.

5.3.1 Heating Strategy Rationale

- The residential units and purpose-built medical centre will improve upon the current Building Regulation Part L 2013 criteria in terms of carbon dioxide emission rate and fabric energy efficiency;
- There will be no local emissions associated with the proposed full electric heating strategy;
- Electrical panel heating generates a reduced overheating potential – electric space heating delivers virtually instantaneous heating at the location it is required. Unlike a 'wet system' associated with communal gas boilers which inherently have a long lag time for the heat to be generated and then dissipated when no longer needed. This lag time can lead to overheating in the dwellings as the hot water remains in the radiators for a considerable time after the heat demand is required;
- A fully electric heating system is much more cost effective in terms of installation than communal gas and requires much lower maintenance. This will therefore keep service charges down for the building's occupants; and,
- Electric heating, as proposed for the dwellings at The Ducie Arms, is 100% efficient at the point of consumption. The UK government is committed to reducing the country's emissions and has legislated to do so within the Climate Change Act. As the UK's electricity grid becomes less carbon intense over time the carbon emissions associated with full electric heating will become less.

5.4 Renewable Energy Feasibility

A number of renewable energy technologies have been considered for this site, including:

- | | |
|-----------------------|--------------------|
| • District Heating; | • Wind; |
| • Solar Hot Water; | • Heat Pumps; and, |
| • Photovoltaics (PV); | • Biomass heating. |

A review of The Ducie Arms proposals and site location has been completed to determine the appropriate option(s) for this development, as detailed in Table 5.3 below.



Table 5.3 – Renewable Energy Feasibility Study

Technology	Description	Advantages	Limitations	Feasibility
Combined Heat and Power (CHP)	CHP is effectively an on-site, mini power plant providing both electrical power and thermal heat energy. It is an energy efficient, low carbon measure rather than a renewable energy technology.	✓ Buildings with high heat / hot water demands and constant power demands lend themselves to CHP. ✓ Can be linked to a district heating scheme. ✓ Efficient use of fuel and excess electricity can be exported to the grid.	✗ Only viable for buildings with high heat / hot water demands and constant power. ✗ Plant space required. ✗ Maintenance intensive.	No - Given there will be low space heating for around half of the year the contribution from CHP will be limited to a proportion of the hot water load only, therefore the commercial viability of this type of system cannot be proven.
District Heating	District Heating systems provide multiple buildings or dwellings with heat and hot water from a central boiler house, or 'energy centre'. The system can provide heating or cooling which is transferred from the energy centre through a network of highly insulated pipes to each dwelling.	✓ Efficient use of fuel. ✓ Eliminates the need for gas to be installed.	✗ Relies upon the installation of nearby heat networks.	No - It has been determined that there are no existing or proposed heat networks/energy centres within a moderate radius from the development and there are no existing networks local to the site.
Solar Hot Water	The solar collector absorbs the radiant energy of the sun and converts it to heat energy for use as hot water in buildings.	✓ Feasible for small scale developments. ✓ Low maintenance.	✗ Panels ideally facing south at 30° tilt for optimum efficiency.	Potentially - Solar thermal is considered to be a technically feasible option for the residential buildings but is discounted on the grounds of viability. Available roof space would be better utilised for PV panels which offer a better energy yield and emissions reduction per pound (£) of capital expenditure.



