

Environmental Standards

Statement

Ref: Z43470

18No Proposed Apartments

at

**67 Old Market Street,
Blackley
Manchester
M9 8DX**

for

CEJ Homes Ltd



FS 560187

Energy Counsel
Viridor House
No.3 Bolholt Terrace
Bury/Gtr Manchester
BL8 1PP

Tel: +44 (0)161-762 1055

Fax: +44 (0)161-761 1094

Matthew.Gibson@energycounsel.co.uk

www.energycounsel.co.uk

Document Status – Draft

Reference: Z43470			Date
Produced by:		Paul Ahern	12 th December 2022
Checked by:		Matthew Adams	14 th December 2022
Approved by:		Matthew Gibson	14 th December 2022

Disclaimer

This report has been prepared by Energy Counsel with all reasonable skill, care, and diligence within the terms of the Contract with the client, incorporating our Standard Terms and Conditions of Business and taking into account the resources devoted to it by agreement with the Client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client, and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own discretion and risk.

Contents

1. Introduction	6
1.1. Location	7
1.2. Floor Plans	8
2. Policy Drivers for Sustainable Development	11
2.1. National Policy.....	11
2.2. Local Policy	12
3. Methodology.....	20
4. Baseline Energy Assessment.....	22
4.1. Predicted Baseline Energy Requirements	22
5. District & Communal Heating Networks	23
5.1. Decentralised Heating Networks	23
6. Renewable Energy Technologies.....	25
6.1. Photovoltaics (PV)	25
6.2. Solar Thermal HW Panels.....	26
6.3. Ground Source Heat Pump (GSHP)	27
6.4. Air Source Heat Pump/Exhaust Air Heat Pump	28
6.5. Micro Wind Power	28
6.6. Biomass.....	29
7. Energy Assessment of Proposed Scheme	31
8. Sustainable Design & Construction	32
9. Conclusions	35
9.1. Low/ Zero Carbon Technologies Review	35
10. Appendices.....	37
10.1. Energy Model Inputs for Part L1A 2013 Compliance	37
10.2. Index of Figures and Tables.....	38

Executive Summary

This document evaluates the technical and economic feasibility of using both passive and low and zero carbon technologies and assesses the practical levels of CO₂ reduction possible for this development to comply with the following Manchester City Council planning requirements:

- Manchester City Council's Core Strategy 2012 - 2027 (2012) policies EN4 – EN8 and DM1
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2021)

The following low and zero carbon technologies are evaluated:

- | | | |
|----------------------|-------------------|-----------------------|
| • Solar Photovoltaic | • Biogas | • Heat Pumps: Air |
| • Solar Hot Water | • Combined Heat & | Source, Ground Source |
| • Biomass | Power (CHP) | and Exhaust Air |
| • Wind | | |

The approach for the Old Market Street development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL1A 2013
- 2) Enhanced air tightness and thermal bridging
- 3) Heating to be provided by efficient electric panel heaters
- 4) Hot water to be provided by an efficient air source heat pump system
- 5) Decentralised Mechanical extract ventilation system (dMEV) provided to wet rooms
- 6) LED lighting to have presence detection and daylight dimming control to classroom areas

An assessment of CO₂ emissions is made based on the Standard Assessment Procedure (SAP) methodology to comply with Approved Document Part L1A (2013) and in line with the requirements of Manchester City Council planning policy. The development will be provided with energy savings through the use of passive improvement measures, such as improved energy efficiency. This passive approach to compliance will complement the integrated approach to the sustainable energy objectives of the national and local policies.

The principles of a 'Be Lean, Be Clean, Be Green' design philosophy have been applied, which results in a 15.80% improvement over Building Regulations Part L1A 2013, as indicated in Table 1.

Table 1 - Proposed development CO₂ emissions against Building Regulations Part L1A 2013

	Total CO ₂ Emissions (KgCO ₂ /Yr)	
Baseline Emissions of Development (pre-improvement)	25,532	
Proposed Strategy	21,506	
Total Reduction in Carbon (KgCO ₂ /yr)		4,025
Percentage Improvement in Carbon Emissions (over Building Regulations ADL2A 2013)		15.80%

A full design specification that confirms inputs used within the Part L1A 2013 calculations is provided within the appendices of this report.

The development has also been assessed to maximise its sustainability and environmental credentials. This strategy considers many aspects of the design and construction of the development and the following issues have been identified:

1. Energy Efficiency
2. Transport
3. Pollution
4. Construction Materials and Waste
5. Water Consumption
6. Ecological Aspects (Land Use and Ecology)
7. Health and Wellbeing
8. Sustainable Management of the Construction Process

1. Introduction

This Environmental Standards Statement has been developed in support of the planning application for the proposed development at 67 Old Market Street in Manchester.

The proposed development consists of 18No apartments across 4 stories. The development is required to achieve compliance under Building Regulations Approved Document Part L1A (2013).

This assessment has been undertaken to strategically look at the technical and economic feasibility of energy and sustainability measures to maximise the scheme's sustainable and environmental credentials and in accordance with the following planning policies:

- Manchester City Council's Core Strategy 2012 - 2027 (2012) policies EN4 – EN8 and DM1
- Principles of The Guide to Development in Manchester SPD (2007)
- National Planning Policy Framework (2021)

A range of sustainable design principles are explored for this development to minimise the adverse effects of development on the environment at global and local scales, whilst promoting healthy indoor conditions for the occupants. Throughout this report, passive design techniques, energy efficient equipment and appropriate low carbon technologies will also be appraised in line with the 'Be Lean, Be Clean, Be Green' philosophy of relevant planning documents and the Energy Hierarchy.

An assessment of CO₂ emissions is made based on the calculation methodology dictated by the Standard Assessment Procedure (SAP) methodology to comply with Approved Document Part L1A (2013) and in line with the requirements of Manchester City Council planning policy.

1.1. Location

The area of land for the proposed development at Old Market Street, Manchester, M9 is highlighted by the red line boundary shown in Figure 1. Manchester city centre is located three miles to the South of the site.

