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Kampus – New Build

Post-completion Energy and
Environmental Standards
Statement

October 2021

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TÜV

Document Status - For Comment

Reference: Z47744		Date	
Produced by:		Matthew Adams	13 th October 2021
Checked by:		Tony Turner	13 th October 2021
Approved by:		Matthew Gibson	13 th October 2021

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1.0 Introduction

This Energy and Environmental Standards Statement (EESS) has been prepared to demonstrate how the proposed development relates to the environmental standards defined in Manchester City Council's (MCC) Guide to Development in Manchester, Supplementary Planning Document and Planning Guidance Adopted April 2007 and the objectives in the adopted Core Strategy Development Plan Document 2012.

This document also incorporates an Energy Statement for the development (Section 4) detailing the energy saving and efficiency measures incorporated within the completed development, based on the as-built information.

The Environmental Standards Statement and Energy Statement, both planning validation requirements, have been combined into this single document.

This report should be read in conjunction with the full suite of supporting documents and drawings that form the As-built installation.

Our approach has been to influence the building design and equipment selection to ensure a low energy demand and high levels of energy efficiency. The priority has been to reach the optimum energy efficiency before considering the provision of on-site zero / low carbon technologies / district solutions.

Our approach has utilised sustainability in a holistic methodology to embed the following key environmental principals into the development:

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

2.0 Outline Project Information

2.1 Project Description

This report has been prepared for the new Kampus development, which is a residential led, mixed use development that has delivered 478 residential units and commercial floorspace at ground and first floor, as well as car parking, landscaping and public realm improvements.

The site is located between Minshull Street, Aytoun Street, Chorlton Street and the Rochdale Canal.

The new Kampus development comprises of the construction of 2no new multi storey residential apartment blocks (Block C and Block F); and the refurbishment of an existing tower block (Block E) to create 478 residential apartments (a mixture of 1-bed and 2-bed apartments). A car park and a number of commercial retail units have also been provided as part of the development. The retail units will be constructed to a shell standard for future fit out by the occupiers.

The conversion and reuse of two Grade II Listed Buildings adjacent to the application site, Minshull House and the Minto and Turner Building, will be the subject of a separate EESS document.

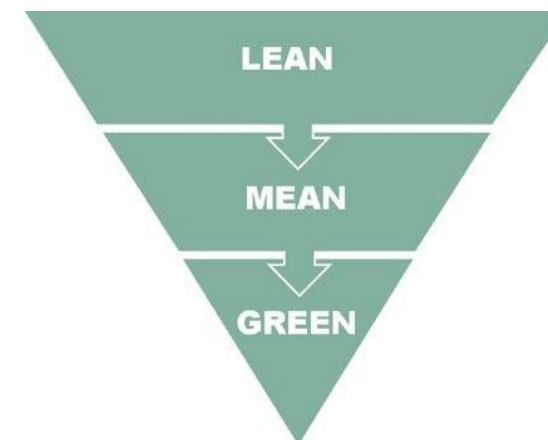
3.0 Environmental Standards

3.1 Environmental Design

The design for the Kampus development applies a wide range of environmental design principles and achieves high levels of fabric energy efficiency and water efficiency, as described throughout this EESS.

As detailed, the CSH has been withdrawn. This means that Policy DM 1 of the Manchester Core Strategy which required new residential dwellings to meet CSH Level 4, subject to viability, has been superseded.

The strategy for reducing energy consumption within the development will follow the energy hierarchy below.



Energy consumption and carbon emissions arising from building operation represents a substantial and dominant portion of the total building environmental footprint. Therefore, minimising energy demand and carbon emissions are one of the core environment and sustainability strategies.

Detailed consideration of efficiency measures and their deployment within the design also fosters a deeper knowledge and understanding of the energy performance of a building. This knowledge and understanding are the fundamental starting point for the development of a renewable energy strategy to meet the demand.

3.2 Lean – Building Passive Measures

3.2.1 Reducing Energy demands and driving energy efficiency

The passive design measures considered for the development are as follows:

- Building form
- Location and orientation
- Solar shading
- Glazing selection
- Glare control blinds

3.3 Mean – High Efficiency Systems, Plant and Controls

High efficiency systems, plant, controls and equipment have been incorporated.

Internal lighting within the apartments, communal space and all external lighting has been provided through the use of energy efficient LED lighting.