Photovoltaics (PV)	PV panels harness solar thermal energy and convert it into electricity which can then be used within a building. The panels may be roof or floor mounted.	✓ Low maintenance. ✓ Easy to integrate into building design. ✓ Cost of PV is constantly dropping.	✗ Panels ideally facing south at 30° tilt for optimum efficiency. ✗ Overshadowing will reduce performance. ✗ Can require significant roof space.	Yes – This technology is considered to be a feasible option for this site and will be considered in more detail below.
Biomass Heating	Biomass boilers typically burn wood chips or pellets as fuel to provide space heating and hot water.	✓ Almost a carbon neutral technology.	✗ Frequent and large fuel deliveries. ✗ Large fuel store required. ✗ Regular maintenance. ✗ Air quality issues in urban areas.	No – This technology would be capable of delivering the target CO ₂ emission reductions but is considered inappropriate for this type of development due to the need for a large fuel storage facility and frequent, large fuel deliveries combined with regular maintenance.
Wind	Wind generation equipment harness the wind to turn a propeller and in doing so, drive an alternator to generate electricity. The turbines may be pole or roof mounted.	✓ Low maintenance. ✓ Excess electricity can be exported to the grid. ✓ Vertical Axis Turbines able to operate at wind speeds as low as 2m/s.	✗ A wind speed of at least 6m/s is typically required for traditional turbines to operate efficiently. ✗ Visual and noise impact risk.	No – The NOABL wind speed database records a wind speed of approximately 4.8m/s at 10m above ground level for this site. In order to operate efficiently a wind speed of at least 6m/s is typically required. Furthermore, there are potential planning issues and perceived safety concerns with this technology.
Ground Source Heat Pumps (GSHP)	GSHPs collect low-grade heat from the ground to supply useful heat for space and water heating requirements by applying additional energy input (in the form of electricity).	✓ Flexible installation methods - vertical ground collector boreholes can be used when space is more limited. ✓ Can provide both heating and cooling as well as hot water.	✗ Full ground survey required to determine suitability/ geology. ✗ Large area required for horizontal ground collector loops. ✗ Prohibitive costs.	No – Such technology is considered unsuitable for this site due to prohibitive costs and the technical complexity of installing the vertical ground collector boreholes within the site boundary.
Air Source Heat Pumps (ASHP)	ASHPs collect low-grade heat from the air to supply useful heat for space and water heating requirements by applying additional energy input (in the form of electricity).	✓ Highly efficient method of producing heat. ✓ Can provide both heating and cooling as well as hot water.	✗ Prohibitive costs. ✗ Internal and external unit space required. ✗ Potential noise issues from external plant.	Yes – This technology is considered to be a feasible option for this site and will be considered in more detail below.



5.5 Proposed Renewable Energy Solution

Photovoltaic (PV) arrays are selected as an appropriate renewable energy technology to contribute to the CO₂ emission reduction target. PV arrays are relatively straightforward to install, benefit from low maintenance costs and will reduce the operational cost of the building. The use of PV in general at this site would provide the following benefits:

- Reducing the building's electrical energy grid load;
- Simple installation and commissioning;
- Low maintenance; and,
- Reliable, proven technology.

Proposed System Details -

It is proposed that PV panels be shallow mounted in arrays tilted at 30° and orientated due south in order to optimise the installed capacity of the system. A total installed capacity of approximately 10.0kWp photovoltaic modules will be allocated onto the flat roof (see Figure 5.1) and apportioned as follows:

- The residential apartments will be allocated with an installed capacity of 9.65kWp;
- The medical centre will be allocated with an installed capacity of 0.35kWp; and,
- An array of this capacity will require approximately 60m² plus an allowance for access and avoidance of over shading (as per installer approval). This PV array may be accommodated within the available roof area.

Figure 5.1 – CGI Showing PV Positioning



PV arrays will be more fully reviewed in the following Energy Demand Calculation section to demonstrate how these may contribute to reducing carbon emissions arising from this development.

Land use -

- There are no land use issues associated with PV technology at this site.

Local Planning -

- There are no planning policy issues associated with this technology. PV is covered under permitted development for existing dwellings and encouraged at all tiers of planning policy.

Noise -

- PV is silent in operation.

Whole life cost and lifecycle impact -

- Current installed costs for PV are approximately £1,500 / kWp installed.
- Additional costs throughout the system's 30-year lifecycle are limited to:
 - Cleaning of the arrays;
 - Potential vandal damage to the arrays; and,
 - Replacement of the DC / AC inverter unit which typically have a lifespan of around 10 years.
- Energy payback estimates for rooftop PV systems are between 4 to 2 years for systems using current multi-crystalline, silicon PV modules.
- With energy paybacks of 2 to 4 years and assumed life expectancies of 30 years, 87% to 97% of the energy that PV systems generate will be 'clean' zero carbon energy.

5.6 Energy Performance Calculations

5.6.1 Methodology – Residential

Approved SAP 2012 software (Design SAP 2012 4.14r16) has been used to calculate energy demand models for all residential dwellings within the scheme. The calculations demonstrate the environmental benefits associated with the 'fabric led' approach to energy demand and emissions reduction, which has been implemented in conjunction with efficient mechanical and electrical systems and on-site micro generation.

SAP software calculates the regulated energy demand of the dwellings and associated carbon dioxide emissions, in accordance with the requirements of Building Regulation, Part L1A (2013) that this development will be constructed in compliance with. A block compliance (multi dwelling) SAP report has been applied to demonstrate that all residential dwellings meet Part L1A (2013) compliance requirements within one collective report (see Appendix A).

5.6.2 Regulated Energy Demand and Emission Calculations – Residential

The calculated Dwelling Emission Rate reduction over Part L1A (2013) and thermal envelope Fabric Energy Efficiency performance associated with the proposed 'fabric led' specification are presented in Tables 5.4 and



5.5 respectively. The proposed Ducie Arms development has therefore been demonstrated to provide a significant improvement beyond the building regulation compliance standard.