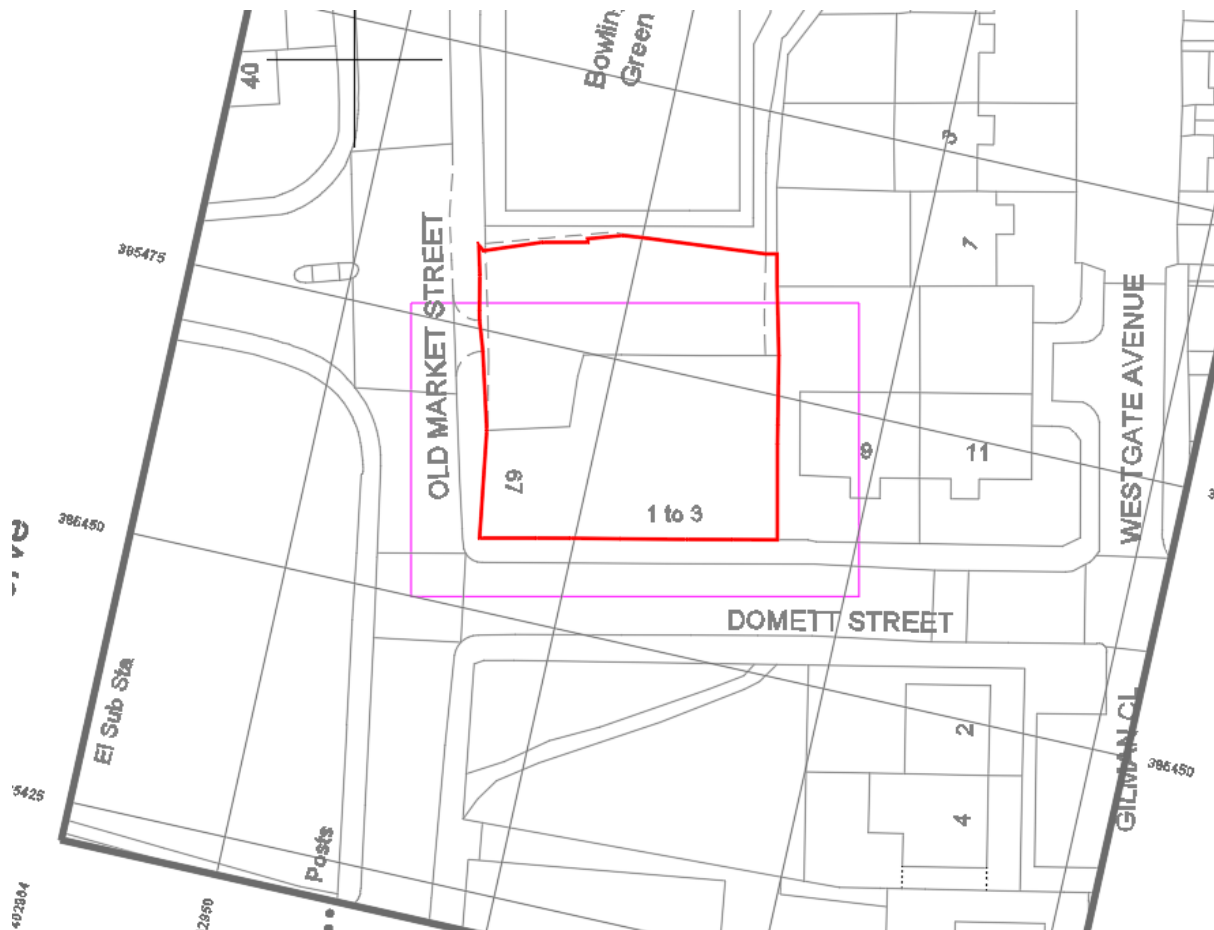
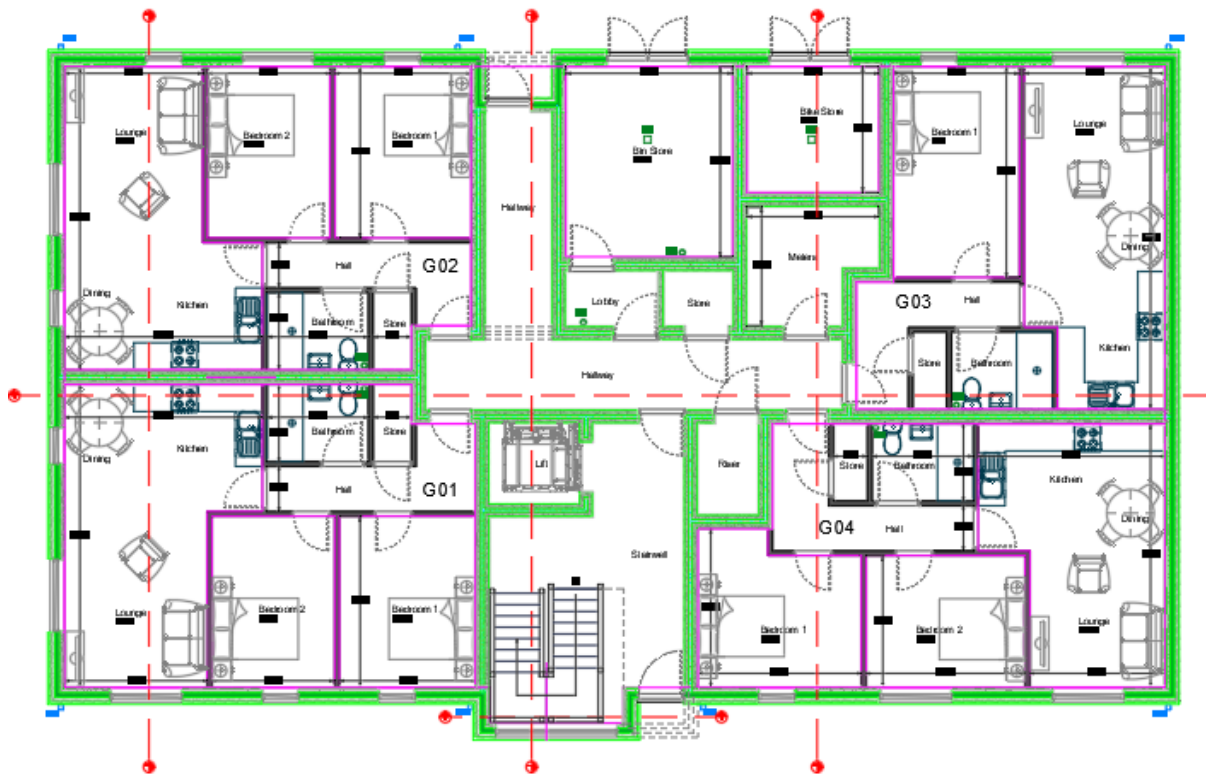


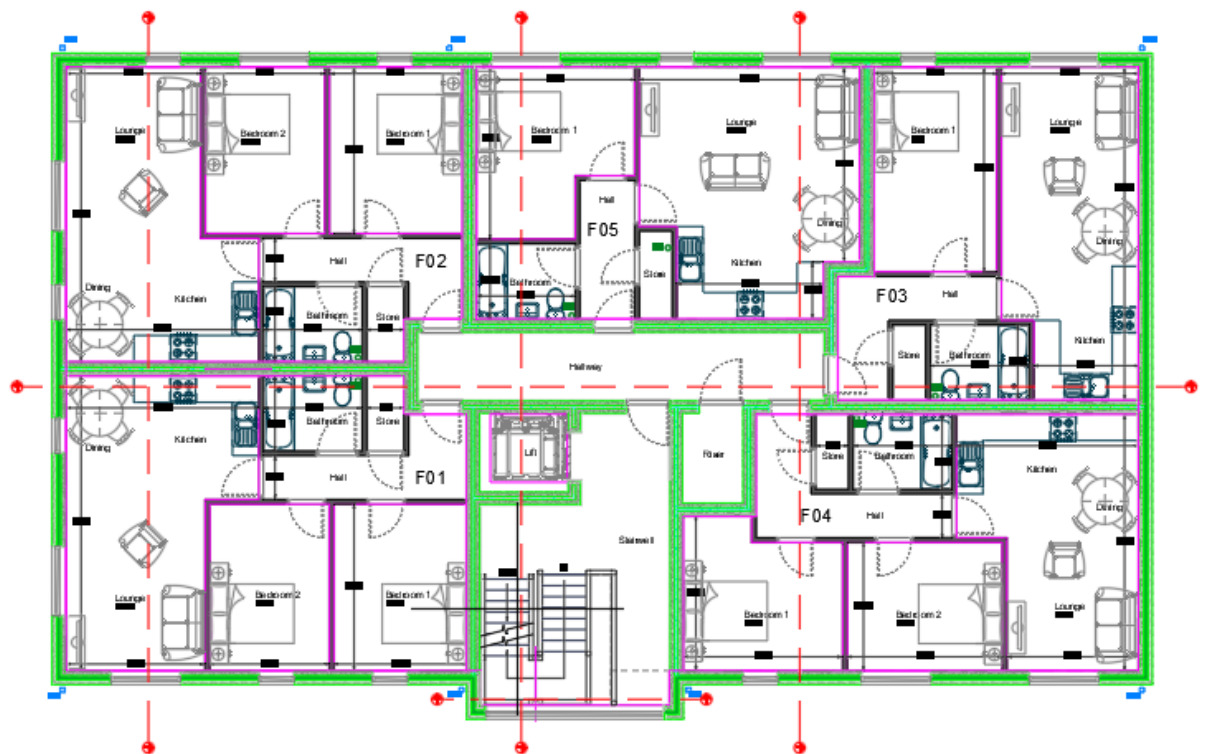
Figure 1 – Map view of proposed Old Market Street development

The site is accessed from Old Market Street to the North of the site, with the surrounding area being largely a residential area.