The lighting scheme within the commercial retail space will be developed by the tenant and as such the design team are not able to confirm energy reduction measures associated with lighting and lighting controls. The fit-out will be designed to meet Part L2A 2013 Criterion 1 ‘Achieving the TER’. A large percentage of the carbon emission comes from the lighting installation and therefore it is unlikely that the fitout scheme will not include low energy light fittings.

As part of the energy reduction strategy the apartments include Mechanical Ventilation with Heat Recovery. The ventilation system chosen has a low specific fan power to minimise the energy required by the fans. The heat recovery will minimise energy being lost through exhaust air. This approach ensures a consistent ventilation provision all year round irrespective of external conditions.

Sanitaryware has been selected to minimise water use within the apartments. Dual Flush WCs, Low flow showers, taps and small capacity baths have been included.

Heating Zones – Each apartment / residential unit is a separately metered and controlled zone to ensure specific areas can be heated, without requiring unoccupied spaces to be operated unnecessarily.

Lighting Controls - lighting controls have been provided to communal / landlord’s areas utilising presence detectors and daylight sensors wherever practical. Manual override has also been incorporated, where appropriate.

3.4 Renewable Energy

The buildings have been connected to the central Energy Centre for the combined new build and listed buildings development. The CHP and boilers within the energy centre combine to provide Low Carbon energy to heat the buildings. The LTHW supply from the Energy Centre is routed via a Plate Heat Exchanger and distributed around the Blocks C, E and F to serve radiators in each area.

3.5 Water Management

Cold water is stored in Block E, then a Boosted Cold Water Supply (BCWS) is distributed to each individual apartment where a water meter is installed, this metering system is monitored and forms part of the residential letting usage strategy. Any ancillary areas such as bin stores, irrigation or window washing supplies are also metered on the BMS system.

Any leaks would be quickly detected as all metering is live and available on ether the BMS head end or the ISTA metering platform. Water use in the development has been minimised by flow reduction and usage controls. The measures detailed below are included in the installation. These measures have resulted in significant savings in water use (as demonstrated by the Part G Water Efficiency calculations) and reduce the annual cost of water for the building.

Water Use – Measures included in the design	
Area	Measures
Flow Reduction	Low water capacity dual flush WCs
	Low flow taps
	Low flow showers
	Low water consumption white goods
Controls	Dual flush WCs
	User operated
Monitor	Sub metering and BMS monitored water metering for all uses

3.5.1 Landscape

The urban courtyard, street courtyard and corner park have provided an area of permeable surface, enabling the interception, filtration and absorption of rainwater, coupled with the moderation of surface water runoff.

Water use within the landscape strategy will be minimised through a combination of good practice design and the specification of planting that relies solely on precipitation, during all seasons of the year or restricted to contextually appropriate species that thrive without irrigation and will continue to do so in those conditions likely as a result of climate change, i.e. typically warmer and drier conditions.

3.5.2 Flood Risk

A site-specific Flood Risk Assessment (FRA) has been conducted to determine the potential risk of flooding from all sources. This data has been used to inform the design and create an appropriately flood resilient and resistant development.

The EA flood map for planning has confirmed that the Site is within Flood Zone 1. Based on the flood zone extents identified on the EA map for Risk of Flooding from Rivers and Sea, the risk of flooding to the proposed development from rivers is considered to be very low. The Site is located in an area of low susceptibility to groundwater flooding. The EA website Flood Risk map showing Risk of Flooding from Surface Water indicates that there is a low to medium risk of surface flooding which appears to be associated with the Rochdale Canal which forms the northern boundary of the Site. However, the SFRA “Canal Hazard Zones” map indicates that the Site is not at risk of breach or overtopping. Based on the available information, it is considered that the probability of the Site flooding from most sources is low.

As the Site is considered to be at low risk of flooding from all sources (except surface water flooding possibly associated with the Rochdale Canal) the finished floor levels have been set at a minimum of 150mm above the completed external levels in order to prevent surface water flows from extreme storm events entering the proposed buildings.

As there appears to be a risk of flooding associated with surface water flows from the canal, finished external levels have been engineered to provide containment where possible, and where not possible, site levels ensure that surface water is directed away from the existing and proposed buildings, whilst ensuring the ultimate flood route does not cause flooding of buildings off site.