Table 5.4 – Average Regulated Dwelling Emission Rate

Average Dwelling DER (kgCO ₂ /m ² /yr.)	27.8
Average Dwelling TER (kgCO ₂ /m ² /yr.)	30.5
% DER Reduction over Part L 2013	9.1

The above calculation demonstrates that the Dwelling Emission Rate (DER; carbon dioxide emissions) reduction for the residential element of the scheme is expected to be at least 9.1% better than the Part L1A (2013) compliance requirement.

Table 5.5 – Average Fabric Energy Efficiency

Average Dwelling DFEE (kWh/m ² /yr.)	47.8
Average Dwelling TFEE (kWh/m ² /yr.)	58.3
% DFEE Reduction over Part L 2013	18.0

The residential dwellings are expected to achieve a Dwelling Fabric Energy Efficiency betterment of 18.0% relative to the Part L compliance criterion.

These indicative SAP calculations demonstrates that the DER reduction for The Ducie Arms scheme will provide an improvement over the Part L1A (2013) compliance standard as a consequence of the proposed enhanced fabric specification, efficient mechanical and electrical systems coupled with onsite micro generation.

5.6.3 Revised Carbon Factors

SAP 10.1 will be used to demonstrate compliance with the forthcoming iteration of Building Regulation Part L. The current carbon factors applied in SAP 2012 for electricity are out of date, so these new factors better reflect the decarbonised status of the UK's electricity grid, as presented in Table 5.6.

Table 5.6 - Carbon Factors for Grid Electricity

Fuel	Software Version	Fuel Carbon Factor (kgCO ₂ /kWh)
Natural Gas	SAP 2012 (current)	0.216
	SAP 10 (revised)	0.210
Grid Electricity	SAP 2012 (current)	0.519
	SAP 10 (revised)	0.136



- It can be seen that the revised carbon factors to be applied in the forthcoming SAP 10.1 software are c.74% lower than the out-of-date factors currently being applied for building regulation compliance purposes.
- Grid mix electricity has now been calculated to be less than 36% carbon intense than natural gas, whereas the previous carbon factors show electricity to be more than twice as carbon intense as natural gas.
- It should be noted that the use of the SAP 10.1 emission factors in this context is for demonstrating performance against planning policy targets only and, as such, is separate to Building Regulation compliance. Applications should therefore ensure that compliance with Building Regulations is maintained.

To ensure that the assessment of new developments better reflects the actual carbon emissions associated with their expected operation, the latest carbon emission factors, derived from SAP 10.1 may be applied to these results, using the outputs from current compliance calculations which are then manually converted for the revised SAP 10.1 CO₂ factors.

In addition to the building regulation compliance calculations (which are completed with current versions of the approved energy assessment software) we have provided a separate set of manual calculations which apply these reduced SAP 10.1 emission factors for grid electricity to the residential energy model results, which are not currently taken into account by Part L of the building regulations.

Table 5.7 – Calculated Regulated Dwelling Emission Rates – SAP 2012 and SAP 10 Data

	SAP 2012 Data	SAP 10 Data
Dwelling DER (kgCO ₂ /m ² /yr.)	27.8	7.3

Applying the revised carbon factors to the building's Dwelling Emission Rate (DER) shows that the 'full electric' energy strategy proposed for the dwellings will actually provide a DER of 7.3kgCO₂/m².

In line with the MCC's Climate Change Framework, this development has the capability to take maximum advantage of the de-carbonised status of the electricity grid with the full electric heating strategy. This offers a steppingstone towards zero-carbon standards whilst the UK government establish a national zero carbon definition and methodology for near-future implementation.

5.6.4 Methodology – Non-domestic

Approved SBEM software (Elmhurst SBEM Online 4.03r01 SBEM 5.6.b) has been used to calculate an energy demand model for the medical centre under one BRUKL document (see Appendix B for details). A shell and core BRUKL has been produced to demonstrate, for planning purposes, the environmental benefits associated with the 'fabric led' approach to energy demand and emissions reduction, which has been specified in conjunction with efficient mechanical and electrical systems and on-site micro generation. The BRUKL also demonstrates compliance with the performance targets established within MCC's Core Strategy Policy EN6 and Building Regulation, Part L2A.



5.6.5 Regulated Energy Demand and Emission Calculations – Non-domestic

The emissions and energy demand performance associated with the proposed specification for the building is presented in Table 5.8.