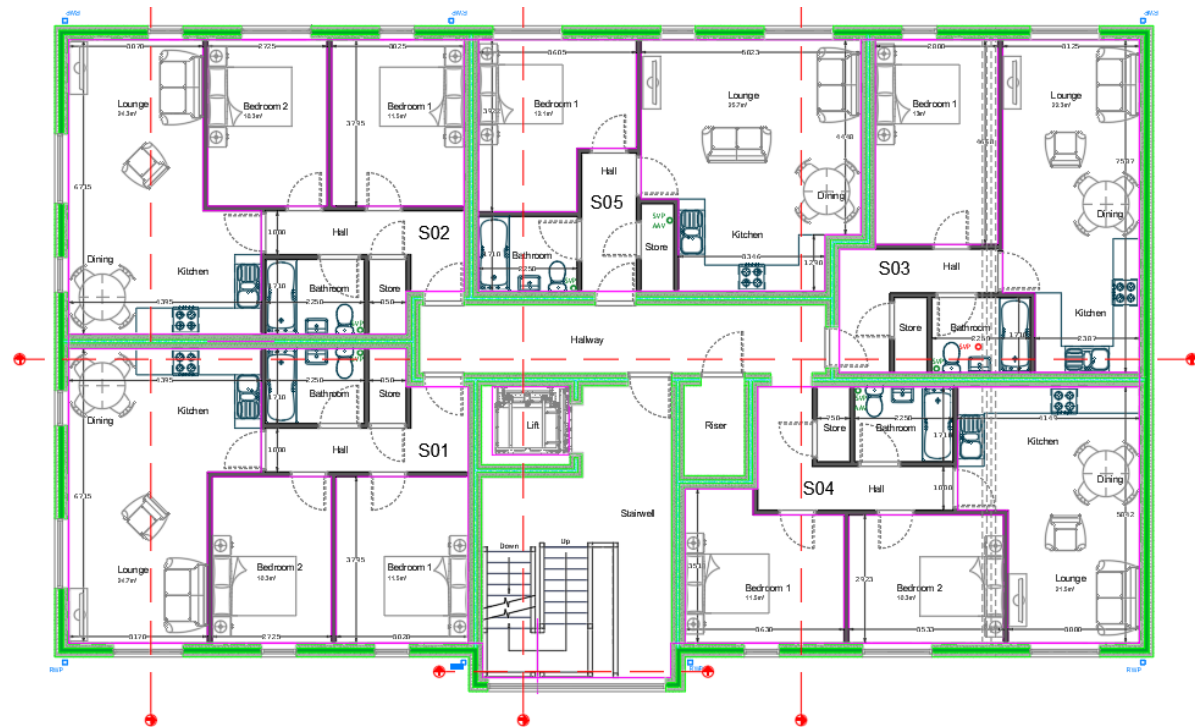
1.2. Floor Plans



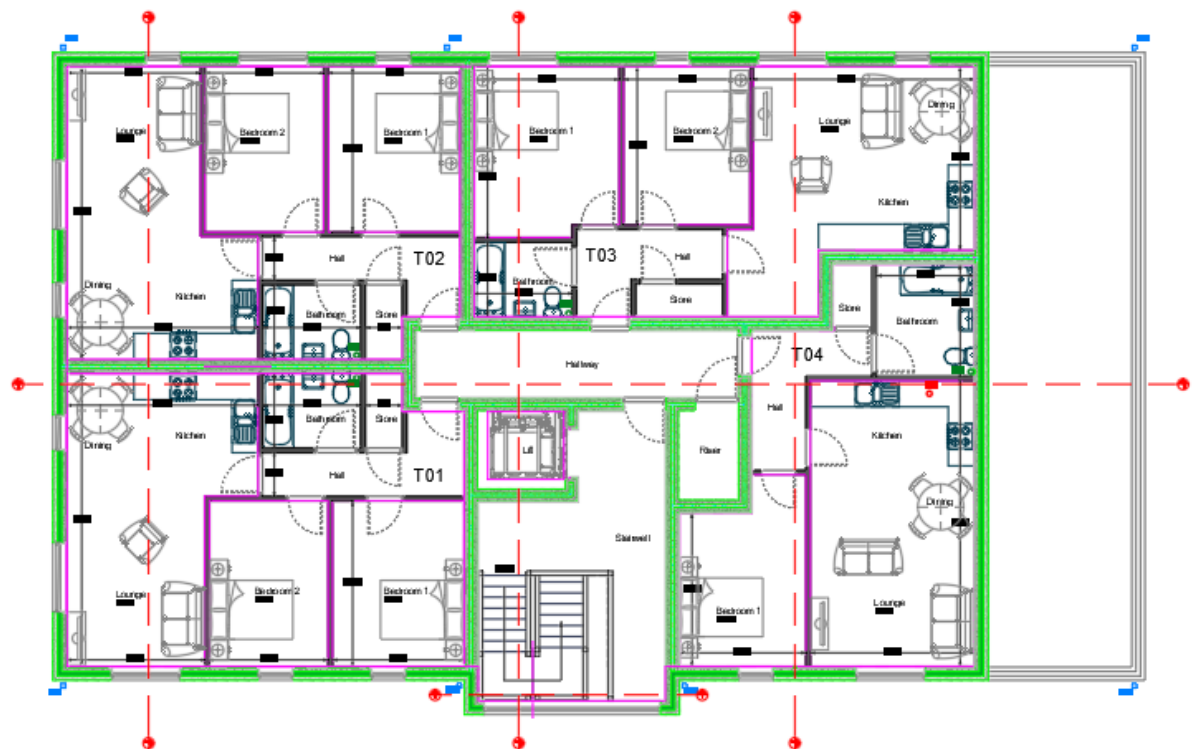
PROPOSED GROUND FLOOR PLAN



PROPOSED FIRST FLOOR PLAN



PROPOSED SECOND FLOOR PLAN



PROPOSED THIRD FLOOR PLAN

Figure 2 – Proposed floor plans for proposed Apartment block at Old Market Street, Blackley

The proposed development consists of a four-storey apartment block consisting of 18No apartments located from Old Market Street. Internally the building consists of the following apartments.

- 12No 2 Bedroom 4 Person Apartments
- 6No 1 Bedroom 2 Person Apartments

2. Policy Drivers for Sustainable Development

This section presents a range of sustainable planning policy that is applicable to the proposed Old Market Street apartments development, at both a national and a local level.

2.1. National Policy

The National Planning Policy Framework, published in July 2021, sets out the government's planning policies for England and they should be applied. Table 2 sets out the relevant sustainability standards for new developments and provides an indication of the design response to be provided.

Table 2 – Key National Planning Policy Requirements and Design Responses

Section	Policy Requirements	Design Response
14. Meeting the challenge of climate change, flooding and coastal change	The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: Shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.	This development will follow the principles set out in Manchester City Council's Core Strategy 2012 – 2027 (2012), using a 'Be Lean, Be Clean, Be Green' approach in reducing operational carbon emissions. An overview of current decentralised energy schemes around the Manchester area and an assessment on the potential for future schemes in relation to this development is provided in Section 5 of this report. This environmental standards statement appraises site specific information to determine the most appropriate approach to minimise energy consumption.

2.2. Local Policy

The adopted Manchester Core Strategy 2012 – 2027 (2012) and the Supplementary Planning Document and Planning Guidance (2007) provide a set of guidelines for new development. All relevant energy and sustainability policy within these documents is provided within this section together with a design response.

Table 3 – Key Local Planning Policy Requirements and Design Responses

Manchester Core Strategy 2012 – 2027 (2012)		
Section	Policy Requirements	Design Response
EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development	All development 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 development 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 used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings. Where appropriate 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.	The proposed Old Market Street development will follow the principles of the Energy Hierarchy by adopting a passive fabric-first approach to design before the use of renewable technologies. A full energy strategy is provided in Section 7 of this report, following an appraisal of a range of site-specific measures in line with the 'Be Lean, Be Clean, Be Green' approach. A review of district heating opportunities is provided in Section 5 of this report, in line with current local development.
Policy EN 5 – Strategic Areas for low and	Within Manchester it is considered that the following strategic areas, indicated on the key diagram, will have a major role to play in achieving an increase in the level of	The proposed Old Market Street development does not fall within a Strategic

zero carbon decentralised energy infrastructure	decentralised, low and zero carbon energy supplies available: • 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 • 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. The Council will work with all relevant stakeholders, which may include developers, landowners, residents, community groups, private sector partners, utilities companies, neighbouring authorities and other public sector bodies, as appropriate, to bring forward such plans. Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO2 reduction funded by contributions.	Area for decentralised development, as defined within the Manchester City Council Core Strategy 2012 – 2027. The proximity of the site to current decentralised energy networks is illustrated within Section 5 of this report.
---	---	---