Finished external levels have been engineered to ensure falls are away from buildings and building access points where possible and to provide positive drainage to prevent ponding. The risk of accumulation of standing water against the buildings has therefore been minimised.

3.6 Waste Management

Residential Waste Strategy – Residential waste volumes and requirements have followed GD04 Guidelines. The total quantity of residential storage has been calculated from guidance provided in Manchester City Councils document ‘GD04 Waste Storage and Collection Guidance for New Developments V2.00 -0 Citywide Support - Environmental Protection (September 2014)’. Compliance with this Waste Strategy by the completed development has ensured that there are sufficient waste storage areas across the development to enable residents to segregate their recyclables and waste and provide appropriate access for refuse collection vehicles (RCVs).

Refuse within residential store areas is separated by a tri-separator bin chute into general (including organic), co-mingled recycling and paper/card waste.

Refuse stores have close access to refuse vehicle lay-bys and opening and closing of these stores will be managed by the developments management company (Native). Native organise for the waste to be collected by MCC or a private refuse collection company (where the recycling streams become contaminated). Refuse storage has been located, sized and coordinated to enable efficient access by collection crews and vehicles. Refuse / delivery vehicle parking areas have been designed to ensure adequate parking and access to the refuse stores.

The volume of waste to be collected is based on a once weekly collection frequency and has used GD04 calculation guidelines.

All refuse stores are mechanically ventilated.

Retail/Leisure Waste Strategy – All retail/leisure refuse will be collected by a private collection company. Retail/leisure refuse will be stored within each unit’s demise, and it will be the tenant’s responsibility to fit this space out and install the required plant for ventilation. All retail/leisure refuse space is separate to the central residential refuse stores. Volume of waste to be stored is based on a twice daily collection (however, this can be altered/adapted based on type of unit and amount of waste produced). These calculations are based on guidelines from ‘*Designing Waste Management in New Developments*’ by The Association of Directors of Environment, Economy, Planning & Transport (ADEPT).

Each retail/leisure tenant will be responsible for fitting out their own refuse store but will comply with a holistic one development retail/leisure waste strategy, managed by Native.

3.6.1 Waste in Use

The design incorporates an internal dedicated waste storage area provided for the segregation and storage of operational waste and recyclable waste volumes generated by the assessed building. Such recycling areas are sized to be appropriate for the building type and users, utilising the MCC waste guidance document.

The waste requirements have been assessed in accordance with BS5906, 2005 on the basis of a volume of 50 litres per person in line with the predicted volumes of waste that will arise from daily/weekly operational activities and occupancy rates for the proposed building type.

Refuse chutes have been provided to enable efficient, safe and hygienic movement of general / recyclable waste from the upper floors to the ground floor refuse areas.

Refuse storage has been located, sized and coordinated to enable efficient access by collection crews and vehicles.

Refuse / delivery vehicle parking areas have been designed to ensure adequate parking and access to the refuse stores.

3.7 Construction Management

3.7.1 Demolition and Construction

A dedicated Resource Management Plan (RMP) has been developed covering the non-hazardous waste related to on-site construction and dedicated off-site manufacture or fabrication (including demolition and excavation waste) generated by the building’s design and construction. This RMP has taken the form of a detailed Site Waste Management Plan (SWMP) covering all phases and has been designed to not only monitor and record, but to manage, inform and benchmark the developments waste performance. The SWMP is a contractor operated system and enabled live analysis of the developments waste performance throughout construction.

The contents of the plan are outlined below:

1. Revision records and Contractor Team Responsibility
2. Overview of SWMP
 - Waste Hierarchy (as detailed in the image below)
 - Project Stage and Project Planning Actions
 - Site Operations and Post-completion Actions
 - Pre-start Estimate and Benchmarking
 - Identified Waste Generated
 - Site Operations Waste Streams
3. Introduction, Updating the Plan and Duties
4. Project Description
5. Total Gross Development Area
6. Estimate of Types and Quantities of Waste
 - a Demolition Waste
 - b Excavation Waste
 - c Construction Waste
 - d Guide to European Waste Codes
7. Management of Waste
 - a Waste Control and Disposal
 - b Reduce and Reuse Measures
 - c Recycle / Recover Measures
 - d All other waste
 - e Disposal Responsibilities
 - f Management of Hazardous Waste
8. Waste Carrier Details and Disposers
9. Record of Waste Removed / Recycled
10. Post Contract Review
 - a Estimate of Cost Saving
 - b Explanation of any deviation from the original plan
 - c Post Project Waste Figures

Any and all non-hazardous waste related to on-site construction and dedicated off-site manufacture or fabrication (including demolition and excavation waste) generated by the building’s design and construction has been minimised.

