



ELEMENT
SUSTAINABILITY

55 SLACK ROAD, MANCHESTER

ENVIRONMENTAL STANDARDS STATEMENT

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ELEMENT SUSTAINABILITY

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1. INTRODUCTION

Element Sustainability has been commissioned by Nural Haque to review the sustainability and energy performance of the proposed residential property to be constructed at 55 Slack Road in Manchester.

The purpose of this statement is to summarise the relevant policy background and requirements of Manchester Borough Council and to demonstrate the ways in which the developer has addressed these aims through their proposals, ensuring all practicable measures have been taken to deliver a sustainable development at this site.

Details of the design attributes, specifications and characteristics of the scheme are appraised in order to demonstrate how the proposals contribute to sustainable development in Manchester and seek to mitigate the environmental impacts of the scheme, providing a sustainability appraisal in support of the planning application.

This report is intended to support the planning application for this development and therefore, establish an approach to the delivery of this scheme which meet the criteria outlined by the Council that the developer commits to implement at the site.



2. DEVELOPMENT PROPOSALS

2.1 Development Site Description

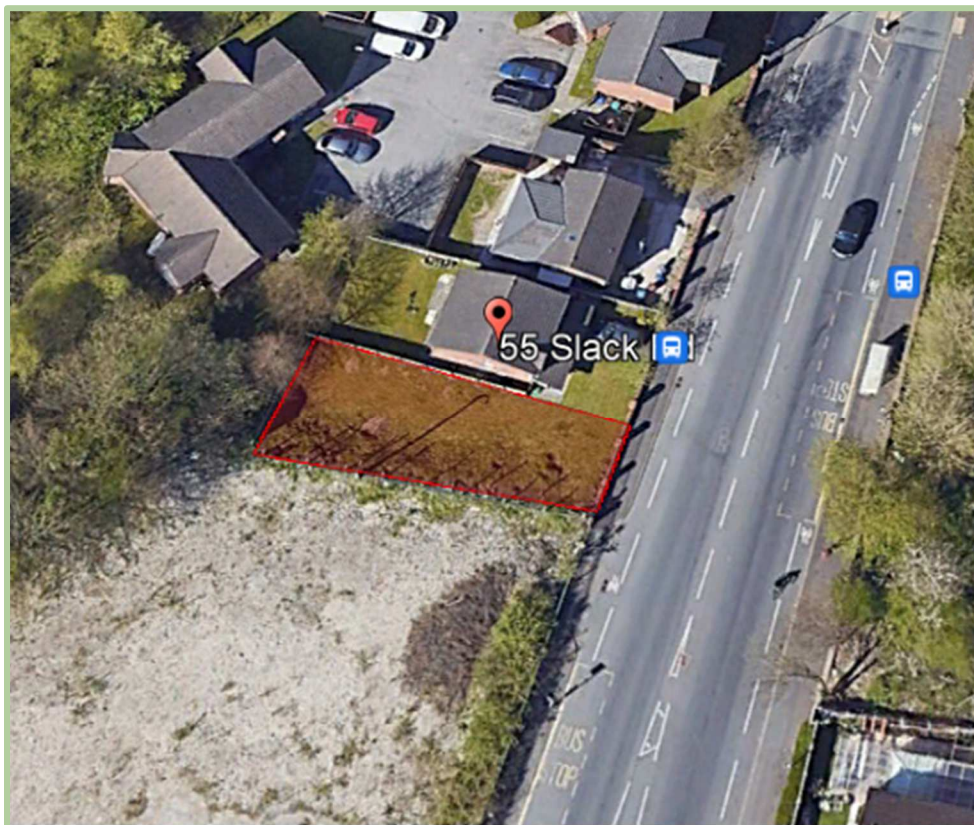
The application site is currently a vacant brownfield plot of land located in a residential area, adjacent to 55 Slack Road, a residential property located north of Manchester City Centre.