Table 5.8 – Calculated Regulated Building Emission Rate

Building BER (kgCO ₂ /m ² /yr.)	25.7
Building TER (kgCO ₂ /m ² /yr.)	29
% BER Reduction over Part L 2013	11.4

The representative SBEM calculation demonstrates that the Building Emission Rate (BER) reduction will be at least 11.4% better than Part L2A (2013) compliance requirements. The scheme provides a significant improvement above Building Regulation, Part L2A standards.

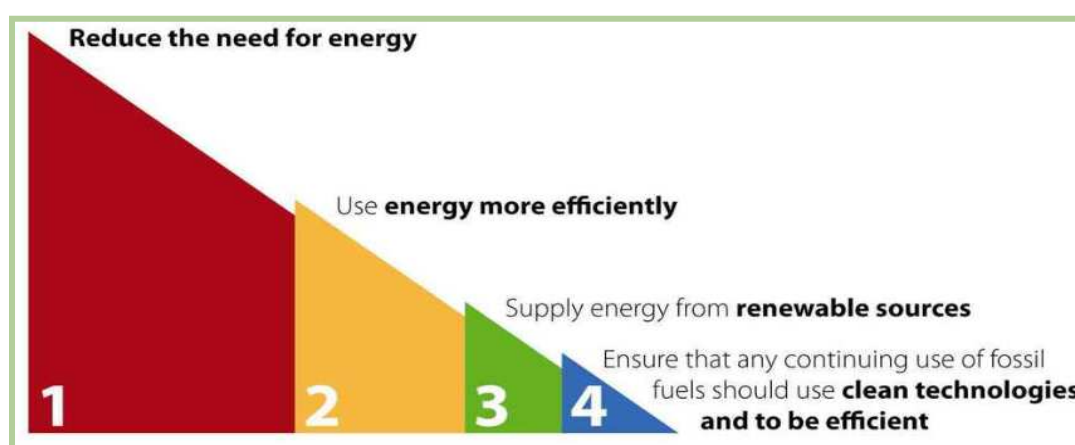
This is a result of considered design with enhanced fabric specifications, efficient mechanical and electrical systems plus the integration of low and zero-carbon technologies.

5.7 Energy Hierarchy

The scheme will incorporate an enhanced material specification along with high quality design and construction standards in order to improve energy efficiency through a ‘fabric led’ energy strategy. The construction, design and specification proposed for this scheme will deliver dwellings that are inherently efficient and cost-effective during occupation.

The Energy Hierarchy provides a framework to guide energy policy and decision making to achieve practical and cost-effective carbon emission reduction strategies. The hierarchy prioritises demand-side activities to reduce wastage and improve efficiency (see Figure 5.2).

Figure 5.2 – The Energy Hierarchy



First Principle

The following efficiency measures are designed to reduce heat losses and minimise energy demand:



- The proposed development will be constructed with a material and design specification which exceeds minimum Building Regulation standards and includes numerous efficiency measures designed to reduce heat losses and minimise energy demand, including very good levels of insulation and low u values;
- The insulated distribution pipework will minimise energy losses from the hot water systems, often referred to as 'standing losses'. Furthermore, the dwellings are designed to not require active cooling;
- The design air permeability target for the scheme is 4.0m³/hm² (@50Pa.). This low air permeability target will minimise any uncontrolled ventilation and assist to limit heat loss through the structure of the build; and,
- The g value of the glazing within both the residential units and medical centre will be optimised to control solar gain in the summer months and allow beneficial gains in the winter season so as to minimise the overheating risk and limit the heating energy demand within the building.

This 'fabric led' approach to minimising energy demand and associated carbon dioxide emissions is aligned with the first principle of the energy hierarchy which states that reduction in energy demand should be achieved initially by energy efficiency.

Second Principle

As per the second principle of the Energy Hierarchy:

- Sophisticated control systems for the space and water heating will ensure that energy consumed by the development is used efficiently;
- Hot water in the dwellings will be separately programmable and high efficiency cylinders with low standing losses will be specified; and,
- 100% LED provision and sophisticated control systems will be incorporated throughout the development. Photocell and automatic presence control of the lighting will be specified in order to further improve the efficiency of the lighting system within the communal zones.

Third Principle

As per the third principle of the Energy Hierarchy:

- Photovoltaic arrays will be integrated on the flat roof of the Building to reduce the carbon dioxide emissions associated with the occupied development; and,
- High efficiency heat pumps will supply heating and cooling on demand, to the non-domestic zones.