Policy EN 6 - Target Framework for CO2 reductions from low or zero carbon energy supplies	Applications for residential development of 10 or more units and all other development over 1,000m² will be expected as a minimum to meet the target for the defined areas below. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development. The target framework relates to three broad development locations and their potential for low and zero carbon, decentralised energy. The areas are defined as follows: • Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling). • Target 2 Electricity intense areas: Locations where the predominant building type has an all-electric fit-out such as retail units and leisure complexes. • Target 3 Micro-generation areas: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical. <table><tr><th>Target</th><th>% Minimum Requirement</th></tr><tr><td>Target 1: Network development area</td><td>CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.</td></tr><tr><td>Target 2: Electricity intense buildings</td><td>+10% increase on Part L 2010</td></tr><tr><td>Target 3: Micro generation area</td><td>+15% increase on Part L 2010</td></tr></table>	Target	% Minimum Requirement	Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.	Target 2: Electricity intense buildings	+10% increase on Part L 2010	Target 3: Micro generation area	+15% increase on Part L 2010	The proposed development consists of a four-storey apartment block consisting of 18No apartments and is therefore within the threshold of a major development and will be expected to meet Target 2 The site does not sit within an area defined for development of low and zero carbon, decentralised energy. An overview of the site in relation to current decentralised networks in the region is provided in Section 5. No less than a 10% improvement over Part L 2010 will be provided through a fabric first and energy efficiency approach. The use of air source heat pumps (ASHP) for hot water only provides efficient hot water to each apartment ensuring carbon emissions savings against the Part L TER baseline.
Target	% Minimum Requirement									
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010.									
Target 2: Electricity intense buildings	+10% increase on Part L 2010									
Target 3: Micro generation area	+15% increase on Part L 2010									
Policy EN 7 – Energy Infrastructure opportunities	There will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations: That any new generating plant capable of producing heat and cooling as well as electricity should be located in a way that facilitates future connection to a local distributed	An overview of the site in relation to current decentralised networks in the region is provided in Section 5.								

	energy system. • That any energy centre, including generating plant, standby/boiler plant and substations, shall be located and designed to a high quality so as to integrate with and contribute to the townscape. • Biofuels should be obtained from sustainable sources and processes and in a way that minimises transport impacts, following a sequential approach in order to minimise CO2 emissions – firstly prioritising local and regional sources, followed by national, European and international. • Consideration should be given to biofuel delivery by rail and waterways where possible. Where large-scale fuel or feedstock delivery is required by road the energy centre must be located in or adjacent to light industrial, industrial or leisure uses with any impact on local residential amenity minimised. • The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN16. • Flood risk, through the Manchester-Salford-Trafford Strategic Flood Risk Assessment. In determining proposals for development, consideration will be given to the need to safeguard strategic energy sites and network routes, both proposed or existing, where these have been identified as having strategic significance for the delivery of low or zero carbon energy infrastructure or, would be required in order to achieve the successful regeneration of an area in line with targets for reducing carbon emissions.	Due to the relatively small scale of the development, the development of a new energy centre would not be a feasible design solution.
Policy EN 8 – Adaptation to Climate Change	All new development will be expected 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,	An overview of how the Old Market Street project is intended to follow the list to be adaptable to climate change is provided within

	although this is not an exhaustive list: • Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rain water 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 • The opportunity to provide linked and diverse green space to enhance natural habitats which will assist species adaptation Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO2 mitigation under Policy EN6, subject to sufficient evidence to quantify their contribution to compliance.	Section Error! Reference source not found. of this report.
Policy DM 1 – Development Management	All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document: - • Appropriate siting, layout, scale, form, massing, materials and detail. • Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area. • Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise. • Accessibility: buildings and neighbourhoods fully accessible to disabled people, access to new development by sustainable transport modes. • Community safety and crime prevention. • Design for health. • Adequacy of internal accommodation and external	The proposed Old Market Street development seeks to meet the development management goals as described within Section Error! Reference source not found. of this report. The proposed development falls into the category of a residential development, therefore Code for Sustainable Homes applies rather than BREEAM. Within this report under section 8 the following points are covered; items such as flood risk, thermal comfort (overheating),

	amenity space. • Refuse storage and collection. • Vehicular access and car parking. • Effects relating to biodiversity, landscape, archaeological or built heritage. • Green Infrastructure including open space, both public and private. • The use of alternatives to peat-based products in landscaping/gardens within development schemes. • Flood risk and drainage. • Existing or proposed hazardous installations. • Subject to scheme viability, developers will be required to demonstrate that new development incorporates sustainable construction techniques as follows (In terms of energy targets this policy should be read alongside policy EN6 and the higher target will apply):- a. For new residential development meet as a minimum the following Code for Sustainable Homes standards. This will apply until a higher national standard is required: Year 2010 – Code Level 3; Year 2013 - Code Level 4; Year 2016 - Code Level 6; and (b) For new commercial developments to demonstrate best practice which will include the application of the BREEAM (Building Research Establishment Environmental Assessment Method) standards. By 2019 provisions similar to the Code for Sustainable Homes will also apply to all new non-domestic buildings.	passive design and a variety of ecological aspects in relation to soft landscaping design, habitat management and creation.
Supplementary Planning Document and Planning Guidance (2007)		
Section	Policy Requirements	Design Response
4.5 – Energy Efficiency	Part 1 Policy E1.5 encourages high standards of energy efficiency in new development. In the Environmental Standards Statement, developers should show how they have considered the steps necessary to reduce energy demand at the earliest stages of design. Developers should aim to reduce CO2 emissions by at least	In line with the principles of the Be Lean, Be Clean, Be Green design philosophy, the Old Market Steet development seeks to provide a sufficient design

	25% more than the requirements of the current Building Regulations, which at present are Building Regulations: Approved Document L (2006) – ‘Conservation of Fuel and Power.’ The following design principles will assist developers in achieving energy efficiency targets: • Minimise reliance on energy-using equipment for heating, cooling, lighting and natural ventilation • Position trees and soft landscaping on and around the development and within buildings to provide natural shading, insulation and air conditioning • Integrate energy efficient micro-generation and community heating schemes, such as combined heat and power (CHP) • Site layout and building design principles should maximise the capture and use of daylight and passive solar energy, whilst avoiding excessive solar gain in summer • Specify energy and water efficient appliances and systems	solution that provides compliance with Building Regulations Part L1A. An early-stage overview of these calculations is provided in Section 7.
4.6 – Renewable Energy	To reduce energy demand and the harmful impact of using energy from non-renewables, in line with UDP Part 1 Policy E1.5, developers should aim for at least 20% of final site energy demand to be met by on-site renewable energy technologies. Renewable energy targets can be achieved more readily by undertaking the measures suggested above reducing the total energy demand of the building. It is possible to produce developments that use 50% and even 100% energy from renewable sources. To achieve this, developers should: • Assess opportunities for integrating small- and large-scale renewable energy generation systems to improve the energy security of occupants and the neighbourhood, including siting of energy generation businesses on-site and export of surplus energy • Use a mix of technologies to help generation patterns match demand	A full appraisal of low and zero carbon technologies is provided in Section 6 of this report. Achieving compliance with Building Regulations Part L1A will be demonstrated through a passive fabric-first approach. This ensures that the highest standards of fabric efficiency and energy efficiency are achieved, prior to applying low carbon or renewable technologies to the development. The levels of

	• Investigate energy generation opportunities before designing building envelopes or fixing their location, to optimise utilisation of wind, solar and geothermal resources • Consider final energy demand rather than building energy consumption in the selection and sizing of generation equipment • Explore opportunities to tackle waste and energy issues collectively through use of anaerobic digesters linked to CHPs (Combined Heat and Power devices) • Consider private wire networks as an alternative to grid connection and availability charges on larger developments.	the energy hierarchy are defined below in Section 3.
--	---	--

3. Methodology

The first step of the full energy strategy assessment has been to undertake a baseline energy assessment. The baseline energy assessment consists of calculating the total CO₂ emissions of the development to meet Building Regulations and then compare the proposed improvement measures against this baseline. Building Regulations Part L1A 2013 (SAP) applies to the development and provides carbon emissions from regulated energy.

The building can then be benchmarked/thermally modelled using the energy hierarchy:

1. Be Lean <i>A reduction in energy use as a result of passive design and energy efficiency</i>
Thermal performance of envelope (U-values) Glazing design Airtight construction Efficient mechanical ventilation and heat recovery Variable speed fans and pumps Energy Efficient lighting
2. Be Clean <i>A focus on supplying energy to the development through efficient means</i>
Connect to low carbon heat networks Develop site wide heat network from single energy centre On site CHP Provide energy efficient individual heating
3. Be Green <i>The installation of renewable technologies to meet energy demand where possible</i>
Consider the feasibility of renewable energy technologies Assess the integration of renewable technologies based on the above measures

The development must be provided with energy savings through the use of thermal improvements to fabric (a 'fabric first' approach), followed by other clean energy solutions (energy efficiency improvements, district heating, etc...) and finally the use of renewable energy technologies, where

practical. This hierarchy complements the integrated approach to the sustainable energy objectives advocated through Manchester City Council local policy.