Slack Road runs parallel to the eastern perimeter of the application site, which separates the site from an area of hardstanding and vegetation which is encompassed by a perimeter wall and trees. In addition to this, there are other residential properties along Slack Road to the east of the proposed development. Beyond the site boundary to the south and west lies a large area of hardstanding and dense mixed vegetation.

The site is not considered to be in a designated conservation area.

The pre-development site is presented in Figure 2.1 below.

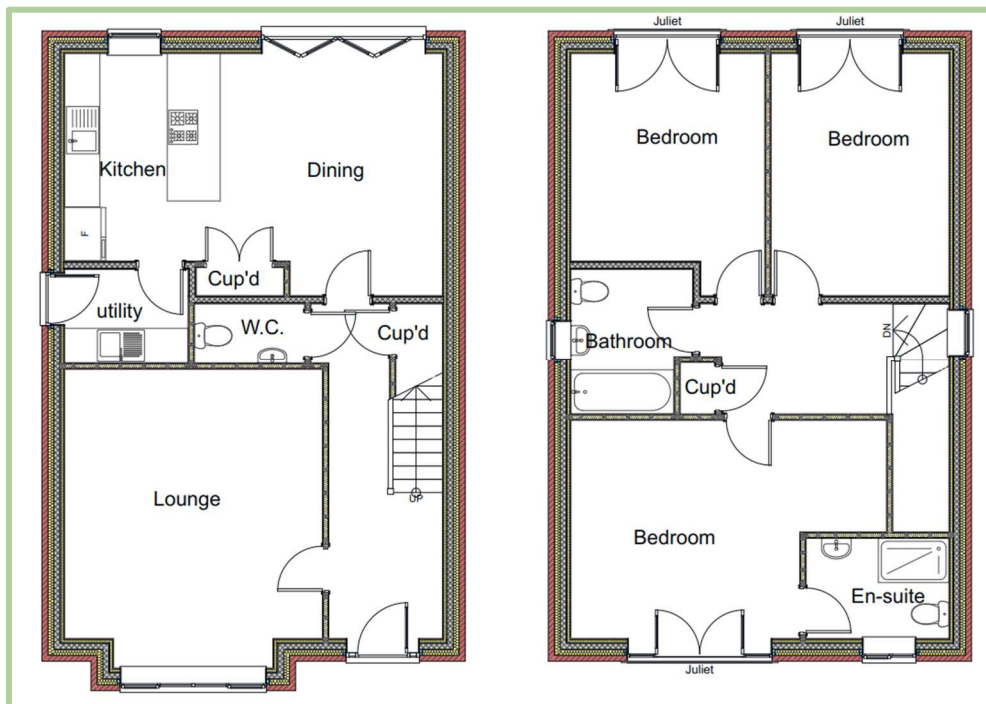
Figure 2.1 – Pre-developed Site



2.2 Development Proposals

Planning approval is sought to build a two storey, detached dwelling adjacent to 55 Slack Road. Figure 2.2 and 2.3 presents the proposed floor plans and elevations for the proposed Slack Road residential development.



Figure 2.2 – Proposed East Elevation*Figure 2.3 – Proposed Ground and First Floor*

3. POLICY REVIEW

3.1 National Planning Policy

The National Planning Policy Framework (NPPF) 2021 states the planning system should play an active role in guiding development to sustainable solutions. At the heart of the 2021 updated NPPF lies the ‘presumption’ in favour of sustainable development. There are three dimensions to sustainable development, as stated within the NPPF: economic, social, and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:

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

A social role – supporting strong, vibrant, and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating beautiful and safe places, with accessible local services that reflect the community’s needs and support its health, social and cultural well-being.

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

These dimensions are considered to be mutually dependent with the NPPF, in its entirety, defining sustainable development. The NPPF states that ‘the purpose of the planning system is to contribute to the achievement of sustainable development’. It summarises the objective of sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their needs. It goes on to state that at a similarly high level, members of the United Nations – including the United Kingdom – have agreed to pursue the seventeen Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being, and environmental protection.