Fourth Principle

The remaining space and water heating demand will be met by electric panel and immersion heaters (100% efficient). This will ensure that fossil fuels consumed by the National Grid for heating purposes will be burnt cleanly and efficiently.

The development proposals are therefore aligned with the energy hierarchy promoted within the Manchester Guide to Development and Core Strategy Policy EN 4.

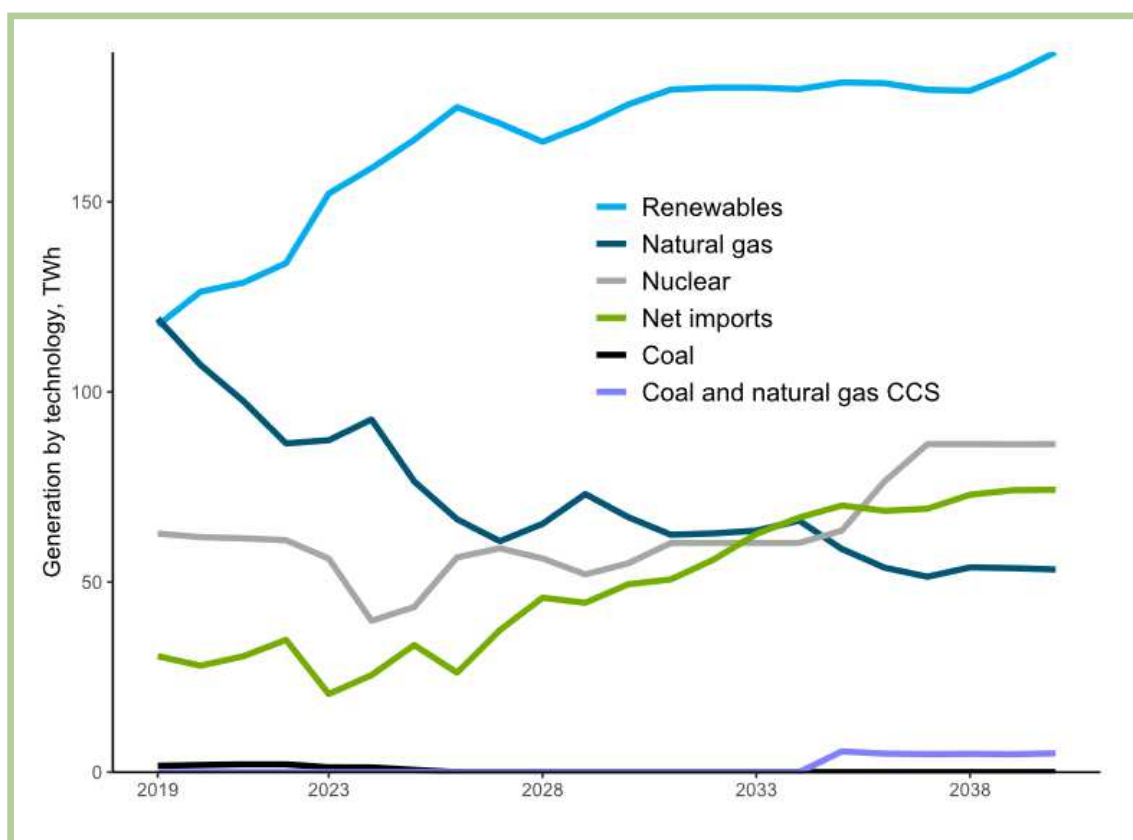


6. CLIMATE CHANGE EMERGENCY

A Climate Emergency was declared by Manchester City Council on 10th July 2019, with a target to make Manchester carbon neutral by 2038. In support of this, the developer wishes to highlight the following measures that will form part of the specification of this development:

- An energy strategy that delivers carbon dioxide emission reductions and renewable energy generation in line with the Energy Hierarchy:
 - In securing compliance with the current, building regulation Part L targets, a commitment is made to construct a high quality, energy efficient thermal envelope thereby minimising demand side energy loads – in accordance with the principles of the Energy Hierarchy;
 - A commitment is made to achieving at least **9% improvement in the Dwelling Emission Rate** reduction relative to the current Part L1A (2013) compliance standard;
 - The Building Emission Rate (BER) is anticipated to be at least **11.4% better than current Part L2A (2013) standards;**
 - The low carbon share of electricity generation is projected to rise to 83% in by 2040. As the UK electricity grid CO₂ footprint continues to reduce (see Figure 6.1 sourced from BEIS Energy and Emissions Projections 2019), so too will the carbon dioxide emissions associated with this ‘fully electric’ building services energy strategy. This would not be the case if the building were heated from fossil fuels (for example, gas boilers and/or CHP); and,