The planning policies require a full review of the technical and economic feasibility of the following renewable technologies:

- Biomass heating
- Biomass combined heat and power
- Solar hot water
- Solar photovoltaic
- Ground source heat pumps
- Air source heat pumps / exhaust air heat pumps
- Wind power

To achieve the targets set the development must achieve a balance between fabric, heating and control, ventilation and air leakage improvements, the amount of zero or low carbon technology installed and the capital, life cycle and running costs and maintenance and operation.

Feasible renewable energy technologies have been considered during the assessment to ensure the most suitable renewable energy is chosen for the demands of this scheme. The pros and cons of each technology with respect to this site are considered as part of this statement.

4. Baseline Energy Assessment

Energy Counsel have based the analysis on current Building regulations ADL1A 2016 (SAP 2012), taking into account solutions that must not only be energy efficient but also practical, reliable and user friendly.

Energy Counsel have carried out preliminary SAP 2012 calculations for the proposed dwelling.

To meet compliance with new build Building Regulations Part L1A 2016, the Dwelling Emissions Rate (DER) must be lower than or equal to the Target Emissions Rate (TER). SAP 2012 is the Governments Standard Assessment Procedure (SAP) for calculating the energy aspects of a dwelling. SAP is a measure of fuel costs for heating, hot water and lighting for a dwelling. SAP 2012 can also be used to ascertain the energy requirements of a development.

4.1. Predicted Baseline Energy Requirements

The predicted baseline CO₂ emission demands for the development:

Table 4 - Baseline dwelling carbon emissions

Ref	Dwelling Type	No. of Type	TFA	TER	Total Carbon Emissions (Kg CO ₂ /yr)
Z43470	Grnd Floor 2B4P Apartment	3	60.03	26.72	4,821
Z43471	Grnd Floor 1B2P Apartment	1	48.11	30.36	1,461
Z43472	Mid Floor 2B4P Apartment	6	60.03	23.16	8,342
Z43473	Mid Floor 1B2P Apartment	4	48.11	24.7	4,753
Z43474	Top Floor 2B4P Apartment	3	60.03	26.39	4,753
Z43475	Top Floor 1B2P Apartment	1	50.03	28.21	1,411
Total		18			25,532

The baseline carbon emissions for the new build dwellings are **25,532 KgCO₂/yr.**

5. District & Communal Heating Networks

This section outlines how consideration of energy supplied efficiently from a district heating network can be provided to the development in line with the energy hierarchy.

5.1. Decentralised Heating Networks

The energy policy reaffirms the view that energy generated by centralised power stations and transmitted through the national grid is highly inefficient and wasteful.

One of the priorities for reducing CO₂ emissions is to reduce reliance on centralised power stations. This means increasing the use of local, low-carbon energy supplies through de-centralised energy systems.

De-centralised plant generally means any heating and hot water and/or electricity generation provided on a district wide (DHN) or site wide (CHN) basis. DHN and CHN can typically include combined heat and power equipment (CHP). CHP is an engine which, when running, generates electricity and heats water which can then be distributed around a development.

Benefits of district heating networks can include:

- Provision of low carbon / lower cost heat to domestic and commercial customers
- Diversification of the energy mix
- Reductions in region-wide carbon emissions
- Targeting and reduction of fuel poverty
- Potential long term revenue streams for local authorities
- Alignment with regeneration programmes
- Driving the growth of the low carbon services sector

However, there are currently no existing district heating networks within proximity to the site, and the development of a decentralised system would not be feasible or beneficial for a project of this scale. An extract from The Association for Decentralised Energy's District Heating Installation Map is provided in Figure 3. This confirms that the nearest existing network is a residential network, around three mile south of the proposed site.

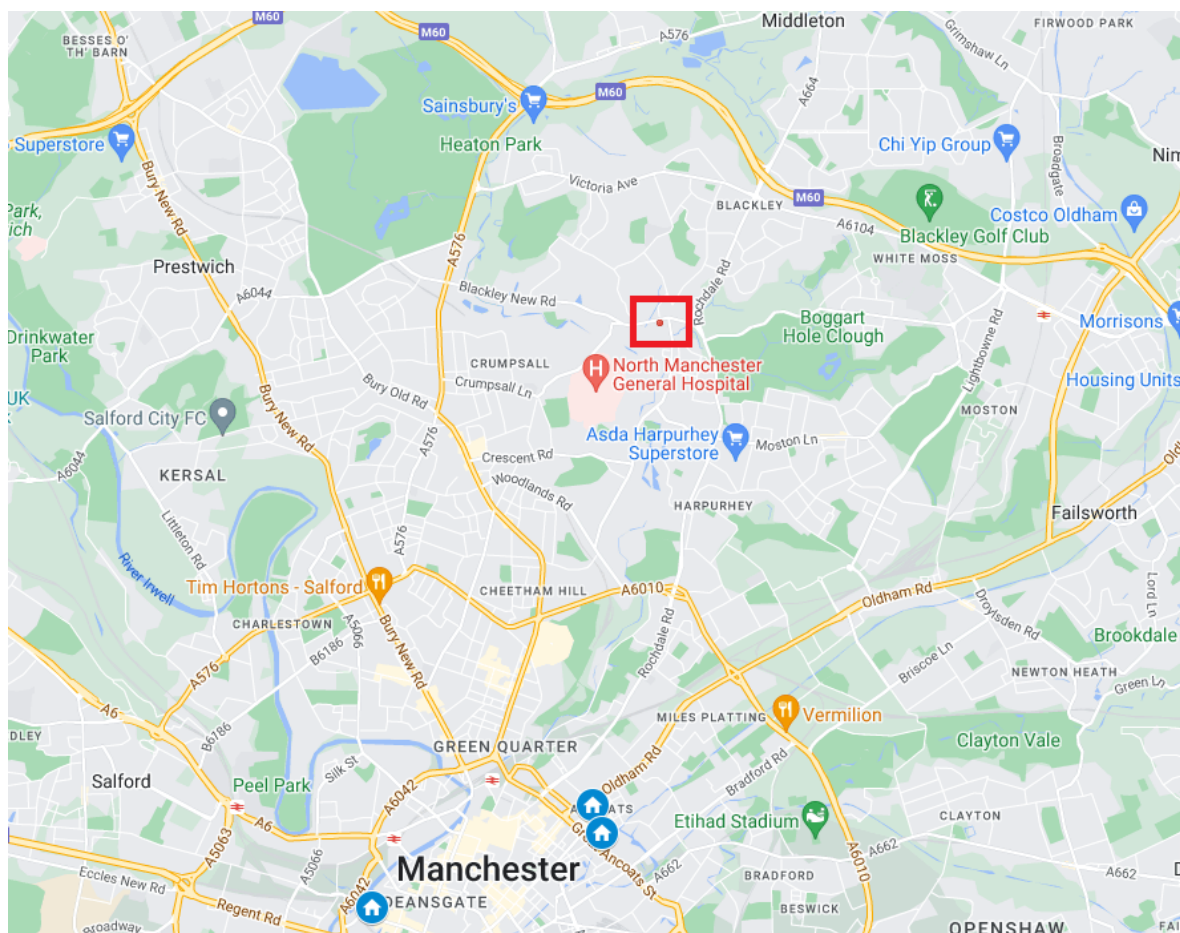


Figure 3 – Location of site in relation to current local heat networks

6. Renewable Energy Technologies

Energy Counsel have reviewed options for the use of on-site renewable energy / Low or Zero Carbon Technology (LZCT) in line with the policy aspirations of the Manchester Core Strategy 2012 – 2027 (2012).

This renewable energy statement/strategy reviews the technical and economic feasibility of the following technologies –

- Solar Photovoltaic
- Solar Hot Water
- Ground Source Heat Pumps
- Air Source Heat Pumps / Exhaust Air Heat Pumps
- Micro Wind Power
- Biomass

6.1. Photovoltaics (PV)

Photovoltaic panels convert sunlight into electricity to run lights and appliances. Photovoltaic panels use cells to convert light into electricity. A PV cell normally consists of 1 or 2 layers of a semi conducting material such as silicon. When light shines on a cell it generates energy causing electricity to flow, the higher the light intensity is, the more electricity flows.