In order that the waste targets have been met, all waste materials have been sorted into separate key waste groups (according to the waste streams generated by the scope of the works) either on-site or through a licensed contractor for recovery.

The Waste Hierarchy



3.7.2 Construction site environmental management

The principal contractor registered the site with the Considerate Constructor Scheme (CCS) and has undertaken works in accordance with the standard. Sites registered with CCS are monitored against a Code of Considerate Practice, designed to encourage best practice beyond statutory requirements. The Considerate Constructors Scheme aims to minimise waste, reduce a developments carbon footprint and maximise resource usage.

During construction, best practice measures have been implemented to minimise potential impacts to sensitive local receptors resulting from emissions to air and water, noise and vibration and from site lighting. The development has achieved a 'Performance Beyond Compliance' certificate.

The principal contractor has monitored and recorded energy use, water consumption and transport data resulting from all on-site construction processes and dedicated off-site monitoring throughout the build programme to manage, inform and benchmark the developments construction process. This level of monitoring has enabled the contractor to minimise consumption and maximise resource use.

3.7.3 Reuse of Materials from the Demolition

Due to the existing buildings on site, there is an opportunity to recycle some of the material from the existing building demolition. To determine the viability of this approach, a pre-demolition audit of the existing buildings, structures and hard surfaces was completed to determine whether reuse is feasible and, if not, to maximise the recovery of material from demolition for subsequent high grade/value applications.

As a result of this audit, it was determined that some 6F2 would be reused on site, it was utilised for the piling mat underneath Block C and Block F. Block C has a footprint of approx. 1250m² and Block F of 2875m². The mat had a depth of 500mm so in total, a volume of approx. 2062.5m³ was reused in the scheme. The remainder of 6F2 was unable to be used on site and was taken away by a licensed Waste Contractor for recycling elsewhere.

3.8 Biodiversity

A full ecological appraisal of the site has been carried out. This was written up and submitted as part of the planning application documents.

Trees and plants are vital to creating a more sustainable, greener and pleasant development. Plants provide a wealth of benefits, improving the micro-climate, air and water quality, increasing biodiversity and enhancing the visual and amenity value of the landscape. Plants also humanise urban spaces and provide a natural seasonal sense of time.

Biodiversity and green infrastructure are key to the Kampus scheme. The landscape scheme has enhanced the ecological value of the site and provides a rich variety in vegetation to emphasize the different atmospheres. The vegetation differs in each part of the courtyard, Resident's Garden and external planted areas.

The planting includes species of varying heights that considers the entire lifecycle of bees and butterflies, to provide breeding places and a succession of food, it focuses where possible on nectar rich and berrying species to support wildlife. Where possible plant native species have been included.

3.8.1 Protection

All existing features of ecological value surrounding the construction zone and site boundary area have been adequately protected from damage during clearance, site preparation and construction activities.

Retained trees of significant ecological value have been protected by barriers to minimise direct impact and from severance or asphyxiation of the roots.

Hedges and natural areas requiring protection had barriers erected and be protected, or, when remote from site works or storage areas, were protected with a prohibition of construction activity in their vicinity.

Watercourses were protected by cut-off ditches and site drainage to prevent run-off to natural watercourses (as this may cause pollution, silting or erosion).

The principal contractor constructed ecological protection prior to any preliminary site construction or preparation works (e.g. clearing of the site or erection of temporary site facilities).

Where possible all flora habitats that existed on site were protected by the contractor through appropriate programming of site works to minimise disturbance to wildlife.

Pollution prevention guidelines produced by the Environment Agency have been followed (as demonstrated by the Mount Anvil Environmental Management Plan) to ensure that botanical species of nature conservation interest located in the canal system were not impacted.

3.8.2 Ecological Features

A new ecologically valuable habitat, appropriate to the local area (preferably of local provenance), has been created that supports important biodiversity in line with the Government's planning policies for England and Wales. Policies that relate to conserving and enhancing the natural environment include 'minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

The increase in planting area, diversity and introduction of green corridors will improve species biodiversity and form migration corridors which enable natural migration through the site. The increase in overall green space will increase opportunities for habitat expansion leading to an improved ecological value within the local area.