Figure 6.1 - Energy and Emissions Projections 2019 (BEIS)



- Calculations to demonstrate the benefits associated with decarbonisation of the grid have been prepared (see Section 5.6.3), with specific reference to the revised SAP10.1 carbon factors.
- Unregulated energy demand (that is, the energy demand associated with appliances and cooking) typically accounts for over half of the total carbon dioxide emissions from modern developments such as this. To limit this:
 - The integrated white goods will have as a minimum an A+ energy rating; and,
 - A welcome pack will be provided to all residents to encourage selection of green energy providers to enable them to make informed decisions.
- There is a limit to fabric enhancements such as increased insulation and improved air tightness as this generates a higher overheating risk and, as a consequence, the building would generate cooling loads. The design of the residential elements will balance both requirements and incorporates a building specification intended to avoid cooling requirement and the associated wasted energy in producing cooled air. Thus, through the integration of passive design measures such as the specification of the window g-value, the dwellings will not require active cooling, which further limits the energy demand of the development.
- Waste is a misuse of natural resources and also contributes a large proportion of the UK's carbon footprint;
 - Waste minimisation during construction will reduce raw materials demand, thereby reducing the building's embodied carbon footprint; and,
 - During occupation, the building will benefit from recycling facilities to enable the local authority waste reduction targets, diverting more materials away from landfill and reducing the occupant's carbon footprint further.
- The site's location will enable low carbon, sustainable lifestyles. Located minutes away from several bus stops, the residents have the option to utilise various sustainable modes of transport. This is facilitated by:
 - Infrastructure provided such as secure cycle storage on site plus fast-charge, floor mounted EV charging units;
 - Travel options, including local access to transport nodes for bus and rail; and,
 - Local amenities that are within easy walking distance of the site, enabling residents to live local with a reduced need to travel.
- The dwellings are designed to incorporate features that will serve to reduce energy demand, and in turn, carbon emissions arising from access to the dwellings:
 - The lighting provision will include active sensors; and,
 - The fit-out specification of the dwelling will seek to minimise water demand. Water efficiency measures (such as dual flush toilets, flow restrictors and reduced volume baths) will limit potable water demand to <110litres/person/day. This will reduce water heating energy loads and also cut the process energy required to supply clean drinking water.

These commitments, in combination, seek to work towards the carbon reduction target of no more than 1.5°C global temperature increase and assist Manchester City Council in meeting their Climate Change Emergency objectives.



7. CONCLUSION

This statement has reviewed the environmental performance of the proposed development site at The Ducie Arms, Manchester against national and local policies. The material specification and servicing strategy for the scheme and the building (carbon dioxide) emission rates have also been reviewed.

Energy Strategy –

Full compliance with the key criteria of the Manchester Core Strategy have been achieved by the proposed energy strategy while responding positively to MCC's declaration of a Climate, as follows:

- These proposals will deliver a scheme that accords with the adopted Core Strategy Policy EN 4, EN 6 and the Supplementary Planning Document (SPD) criteria. The development will be designed and specified in accordance with the principles of the energy hierarchy and will achieve the following:
 - A Building Emission Rate improvement of at least 11.4% over Part L2A will be secured for the medical centre;
 - The indicative SAP calculation shows that building specification is expected to achieve a 9.1% betterment in dwelling emissions over Building Regulation Part L1A (2013); and,
 - The Dwelling Fabric Energy Efficiency (DFEE) reduction for the dwellings is at least 18% better than the Part L1A (2013) compliance standard through enhanced fabric measures.
- The proposals include for an array of PV panels in addition to highly efficient heat pump technology thus, further reducing the energy loads and therefore carbon emissions arising from the occupied development. This approach to reducing energy demand responds positively to the council's climate emergency objectives and will help to deliver a scheme that is inherently efficient and cost-effective during occupation
- As a consequence of the decarbonised status of the UK's electricity grid, the actual emissions are 74% lower than the current out-of-date carbon factors used for building regulation compliance purposes. In line with Manchester City Council's Climate Change Framework, this development will take advantage of the decarbonating status of the electricity grid with its full electric heating strategy, ultimately facilitating a 'near-zero' or zero carbon scheme, as the grid mix electricity supply is decarbonised over time.