The amount of energy PV cells generate is referred to as Kilowatt Peak (KWp). PV arrays now come in a variety of shapes and

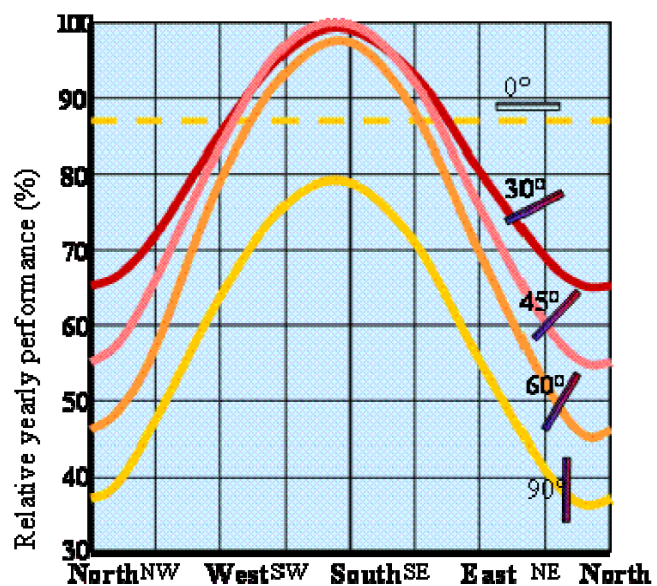


Figure 4 - Performance of photovoltaic panel orientation

colours, ranging from grey 'solar tiles' that look like roof tiles to panels and transparent cells that you can use on conservatories and glass to provide shading as well as generating electricity. The roof must be strong enough to take the weight of the solar panels, especially if the panel is placed on top of existing tiles. For flat roofs the panels can be mounted on A-frames to give the optimum angle.

The optimum panel inclination for solar collection is 35°, oriented due south; however panels that are inclined between 35° and 45° and oriented south of west or east are generally suitable. If solar collectors are oriented away from due south then a larger surface area will be required to generate a set amount of energy. The effect of non-optimal orientation is illustrated by the graph in Figure 4.

The use of photovoltaic panels has not been specified for this development as greater carbon emissions savings can be made through the use of highly efficient heat pumps for hot water.



Figure 5 - Photovoltaic array on a pitched roof

6.2. Solar Thermal HW Panels

Solar panel heating uses the radiant energy from the sun to heat water, most commonly for domestic hot water needs. There are two types of collectors used for solar water heating – flat plate collectors and evacuated tubes collectors. The systems function successfully in all parts of the UK, as they can work in diffuse light conditions. The collector should be mounted on a 10-60 degrees pitch facing south, although other variations can be used, south is the most efficient.

The cost of installing the system is dependent on the distance between the solar collector and the hot water storage and therefore costs vary. The closer the collectors are to the hot water storage, the less pipe work is required. Annual maintenance checks are recommended. The solar collectors are connected to a condensing boiler via a HW cylinder with twin coil.

They are a 'simple' and guaranteed technology which will act as a pre-heat for the Hot Water and Heating usage. Payback between capital cost and energy saving can normally be achieved within 12 – 20 years, subject to usage type.

The use of solar thermal panels work best in conjunction with individual heating systems for dwellings. The orientation of the development is fine for the utilisation of solar water heating to

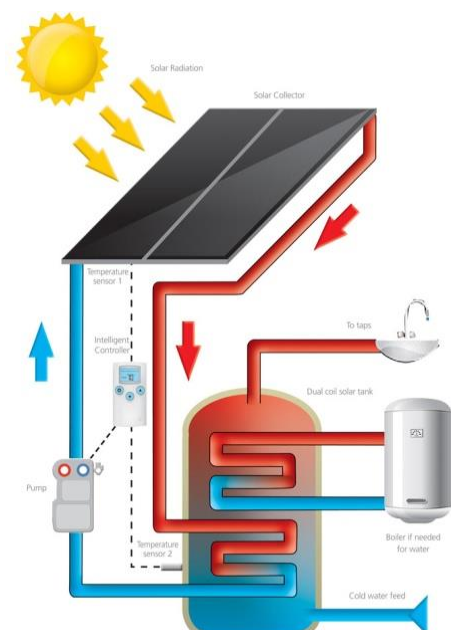


Figure 6 - Principles of a solar thermal system

provide domestic hot water however it is not expected to achieve significant carbon savings when compared to the highly efficient air source heat pumps for hot water.

6.3. Ground Source Heat Pump (GSHP)

GSHPs have been developed specifically for the housing market and are now considered to be an established reliable technology. The GSHP would be sized to cater for the heating and domestic hot water requirements. Typically, they are more suited to apartments as a centralised system would be installed with multiple bore holes to a depth of up to 125 metres depending on the ground conditions. GSHPs use a heat exchanger to extract heat from the earth.

The efficiency of ground source heat pumps is measured by Co-efficient of Performance (CoP), this is the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Average CoP is around 2-4 although some systems may produce a greater rate

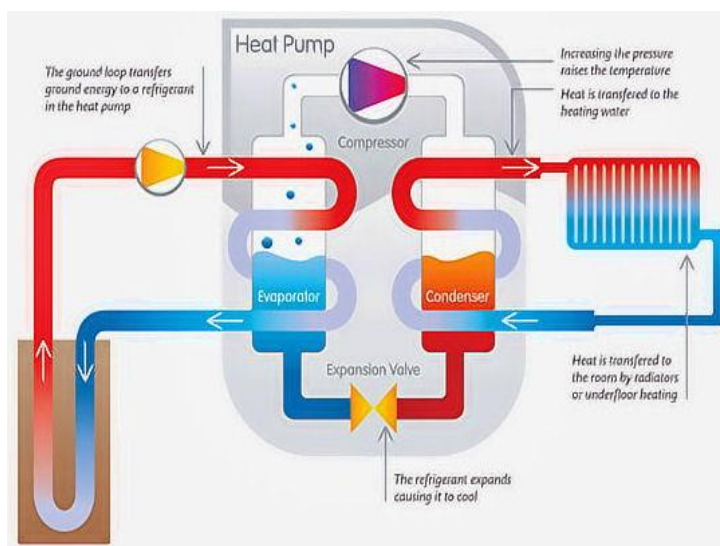


Figure 7 - Principles of a GSHP system

of efficiency. This means that for every unit of electricity used to pump the heat, 2-4 units of heat are produced, making it an efficient way of heating a building. If grid electricity is used for the compressor and pump, then there is the opportunity to consider a range of energy suppliers to benefit from the lowest running costs, for example by choosing an

economy 10 or economy 7 tariff.

Due to the availability of land around the development, GSHPs are not considered an appropriate design solution.

6.4. Air Source Heat Pump/Exhaust Air Heat Pump

Air source heat pumps (ASHP) and exhaust air heat pumps (EAHP) work in a similar way to GSHP. Air source heat pumps can be fitted on the external façade or in the roof space. An air source heat pump uses small amounts of electricity to take in large quantities of air and extract heat. The efficiency of ASHP is measured by Coefficient of Performance (CoP); this is the ratio of units of heat output for each unit of electricity used to drive the system. Average CoP is around 2-4 although some systems may produce a greater rate of efficiency.

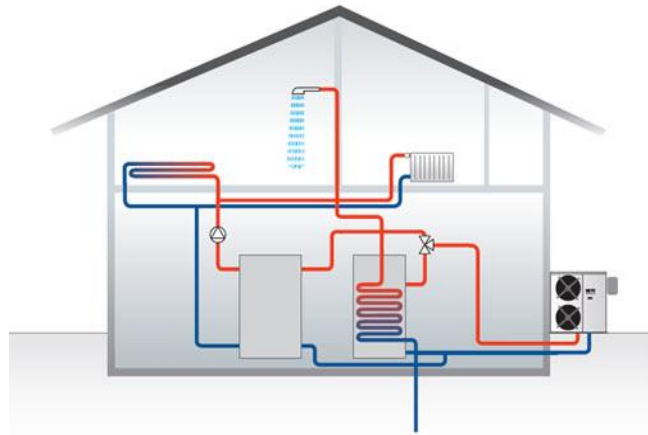


Figure 8 - Principles of an ASHP system

Exhaust air heat pumps such as the NIBE F370 work in a similar manner to ASHP units but have only indoor units (no outdoor compressors) and in addition they also recover heat from their integral exhaust air ventilation system. These units work well on apartment blocks and dwellings where mains gas is unavailable or unsuitable for a development. They are expensive in terms of capital cost of the equipment, installation and the enhanced structural requirements.