The creation of a canal side habitat of significant local value will strengthen the already important role the canal plays in the urban environment. The opening up of the canal side area will both improve migration of species to and from the site and help to establish a new waterside habitat.

Retained and introduced mature trees will be maintained and managed as part of the overall scheme strategy and incorporated in the habitat management plan.

The urban courtyard, street courtyard and corner park will incorporate rough grasses, large urban trees in grasses and wildflower beds. These areas form part of the ground level 'green corridor' which acts as a link between areas of biodiversity, enabling an exchange of individuals between populations, which will help prevent the negative effects of inbreeding and reduced genetic diversity (via genetic drift) that often occur within isolated populations.



Urban courtyards

Podium gardens / terraces within the development contain planters around their edges forming a natural barrier, while pots and crates allow for flowers and small trees on the terraces. Though they do not directly replace ground-based habitats and are not part of a ground level 'green corridor', they can be thought of as green 'stepping stones' for wildlife and can cater for a variety of flora and fauna unattainable on traditional roofs.



Roof gardens

3.9 Waterways and Drainage

The nearest open watercourse to the Site is the River Medlock c. 350 m to the southwest of the Site which is designated as Main River. Due to the distance, existing buildings and infrastructure; a direct connection to this watercourse is not possible.

The 'Shooters Brook' is located within the site boundary and is indicated as being 600 mm diameter clay pipes. Additionally, the Dukes Tunnel is present beneath the site. It is understood that both of these features are hydraulically connected to the River Medlock. Currently there are no known existing connections from the site to either the Brook or the tunnel that can be utilised for development of the scheme. As the site does not currently discharge to these features, it is not possible to confirm whether the additional water from the site would increase risk of flooding either on the site or elsewhere in the wider catchment.

The northern boundary to the site is formed by the Rochdale Canal which is understood to be subject to surface flooding. No connections exist to the Canal and as a result it is considered additional flows from the site to the Canal could increase the risk of flooding.

CCTV survey information has shown the site to discharge surface water to the existing public sewers in the vicinity of the site. Given the above it is proposed that the existing connections are maintained for the development of the Kampus Site.

3.9.1 Surface Water Discharge Control

The FRA confirms the site is in a critical drainage area and as such a reduction in surface water flows of 50% is required for brownfield site discharging to existing public sewer. Manchester City Council would prefer if discharge flow rates were reduced to Greenfield Runoff conditions wherever practicable. As a result, attenuation has been installed to facilitate the development of the site.

Controls will include a manhole with vortex control to limit the peak rate of surface water runoff from the site.

3.9.2 Surface Water Attenuation Storage

Due to the constraints of the site attenuation has been provided in below ground storage and will be controlled at the downstream end by a control structure.

Attenuation has been provided for the 100-year storm event plus allowance for climate change and takes the form of below ground geocellular tanks. The Attenuation tank provided 420m³ of water storage volume and has been located underneath the central courtyard to permit access for maintenance and inspection.

The attenuation storage has been provided with an impermeable liner to prevent infiltration of surface water into the made ground.

3.9.3 Water Treatment and Quality

Surface water run-off can contain contaminants such as oil, organic matter and toxic metals. These pollutants, even at low levels, can have a cumulative impact upon water quality. This affects biodiversity, amenity value and in some cases potential water abstraction value. The quality of surface water run-off is a particular issue for small rainfall events which is due to the flush of debris and sediment from paved surfaces being 'washed off' in the first part of the event together with sediment deposits in the pipe network. This is compounded by the fact that this highly concentrated initial flow enters the receiving water at base flow conditions, thus providing a minimum level of dilution.

In accordance with "Use and design of oil separators in surface water drainage systems: PPG 3" no oil separators have been provided. It is envisaged that hardly any surface water will enter the undercroft car park and therefore drainage (gullies) are not required. This means, potential pollutants from the car park cannot enter the system and discharge to the culverted watercourse. In addition, the architect layout shows that there are less than 50 parking spaces per floor within levels 1 and 2 of Block F, therefore a petrol interceptor is not required.

3.9.4 Foul Drainage Strategy

During discussions with the Water Authority, UU confirmed that “Foul will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection to the public sewer can be at a point convenient to yourself”.