Sustainability Performance -

The key issues of Manchester City Council's Supplementary Planning Document (Environmental Standards) in accordance with the Core Strategy Policies DM 1, EN 8 and T 1 have been achieved by the proposals. These are as follows:

- Water consumption of the development will be minimised. The internal water strategy will exceed the regulatory standard specified to achieve a calculated daily consumption of <110litres/person/day through the specification of efficient water fixtures.
- The development site is located within Flood Risk Zone 1. The site drainage strategy will be designed to withstand a 1 in a 100-year storm event plus a 40% allowance for climate change. Post development surface water run-off rates will be limited to at least 50% of the existing surface-water brownfield runoff rates through SuDs and onsite attenuation.



- Waste arising during construction and occupation/operation will be minimised. A site waste management plan will be adopted during construction and a comprehensive waste management plan for the site will accord with the local authority recycling scheme ensuring that adequately sized bin storage areas for the site are provided.
- Construction site management procedures will minimise adverse impacts on the environment and control pollution generated during the construction phase. These include a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling of materials. A commitment will be made to minimise waste and pollution.
- The impact of sound associated with the development will be mitigated by the design/specification of the building. Sound insulation will be specified to comply with acoustic performance compliance standards, and mitigation measures will be implemented, where required, to reduce the noise arising from the mixed-use development.
- The development proposals are on a pre-developed site that currently has little ecological value. The proposals will include soft landscaping to provide an enhancement to both the ecological and aesthetic value of the site.
- The site is located in a highly sustainable location with basic facilities all within easy walking and/or cycling distance of the site therefore, reliance upon traditional methods of transport such as the car will be reduced.

Furthermore, the proposals accord with the aims of the National Planning Policy Framework, as follows:

- The proposal includes the redevelopment of a previously developed site and represents a very efficient use of land;
- Construction practices that minimise adverse impacts on the environment will be adhered to including a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling, a commitment will be made to minimise waste and pollution; and,
- Exceeding the regulatory compliance criteria (Part L1A and L2A) will assist in lessening the impact of this development on the environment by the way of reducing carbon emissions.

In conclusion, the proposals reviewed within this statement for the scheme at The Ducie Arms, Manchester will deliver a high-quality development that accords with the guidance provided within the Manchester City Council's adopted policies.



Appendix A – SAP: Block Compliance Report



BLOCK COMPLIANCE

Calculation Type: New Build (As Designed)

Block Reference	Ducie Arms	Issued on Date	
Block Name			
Assessor Details	Mr. Laurie Wills, Element Sustainability Limited, Tel: 01829 733444, laurie@elementsustainability.co.uk	Assessor ID	H367-0001
Client			

Block Compliance Report - DER

Block Reference: Ducie Arms		Block Name:			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DER (kgCO ₂ /m ²)	TER (kgCO ₂ /m ²)	% DER/TER
Ducie Arms - L3, Unit 5-1	1	73	-23.27	31.06	174.92 %
Ducie Arms - L3, Unit 3-1	1	64	31.72	26.43	-20.01 %
Ducie Arms - Duplex, Unit 2-1	1	68	38.00	30.53	-24.47 %
Ducie Arms - L3, Unit 4-1	1	58	34.06	28.77	-18.41 %
Ducie Arms - L3, Unit 1-1	1	42	37.24	31.87	-16.85 %
Ducie Arms - L2, Unit 1-1	1	42	41.58	34.92	-19.08 %
Ducie Arms - L2, Unit 4-1	1	58	40.60	31.69	-28.11 %
Ducie Arms - L2, Unit 3-1	1	64	38.41	30.77	-24.85 %
Totals:	8	469	238.34	246.04	
Average DER = 27.75 kgCO ₂ /m ²		% DER/TER	PASS		
Average TER = 30.52 kgCO ₂ /m ²		9.08 %			

Block Compliance Report - DFEE

Block Reference: Ducie Arms		Block Name:			
Property-Assessment Reference	Multiplier	Floor Area (m ²)	DFEE (kWh/m ² /yr)	TFEE (kWh/m ² /yr)	% DFEE/TFEE
Ducie Arms - L3, Unit 5-1	1	73	50.50	65.71	23.15 %
Ducie Arms - L3, Unit 3-1	1	64	36.88	45.15	18.32 %
Ducie Arms - Duplex, Unit 2-1	1	68	52.07	62.67	16.91 %
Ducie Arms - L3, Unit 4-1	1	58	41.91	52.34	19.92 %
Ducie Arms - L3, Unit 1-1	1	42	43.54	53.45	18.53 %
Ducie Arms - L2, Unit 1-1	1	42	51.94	63.69	18.45 %
Ducie Arms - L2, Unit 4-1	1	58	54.62	62.10	12.05 %
Ducie Arms - L2, Unit 3-1	1	64	50.02	59.75	16.29 %
Totals:	8	469	381.49	464.87	
Average DFEE = 47.76 kWh/m ² /yr		% DFEE/TFEE	PASS		
Average TFEE = 58.27 kWh/m ² /yr		18.04 %			