ASHPs are utilised for this development for hot water only. The hot water heat pumps will be provided to each apartment to provide efficient hot water and ensure the carbon savings are met.

6.5. Micro Wind Power

Wind power is one of the cleanest and safest methods of generating electricity. However, wind power is unfeasible due to the fact the development is in an urban area and local wind conditions would not be sufficient to provide enough power. Most small wind turbines generate Direct Current (DC) electricity. Systems that are not connected to the national grid require battery storage and an inverter to convert DC electricity into Alternating Current (AC) which is mains electricity.

There are two types of wind turbine available:

- Roof mounted – Installed on the roof of the development
- Mast mounted – Which are free standing

Important issues to consider when using wind turbines are:

- Wind speed increases with height so it's best to have the turbine high on a mast or tower.
- Generally speaking the ideal site is a smooth top hill with a flat, clear exposure, free from excessive turbulence and obstructions such as large trees, dwellings or other buildings.
- Small scale wind power is particularly suitable for remote off grid locations where conventional methods of supply are expensive or impractical.
- Where the local annual average wind speed is 6 m/s or more.
- Where there are no significant nearby obstacles such as buildings, trees or hills that are likely to reduce the wind speed or increase turbulence



Figure 9 - Mounted wind turbine

As this development is in an urban area there will be obstacles which reduce wind speed. The average wind speed in this area is 4.5 m/s at a height of 10 metres, which is less than the 6 m/s required. Therefore, micro wind is not a viable technology for this development.

6.6. Biomass

Biomass is a generic name for any fuel produced from organic sources and falls into mainly two categories:

- Woody biomass- forest products, untreated wood products, energy crops and wood pellets
- Non-wood biomass – liquid biofuels (such as biodiesel, bioethanol) or animal waste industrial municipal products and high energy crops such as rape seed, sugar cane and maize.

For domestic properties the fuel used is normally wood pellets, wood chips or wood logs. For larger applications, biomass boilers replace conventional fossil fuel boilers and come with an automated feed by screw drives from hoppers.

Biomass systems require more cleaning than gas or oil boilers and they must be capable of being taken out of service for cooling and cleaning whilst maintaining the building heating supply

particularly in communal heating systems. Centralised gas boilers are therefore still required to support the biomass boiler, which would be the lead boiler. The size of the dedicated plant rooms is substantial. Fuel availability, delivery and storage are also important issues to consider.

Air quality issues are also an important factor when looking to install biomass. The cost of the fuel depends on the type, delivery distances and whether it is obtained as simple waste product or from another organisation. The cost of wood pellets is currently a little more expensive than mains gas, and woodchip is approx. 30% cheaper, however prices are fluctuating rapidly in the bio-fuel market at the present time creating uncertainty over their take up.



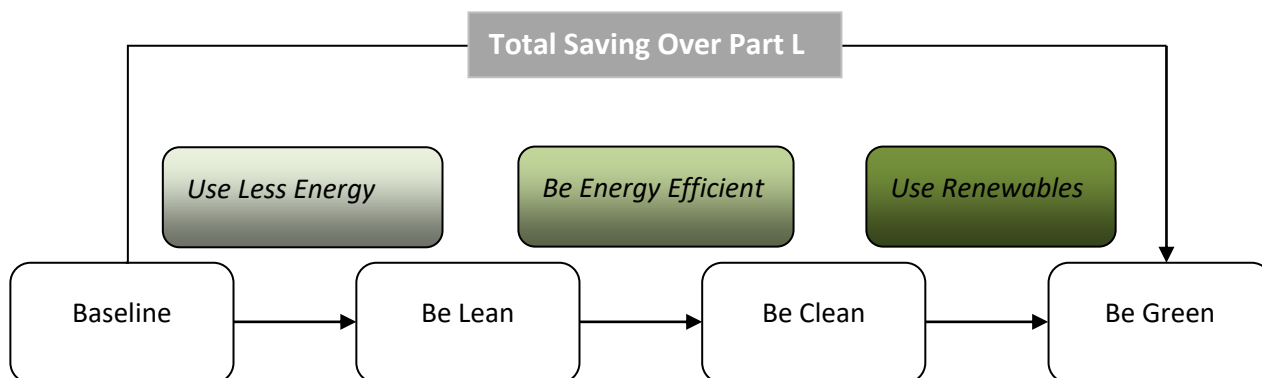
Figure 10 - Biomass boiler and hopper

Biomass CHP is still relatively new to the UK market and is more suitable to large developments where energy demand does not require significant modulation. There are technical issues with small scale Biomass CHP and until these can be resolved and proven the take up of these systems in the UK and Europe has been slow.

Overall carbon savings of 40%+ are achievable with biomass technology. Biomass is more suited to a communal heating system; there is insufficient space to accommodate the equipment and fuel storage to facilitate a biomass boiler. Furthermore, there are noise and air quality issues associated with this type of technology. For this reason, biomass is discounted.

7. Energy Assessment of Proposed Scheme

The development has been provided with energy savings through the use of passive improvement measures such as improved energy efficiency. This passive approach to compliance will complement the integrated approach to the sustainable energy objectives of the national and local policies.



The principles of a Be Lean, Be Clean, Be Green design philosophy have been applied, which results in a 15.80% improvement over new build Building Regulations Part L1A 2016, as indicated in Table 1. A full design specification that confirms inputs used within the SAP calculations is provided within the Appendices of this report.

Table 5 - Proposed development CO₂ emissions against Building Regulations Part L1A 2013

Ref	Dwelling Type	No. of Type	TFA (m ²)	TER	DER	Improvement Factor (%)	Total Carbon Emissions (Kg CO ₂ /yr)
Z43470	Grnd 2B4P	3	60.03	26.72	25.99	2.73%	4,681
Z43471	Grnd 1B2P	1	48.11	30.36	29.12	4.08%	1,401
Z43472	Mid 2B4P	6	60.03	23.16	18.14	21.68%	6,534
Z43473	Mid 1B2P	4	48.11	24.70	17.94	27.37%	3,452
Z43474	Top 2B4P	3	60.03	26.39	23.38	11.41%	4,211
Z43475	Top 1B2P	1	50.03	28.21	24.55	12.97%	1,228
Total		18				15.80%	21,506

8. Sustainable Design & Construction

The design currently includes a number of components that gives the scheme a solid grounding in relation to sustainability and the Code for Sustainable Homes (CfSH) targets. The list below is not exhaustive but spans a range of environmental issues:

Management

- The contractor will utilise the Considerate Constructors Scheme and aim for a best practise standard, which is a score of 35+ with a minimum score of 7 in each category, at the final CCS visit.
- The contractor will manage and monitor environmental issues during construction process. This will include the monthly monitoring and management of energy and water consumption of site activities, separation, streaming and recycling of waste, the reduction of air, dust and ground pollution.

Health and Wellbeing

- External lighting to the proposed development will be highly efficient and will comply with all current guidelines and regulations.
- Safety issues will incorporate recommendations from a CPDA or ALO input no later than RIBA stage 2, wherever practicable.

Energy

- The development will be designed and constructed to achieve low energy and carbon dioxide emissions, improving upon current Building Regulations Part L 2013 using the Be Lean, Be Clean, Be Green energy hierarchy.
- Sub-metering of all major energy consuming systems will be provided to differentiate between energy loads for heating and hot water, lighting and small power consumption.
- Dedicated energy efficient lighting will be installed internally and externally.

Transport

- A travel plan will be developed at the preliminary stages of the project, with a range of transport improvement measures to be included within the development. These measures aim to promote the use of sustainable modes of transport.

Water

- Dual-flush toilets will be provided with low-flow water consuming fittings, to ensure water use within the development is minimised.
- Where areas use more than 10% of the buildings predicted total water usage, sub-metered pulsed output meters will be considered.
- Internal water consumption will be reduced using low flush/ flow appliances. This will include appliances such as aerated/ flow regulated taps, low-flow showers, low-flush WC's, low-flush urinals, PIR control on main water supply to all toilet areas, etc. and where practicable.
- Flow control devices will be installed to sanitary fittings, where practicable.