3.2 Local Planning Policy

3.2.1 Manchester Core Strategy

Manchester’s Core Strategy was adopted on the 11th July 2012 and remains the key document in the adopted Manchester Local Plan. It sets out the long-term strategic policies for Manchester’s future development and will form the framework that planning applications will be assessed against.

Policy EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development: The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO₂ emissions, and rising fossil fuel prices, through the following actions:

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; and,
- To meet residual energy requirements using low or zero carbon energy generating technologies.

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

Policy EN 5 - Strategic Areas for Low and Zero Carbon Decentralised Energy Infrastructure: Within Manchester it is considered that the following strategic areas, will have a major role to play in achieving an increase in the level of 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; and,
- Strategic employment locations.

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

Policy EN 6 - Target Framework for CO₂ Reductions from Low or Zero Carbon Energy Supplies: The Council requires applications for residential development of ten or more units and all other development over one thousand square metres to meet, as a minimum, the targets shown in the tables below, unless unviable.

Developments smaller than the threshold but involving the erection of a building or substantial improvement to an existing building will also be expected to meet the minimum target, where viable, but will not be expected to submit an energy statement.



Table 3.1 – Policy EN6 Domestic CO₂ Emissions Reduction Targets

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

The proposed development falls under the Target three criteria. The scheme will be specified and constructed to comply with Building Regulations Part L, Approved Document Volume 1 (2021). Therefore, the scheme will significantly improve upon the minimum requirements stipulated in Policy EN6.

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

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

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.

Policy EN9 - Green Infrastructure: New development will be expected to maintain existing green infrastructure in terms of its quantity, quality and multiple function. Where the opportunity arises, and in accordance with current green infrastructure strategies, the Council will encourage developers to enhance the quality and quantity of green infrastructure, improve the performance of its functions and create and improve linkages to and between areas of green infrastructure. Where the benefits of a proposed development are considered to outweigh the loss of an existing element of green infrastructure, the developer will be required to demonstrate how this loss will be mitigated in terms of quantity, quality, function and future management.

Policy EN14 – Flood Risk: The Council requires developments to:



- Be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA); and
- All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of green infrastructure. Developers should have regard to the surface water run-off rates in the SFRA User Guide. In critical drainage areas, evidence to justify the surface water run-off approach / rates will be required.

Policy EN15 – Biodiversity and Geological Conservation: The Council will seek to maintain or enhance sites of biodiversity and geological value throughout the city.

Developers will be expected to identify and implement reasonable opportunities to enhance, restore or create new biodiversity, either on-site or adjacent to the site, contributing to linkages between valuable or potentially valuable habitat areas where appropriate, with reference to:

- The Manchester Biodiversity Strategy, which provides further details of priority habitats within Manchester and opportunities for biodiversity enhancement including corridors such as the Mersey, Medlock and Irk River valleys, the canals and disused railway lines, and areas of managed greenspace particularly in parks;
- The Green Infrastructure Framework for Greater Manchester, which encompasses an ecological framework that seeks to guide and inform habitat creation and repair, including identifying large 'biodiversity opportunity areas' including the Moston Brook Corridor and Nutsford Vale;
- Manchester's Climate Change Action Plan;
- The Strategic Flood Risk Assessment (SFRA) for Manchester;
- The River Basin Management Plan for the North West; and,
- The Manchester Tree Strategy.

Any adverse impacts on biodiversity will need to be justified against the wider benefits of the proposal, assessed against other Local Development Framework policies. Where adverse impacts are unavoidable, developers will be required to provide appropriate mitigation and / or compensation. Development should, wherever possible, seek to maintain, enhance or restore existing geology.

Policy EN16 – Air Quality: The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself.