Appendix B – SBEM: BRUKL Report



Project name

Shell and Core

Ducie Arms

As designed

Date: Thu Aug 12 15:20:34 2021

Administrative information

Building Details

Address: Ducie Arms Hotel, 424 Stockport Road,
MANCHESTER, M12 4EX

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.6.b.0

Interface to calculation engine: SBEM Online

Interface to calculation engine version: v4.03

BRUKL compliance check version: v5.6.b.0

Certifier details

Name: Katie Hodgkiss

Telephone number: 07715 986 193

Address: , Information not provided by the user,

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

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	29
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	29
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	25.7
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

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

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.19	0.48	"Wall3757219"
Floor	0.25	0.09	0.18	"Wall3754812"
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	1.4	1.4	"Window375270"
Personnel doors	2.2	1.8	1.8	"Door114617"
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

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

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	4

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- HVAC104157

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	3.5	5	-	-	-
Standard value	2.5*	2.6	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.					

1- HWSGenerator64955

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	0.023
Standard value	1	N/A

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

Shell and core configuration

Zone	Assumed shell?
ZoneFirst Floor Medical 1	YES
ZoneFirst Floor Medical 2	YES
ZoneFirst Floor Medical 3	YES
ZoneGround Medical 1	YES
ZoneGround Medical 2	YES
ZoneGround Medical 3	YES
ZoneGround Medical 4	YES
ZoneMedical Bins	YES

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
ZoneFirst Floor Medical 1		130	-	-	134
ZoneFirst Floor Medical 2		130	-	-	122
ZoneFirst Floor Medical 3		130	-	-	165
ZoneGround Medical 1		130	-	-	105
ZoneGround Medical 2		130	-	-	99
ZoneGround Medical 3		130	-	-	257
ZoneGround Medical 4		130	-	-	266
ZoneMedical Bins		130	-	-	11

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
ZoneFirst Floor Medical 1	N/A	N/A
ZoneFirst Floor Medical 2	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
ZoneFirst Floor Medical 3	NO (-67%)	NO
ZoneGround Medical 1	NO (-34.9%)	YES
ZoneGround Medical 2	N/A	N/A
ZoneGround Medical 3	NO (-42.6%)	NO
ZoneGround Medical 4	NO (-32.6%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	214.2	214.2
External area [m ²]	567.1	567.1
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	4	5
Average conductance [W/K]	263.95	334.29
Average U-value [W/m ² K]	0.47	0.59
Alpha value* [%]	22.65	17.52

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Institutions: Hospitals and Care Homes
	C2 Residential Institutions: Residential schools
	C2 Residential Institutions: Universities and colleges
	C2A Secure Residential Institutions
	Residential spaces
	D1 Non-residential Institutions: Community/Day Centre
	D1 Non-residential Institutions: Libraries, Museums, and Galleries
	D1 Non-residential Institutions: Education
100	D1 Non-residential Institutions: Primary Health Care Building
	D1 Non-residential Institutions: Crown and County Courts
	D2 General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger terminals
	Others: Emergency services
	Others: Miscellaneous 24hr activities
	Others: Car Parks 24 hrs
	Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	17.1	23.9
Cooling	7.58	11.15
Auxiliary	0	0
Lighting	19.04	19.91
Hot water	6.98	3.76
Equipment*	33.67	33.67
TOTAL**	50.71	58.72

* 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	1.16	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	319.02	374.18
Primary energy* [kWh/m ²]	155.68	168.66
Total emissions [kg/m ²]	25.7	29

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

HVAC Systems Performance										
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER	
[ST] Split or multi-split system, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity										
	Actual	215.2	103.9	18.3	8.1	0	3.26	3.55	3.5	5
	Notional	224.2	154.9	25.6	12	0	2.43	3.6	----	----
[ST] No Heating or Cooling										
	Actual	314.3	3.7	0	0	0	0	0	0	0
	Notional	299.4	6.7	0	0	0	0	0	----	----

Key to terms

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

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.16	"Wall3754802"
Floor	0.2	0.09	"Wall3757234"
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	1.4	"Window375270"
Personnel doors	1.5	1.8	"Door114617"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"
U _{i-Typ} = Typical individual element U-values [W/(m²K)] U _{i-Min} = Minimum individual element U-values [W/(m²K)]			
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	4