Table 6 - Recommend water consumption for all fittings

Sanitary fittings	Flow rate or capacity		Consumption (L/person/day)
WC (Full Flush)	4	L/flush	13.53
WC (Half Flush)	2.6	L/flush	
Hand Basin Tap	3	L/min	6.32
Shower	6	L/min	43.7
Bath	140	L/capacity	15.40
Kitchen Tap	4	L/min	12.12
Washing Machine	8.17	L/kg dry load	17.16
Dishwasher	1.25	L/place setting	4.50
Total	Incl. normalization factor 0.91		104.18

Materials

- The scheme will seek to use environmentally certified products with Green Guide A/ A+ Rated materials, wherever practicable.
- All building and construction materials used on the schemes will aim to be sought from environmentally managed accreditation schemes, (such as EMAS/ ISO 14001 accreditation). All timber will be sourced from a certified chain of custody. Overall, at least 80% of all material sourced on this project will be responsibly sourced, and where practical.
- The building will incorporate suitable durability and protection measures or designed features/solutions to prevent damage to vulnerable parts of the internal and external building and landscaping elements

- Insulation will have low environmental impact in use and during manufacture. This is measured via the insulation index rating.

Waste

- A SWMP will be used on this site. Our aim is to divert as much waste from landfill as possible by reducing construction waste below 11.1 tonnes/100m² GIFA and re-use or recycling waste, with diversion from landfill of non-hazardous construction waste >80%.

Ecology and Land-use

- The contractor will enlist the help of a suitably qualified ecologist to recommend appropriate ecological features that will positively enhance the ecology of the site.
- Protection and mitigation measures will be introduced, where practicable, to reduce the impact of the development on the existing site and to enhance the development.
- Ecological improvement will be undertaken to enhance the ecological value of the site once the development is built, wherever practicable.

Pollution

- A flood risk assessment will be undertaken, with the results of which guiding a drainage design that ensures surface water run-off, flooding in the case of drainage failure and watercourse pollution are minimised.
- Reduction of night-time light pollution using ILE compliant light fittings will be installed, where practicable.

9. Conclusions

The approach for the proposed Old Market Street development is to embed sustainability into the heart of the development through the 'Be Lean, Be Clean, Be Green' design hierarchy. The proposed design is predicted to reduce the total carbon emissions by 4,025 kg/CO₂/yr from the baseline emissions of 25,532 kg/CO₂/yr. This equates to a 15.80% carbon reduction from the calculated baseline regulated emissions. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL1A 2013
- 2) Enhanced air tightness and thermal bridging
- 3) Heating to be provided by efficient electric panel heaters
- 4) Hot water to be provided by efficient air source heat pumps
- 5) Decentralised mechanical extract ventilation (dMEV) provided to all wet rooms
- 6) LED lighting to have presence detection and daylight dimming control to classroom areas

9.1. Low/ Zero Carbon Technologies Review

- Photovoltaic panels have not been specified for this development as the carbon emissions savings can be achieved by utilising energy efficient air source heat pumps for hot water.
- Solar Thermal Hot Water is not considered a viable option as an accurate estimate of hot water demand is not known; however, it is not expected to be a major energy contributor.
- Biomass has been discounted as it poses problems in terms of air quality, delivery of fuel, storage and transportation for deliveries, etc. It would require a centralised larger plant space for storing fuel, which is not suitable.
- Micro-wind turbines are not preferred on this development due to potential problems with wind turbulence and mounting of the units. The wind speeds in the area are not conducive to wind power electricity generation and there would be issues with turbulence, wind shading and noise.
- GSHPs are not viable for site because of spatial and financial costs. There is no room to accommodate a GSHP vertical bore and associated communal plant room, ground conditions are unknown and systems are costly.
- Individual ASHP for hot water have been specified for each dwelling in this development, from which the carbon emissions savings can be made.

An overall 15.80% improvement in CO₂ emissions above the Building Regulations Part L1A 2013 baseline is proposed to support our application and to meet policy requirements.

Table 7 - Summary of Carbon Emissions

	Total CO₂ Emissions (KgCO₂/Yr)	
Baseline Emissions of Development (pre-improvement)	25,532	
Proposed Strategy	21,506	
Total Reduction in Carbon (KgCO₂/yr)		4,025
Percentage Improvement in Carbon Emissions (above Bldg Regs ADL2A 2013)		15.80%

Several sustainable initiatives will be implemented by the project team and commitments have been identified to further improve the environmental and sustainability profile of the proposed development in the future stages of the design and construction processes. This will offer building occupiers, and the surrounding area added benefits in terms of quality of living standards, lower energy and water bills and enhanced/improved surroundings and facilities.

- Water efficiency will be promoted throughout the development through the incorporation of water efficient fittings and water metering. Reduction in water usage indirectly impacts on energy usage embodied carbon reductions through water treatment.
- Procurement and construction processes will be carried out to minimise the environmental impacts of materials, with sustainable locally sourced and/or recycled materials being selected wherever practicable. This also impacts on embodied carbon and energy usage.
- The development provides compliance with the sustainability measures in Manchester City Council local policy through a holistic range of sustainability and energy efficiency measures to ensure impact is minimised.

10. Appendices

10.1. Energy Model Inputs for Part L1A 2013 Compliance

Item	Brief description	Notes	Confirm
	The following information is required for the design submission (as per requirements of approved doc L2A).	Please note submission is now in two stages. A) Design B) As installed	
1. Building Details			
1.1	Building Regulations Part L1A 2013 applies.		
1.2	Full Building address is: tbc	Old Market Street, Blackley, Manchester	
2. Floor Construction Details			
2.1	Ground floor is insulated to achieve the U-value stated opposite.	U-Value = 0.19 W/m ² K	
3. Wall Construction Details			
3.1	External walls are insulated achieving the U-value stated opposite.	U-Value = 0.21 W/m ² K	
4. Roof Construction Details			
4.1	Roof is insulated achieving the U-value indicated opposite.	U-Value = 0.11 W/m ² K	
5. Openings			
5.1	External solid personnel doors are installed to achieve the U-value opposite.	U-Value = 1.4 W/m ² K	
5.2	All double-glazed windows are to achieve the U-Value indicated opposite.	U-value = 1.4 W/m ² K	
6. Ventilation			
6.1	This Design Stage SAP calculation assumes an air permeability of 5m ³ /hr.m ² at 50pa will be achieved.	5m ³ /hr.m ² at 50pa	
6.2	Decentralised mechanical extract ventilation (dMEV) is installed to all wet rooms	SFP = 0.16W/l/s	
6.3	All other areas of the building are naturally ventilated.		
7. Space Heating and Cooling			
7.1	Heating is provided by electric panel heaters to all habitable rooms.		
7.2	The heating system is provided with central time control, local time and temperature control and weather compensation.		
7.3	No cooling is provided		
8. Water Heating			
8.1	Water heating is provided by individual air source heat pumps for hot water only.	Cylinder size 200litres 1.61 kWh/day losses	
9. Lighting and lighting controls			
9.1	All light fittings will be low energy		
10. Renewables			
10.1	No renewables are provided within the development.	No PV	
11. Other			
11.1	Accredited Construction Details (ACD) for limiting thermal bridging are installed at every junction in the main fabric. The defined Y value must be calculated for each dwelling	Refer to ACDs	

10.2. Index of Figures and Tables

Figure 1 – Map view of proposed Old Market Street development.....	7
Figure 2 – Proposed floor plans for proposed Apartment block at Old Market Street, Blackley	9
Figure 3 – Location of site in relation to current local heat networks.....	24
Figure 4 - Performance of photovoltaic panel orientation	25
Figure 5 - Photovoltaic array on a pitched roof	26
Figure 6 - Principles of a solar thermal system	26
Figure 7 - Principles of a GSHP system.....	27
Figure 8 - Principles of an ASHP system.....	28
Figure 9 - Mounted wind turbine.....	29
Figure 10 - Biomass boiler and hopper	30
Table 1 - Proposed development CO ₂ emissions against Building Regulations Part L1A 2013	5
Table 2 – Key National Planning Policy Requirements and Design Responses.....	11
Table 3 – Key Local Planning Policy Requirements and Design Responses	12
Table 4 - Baseline dwelling carbon emissions.....	22
Table 5 - Proposed development CO ₂ emissions against Building Regulations Part L1A 2013	31
Table 6 - Recommend water consumption for all fittings	33
Table 7 - Summary of Carbon Emissions.....	36