Policy EN17 – Water Quality: The Council require:

- New developments to avoid any adverse impact on water quality, including during the construction phase, and wherever possible should seek to enhance water quality, both chemical and ecological.



- Development should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses.

Policy EN19 – Waste: The Council will:

- Require all developers, including those of new waste management facilities within the district, to demonstrate the proposal's consistency with the principles of the waste hierarchy (prevention, reduction, re-use, recycling/composting, energy recovery, final disposal);
- Require all developers to submit a waste management plan to demonstrate how both construction and demolition waste will be minimised, and recycled on site wherever possible, and how the sustainable waste management needs of the end user will be met; and,
- Encourage communities to take responsibility for the waste they create through the provision of accessible facilities.

Policy DM1 – 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:

- 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 amenity space;
- Refuse storage and collection;
- 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 and,
- 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):
 - 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; and



- Year 2016 - Code Level 6.

3.3 Guide to Development in Manchester, Supplementary Planning Document

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

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

3.4 Manchester's Great Outdoors

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

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

3.5 Climate Emergency

On 10th July 2019, a motion asking Manchester City Council (MCC) to formally declare a **climate emergency** was unanimously agreed. The motion declares that climate change is a serious risk to Manchester's future. Manchester is committed to embedding the issue as an integral part of council decision-making – making sure that all key decisions are taken with the city's target of becoming zero-carbon by 2038 in mind. The council has agreed the following:

- To deliver the 2038 zero carbon target and determine if an earlier target can be possible;



- Make climate breakdown and the environment an integral part of activity throughout the council, including all decision making, ensuring key decisions take into account the impact on achieving the zero-carbon target;
- Investigate and introduce measures to help reach domestic zero carbon levels, including addressing fuel poverty and retrofitting existing homes; and
- Investigate ways to ensure that future local plans place a mandatory requirement for all new development to be net zero carbon by the earliest possible date.

In March 2020 the Executive adopted the Manchester Climate Change Framework 2020-2025. The five-year framework sets out measures that MCC will take in order to reduce carbon emissions from its buildings, energy use and transport. Measures include retrofitting buildings to improve energy efficiency, increasing the use of electric vehicles, and seeking 100% renewable energy. Whilst this has also not been formally adopted into planning policy, it is a key consideration for future development proposals.

3.6 Emerging Policies

The Draft 'Places for Everyone' (PfE) Plan is a new long-term plan of nine Greater Manchester districts (Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan) for jobs, new homes, and sustainable growth. It has been prepared by the Greater Manchester Combined Authority on behalf of the nine districts.

The Draft Plan will determine the kind of development that takes place across the city-region, maximising the use of brownfield land and urban spaces while protecting green belt land from the risk of unplanned development. It will also ensure all new developments are sustainably integrated into Greater Manchester's transport network or supported by new infrastructure.

On 11th August 2023 inspectors appointed by the Secretary of State (Levelling Up, Housing and Communities) confirmed that the Places for Everyone plan is ready to move to the next stage of the process.

3.7 Regulatory Framework

Building Regulations, Part L - Conservation of Fuel and Power sets the compliance standards for energy demand and carbon dioxide emissions from buildings. Guidance on how to meet the requirements of this regulation is provided within a number of approved documents. The relevant document is referenced below:

Approved Document Volume 1: Dwellings: Gives guidance on how to comply with Part L of Schedule 1 to the Building Regulations and the energy efficiency requirements for dwellings.

Minimum energy performance requirements shall be approved and expressed in accordance with the methodology for new dwellings in the form of:

- Target carbon dioxide (CO₂) emission rates;
- Target fabric efficiency rates; and,
- Target primary energy rates.