Foul drainage connections have been provided to the public combined sewers using existing connections present on Site, wherever practical. These existing connections have been utilised to reduce the extent of off-site works and gaining approval for new connections to the existing sewer system, avoiding disruption to existing traffic on the busy highways infrastructure and also to reduce health and safety issues associated with connecting the existing deep drainage.

Foul drainage has made an allowance for grease traps / interceptors for kitchen areas in the above ground drainage systems.

3.9.5 Pump Stations

It is understood that the Site currently discharges by gravity to the existing infrastructure via existing connections, therefore pump stations are not required.

4.0 Energy Statement

Policy EN 6 of the Manchester Core Strategy requires that developers prepare an Energy Statement. Although the emissions targets contained within this policy have now been superseded this Energy Statement has been prepared in order to demonstrate the total regulated energy that the completed development is predicted to use and the associated carbon emissions.

Following the publication of the Ministerial Statement setting out the conclusion of the Housing Standards Review, the Government’s policy is that local authorities can continue to set and apply performance policies related to energy and CO2 emissions that exceed Building Regulations (though not exceeding CSH Level 4) where they have referenced the Code for Sustainable Homes in policy. Given that MCC has existing policies in place, they are able to apply this interim measure which corresponds to an approximate 25% reduction in CO2 emissions compared with the requirements of Part L (2010). However, as was the case with policies EN 6 and DM 1, MCC are likely to continue to consider the impact on viability so as not to unnecessarily stall or otherwise stifle development.

Appendix A of the Manchester Core Strategy provides a guide to assist in completing the Energy Statement and sets out the methodology that should be followed. This consists of the following steps:

1. Set out baseline information including proposed uses and floor space.
2. Calculate regulated energy demand and associated CO2 emissions of completed development assuming only compliance with Part L.
3. Apply the appropriate emissions reduction target.
4. Apply the energy hierarchy to identify opportunities to design out energy consumption and emissions and set out reductions achieved by each measure.
5. Consider appropriate low carbon, renewable or decentralised technologies.
6. Assessment of least cost option of meeting the reduction target.

This section provides information in relation to these steps for the completed Kampus development.

4.1 Development information

The new Kampus development comprises of the construction of 2no new multi storey residential apartment blocks (Block C and Block F); and the refurbishment of an existing tower block (Block E) to create 478 residential apartments (a mixture of 1-bed and 2-bed apartments). A car park and a number of commercial retail units are also to be provided as part of the development. The retail units will be constructed to a shell standard for future fit out by the occupiers.

4.2 Building Regulations

The dwellings have been assessed under Building Regulations Part L1A, 2013 ‘Conservation of fuel and power in new dwellings’. The development has met the requirements of this document.

4.2.1 Criterion 1 ‘Achieving the TER and TFFE rate’

To meet the requirements of Criterion 1 the Dwelling CO2 Emission Rate (DER) and the Dwelling Fabric Energy Efficiency (DFEE) rate must be no worse than the Target CO2 Emission Rate (TER) and the Target Fabric Energy Efficiency (TFEE).

SAP calculations have confirmed the strategy required to achieve compliance. The strategy includes:

- Improved U-values over the allowable values stated within Building Regulations Part L1A.
- Improved air permeability over the maximum value stated within Building Regulations Part L1A.
- The use of high efficiency low energy lighting.
- Heat recovery through whole dwelling ventilation systems.
- The use of CHP technology by utilising the Energy Centre to provide space heating and Domestic Hot Water.

4.2.2 Criterion 2 ‘Limits on design flexibility’

The fabric parameters included within the dwellings have met or bettered the limiting values set out in Building Regulations Part L1A. The table below shows the comparison between these values and the values included within the development.

Building Element	Limiting Fabric Parameters	Installed Values
Roof	0.20 W/m ² .K	0.10 W/m ² .K
Wall	0.30 W/m ² .K	0.15 W/m ² .K
Floor	0.25 W/m ² .K	0.20 W/m ² .K
Party wall	0.20 W/m ² .K	0.00 W/m ² .K
Windows, roof windows, glazed roof-lights, curtain walling and pedestrian doors	2.00 W/m ² .K	1.30 W/m ² .K
Air Permeability	10.0 m ³ /h.m ² at 50 Pa	5.0 m ³ /h.m ² at 50 Pa

Each fixed building service meets or exceeds the minimum acceptable value as set out in the Domestic Building Services Compliance Guide.

4.2.3 Criterion 3 'Limiting the effects of heat gains in summer'

The façade of each building has been built to optimise the use of natural daylight. Solar gains are beneficial in winter to offset demand for heating; however, they can also contribute to overheating in summer. The SAP calculations have indicated a 'not significant' risk of overheating.

4.2.4 Criterion 4 'Building performance consistent with DER and DFEE rate'

'As built' SAP calculations have been carried out to demonstrate that the dwelling emission rate and dwelling fabric energy efficiency improve upon the requirements.

4.2.5 Criterion 5 'Provisions for energy-efficient operation of the dwelling'

Operating and maintenance instructions aimed at assisting the occupiers of the dwelling to achieve the expected level of energy efficiency have been provided.

4.3 Code for Sustainable Homes

Within Manchester City Council's Core Strategy there is a requirement for new housing developments to be assessed under The Code for Sustainable Homes.

On the 25th March 2015 a written Ministerial Statement was issued which sets out the conclusions to the government's Housing Standards Review associated with the withdrawal of the Code for Sustainable Homes Assessment Methodology. The Ministerial Statement also notes that planning consents can no longer dictate compliance with the Code for Sustainable Homes.

4.4 Manchester City Council Core Strategy

The Manchester Core Strategy 2012 to 2027 includes specific policies designed to reduce CO2 emissions. The policies applicable to the proposed development are:

- Policy EN 4 'Reducing CO2 Emissions by Enabling Low and Zero Carbon Development'
- Policy EN 6 'Target Framework for CO2 reductions from low or zero carbon energysupplies'

Policy EN 4 aims to reduce fuel poverty and decouple growth in the economy, growth in CO2 emissions, and rising fossil fuel prices.

All developments must 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.
- To meet residual energy requirements through the use of low or zero carbon energy generating technologies.

Wherever possible new developments and retrofit projects, including energy generation plant, must be located and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies.

Where possible new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future

connection to any existing / potential decentralised energy schemes.

The use of building materials with low embodied carbon in new development and refurbishment schemes.

Policy EN6 stipulates energy reduction targets for residential developments of 10 or more units as shown in the table below.

Target	% Minimum Requirement
Target 1: Network Development Area	CHP/District heating anchor or connection or where not feasible a 15% improvement on Part L 2010
Target 2: Electricity Intense Buildings	+15% improvement on Part L 2010
Target 3: Micro Generation Area	+15% improvement on Part L 2010

The development will require a 15% increase on Part L 2010, which equates to a 9% improvement upon Part L 2013.

4.4.1 Compliance with Policy EN 4 'Reducing CO2 Emissions by Enabling Low and Zero Carbon Development'

The development has complied with the requirements of Policy EN 4 by;

- Minimising the use of artificial lighting through the design of the façade.
- Inclusion of solar control within the glazing system to reduce heat gains within the dwellings.
- Reduce the heating demand of the dwellings by utilising an enhanced building envelope.
- Reduce the electrical demand of the dwellings through the use of LED or low energy light fittings.
- Inclusion of CHP technology by utilising the Energy Centre to provide space heating and Domestic Hot Water.

4.4.2 Compliance with Policy EN 6 'Target Framework for CO2 energy supplies'

The development has complied with EN 6 by achieving a minimum of 15% improvement on Part L 2010, therefore a 9% improvement upon Part L 2013. The As-built SAP calculations for each block confirm that there is an area-weighted average improvement of 14.43% upon Part L 2013 over the whole development, which equates to 20.43% improvement upon Part L 2010.

5.0 Renewable Energy

The viability and potential for low carbon technologies has been considered for the development with discussions required with the electricity supply authority and confirmation of the developments base electrical and thermal demand through modelling. The use of central, gas-fired CHP plant from the Energy Centre, with radiators and heat interface units providing space heating and domestic hot water have been included.

The feasibility of different renewable or low carbon technologies was considered from the outset of design as there are various benefits and disadvantages for each technology. The site and usage of the occupants was included within the feasibility study and the findings are outlined below:

5.1.1 Wind Power

Small scale wind turbines can be used to generate electricity for individual dwellings. Wind turbines harness the power of the wind and use it to generate electricity.

Pros	Cons
Wind turbines are eligible for the feed-in tariff and therefore the homeowner will receive an income from generating electricity.	The recommended average wind speed required to make the technology viable for installation is in excess of 6 m/s. The average wind speed on the site is 4.4 which is below the recommended minimum for turbine installation.
Wind turbines will reduce the carbon emissions of each dwelling.	Turbines generate noise when in operation. This is not desirable for residential locations.
	Turbines have moving parts and therefore require more maintenance than other renewable technologies

The technology is not feasible for use within the development due to insufficient wind speed in the area, noise generation and aesthetics.

5.1.2 Photovoltaic Arrays (PV)

PVs are used to generate electricity directly from sunlight. The electricity generated can be used within the dwelling or exported back to the grid.

Pros	Cons
Reduce carbon emissions and electricity bills.	Relatively high capital expenditure.
Eligible for the Feed-in tariff and therefore the homeowner will receive an income for generating electricity.	Solar PV only generates electricity when the sun is shining. For residential properties, while occupants are not within the dwelling during daytime, the electricity will be exported to the grid. Grid exported electricity receives a lower rate under the feed-in tariff than electricity used within the dwelling and therefore the payback period for the PV array increases.
PV panels have no mechanically moving parts and consequently they require far less maintenance than other renewable technologies.	
PV panels are silent and therefore are the preferred solution for urban areas and for residential applications.	
Easy to install.	

The use of PV is a viable option for a development of this type, however the orientation of the roofs and overshadowing by surrounding buildings make less unviable when compared to other options.

5.1.3 Solar Water Heating

The process of solar water heating involves the absorption of the sun's radiation by collectors, via a fluid (usually water and/or antifreeze), and the transfer of the heat to a hot water storage tank. This is then made available through the building's hot water system.

Pros	Cons
Solar collectors used for hot water are a mature technology offering a high energy contribution.	External area required for locating the solar collectors. These would be sited on the roof and would have a visual impact.
Solar systems can easily store thermal energy in storage tanks and use it when it is required.	Not suitable for high rise buildings as there needs to be a short distance between the panels and the storage to maintain efficiencies.
A typical system will provide virtually all the hot water required by the dwelling in the summer but only around 50% of the annual hot water demand.	Additional plant space required within the dwelling for the storage tank, in addition to the space required for the boiler.
	Additional maintenance is required for the pumps.

Solar hot water heating is not proposed due to the height of the building and distance between panels on the roof and dwellings on the lower levels, and overshadowing by surrounding buildings make it unviable.

5.1.4 Biomass Heating

Biomass, also known as biofuels or bio energy, is obtained from organic matter, either directly from plants or indirectly from industrial, commercial, domestic or agricultural products.

Pros	Cons
The use of biomass is generally classed as a 'carbon-neutral' process because the carbon dioxide released during the generation of energy is balanced by that absorbed by plants during their growth.	Space is required for storing fuel.
	High capital expenditure and fuel costs.
	Availability of biomass fuel local to the development would need to be established.
	Increased maintenance requirements over conventional systems.
	A back-up boiler would be required in case of fuel shortage.

The technology is not considered viable for use within the dwellings due to space required for additional plant and high capital expenditure.

5.1.5 Combined Heat and Power (CHP)

The principal is that a gas or oil-fired engine drives a generator that produces electricity. The heat from the engine block and exhaust are absorbed into a coolant and this is used as a heat source within the building.

Pros	Cons
CHP provides security of electrical supply.	Carbon savings in most smaller, newer domestic properties are insignificant.
Domestic micro-CHP systems typically generate electricity at times which correspond with peaks in demand.	On average, 50% of electricity generated in domestic applications is surplus. There is currently a shortfall of available export reward tariffs for excess electricity directed to the grid.
Local generation of electricity is usually cheaper than buying off-grid.	Current life expectancy of micro-CHP units is reported to be relatively low.
Delivers central heating, hot water and electricity.	High installation costs.
	Extended payback period.
	Require a hot water demand to operate
	Increased maintenance requirements over a standard boiler.
	Noise from the CHP would need to be assessed.
	Flues would need to comply with the clean air act.

CHP has been installed in the Energy Centre to produce electricity and the base heating load for the domestic hot water and space heating for the whole site.

The use of CHP combined with the fabric improvements will significantly reduce the energy consumption and CO₂ Emissions when compared to the existing buildings prior to development.