3.8 Applicable Targets

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

Manchester Core Strategy

- **Policy EN 4** - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development
- **Policy EN 5** - Strategic Areas for low and zero carbon decentralised energy infrastructure
- **Policy EN 6** - Target Framework for CO₂ Reductions from Low or Zero
- **Policy EN 8** – Adaption to Climate Change
- **Policy EN9** - Green Infrastructure
- **Policy EN14** – Flood Risk
- **Policy EN15** – Biodiversity and Geological Conservation
- **Policy EN16** – Air Quality
- **Policy EN19** – Waste
- **Policy DM1** – Development Management

Guide to Development in Manchester, Supplementary Planning Document

Manchester City Council Climate Emergency Declaration

Building Regulations, Part L - Approved Document Volume 1 (2021)



4. SUSTAINABILITY STATEMENT

This section provides an appraisal of the proposals and details the specific approach, design features and specifications which will contribute to reducing the environmental impact of the scheme.

4.1 Energy Performance

In order to limit energy demand and carbon dioxide (CO₂) emissions from the operation of the building, a number of design features will be integrated that will collectively contribute towards the emissions reduction target for the scheme.

Detailed measures are presented in Section 5 of this report, but in essence, the energy strategy proposed is an enhanced 'fabric led' solution coupled with the inclusion of an energy efficient servicing provision to maximise the buildings' performance.

The reduction in energy demand to meet the carbon reduction targets will be achieved through the following design measures and low carbon technology options:

- Improved thermal insulation;
- A low air permeability;
- Photovoltaics; and,
- Low energy lighting.

These measures will secure the carbon reduction targets sought by the local planning authority and **Building Regulations Part L: Approved Document Volume 1**.

4.2 Flood Risk Management

Data obtained from the Environment Agency was used to determine which flood zone the site is located within and the potential flood risk to the property.

Figure 4.1 below presents the latest Environment Agency (EA) Flood Zone Map data which demonstrates that the site is located wholly within Flood Zone 1, demonstrating a low probability of flooding from rivers.



Figure 4.1 – Environment Agency Flood Risk Zone Map



Figure 4.2 – Extent of Flooding: Flood Risk from Surface Water

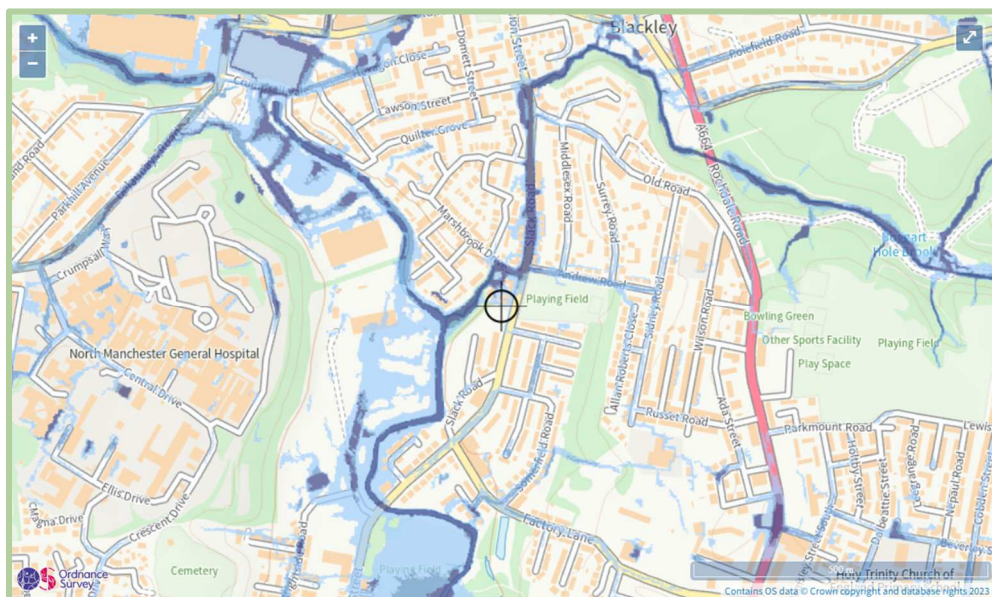


Figure 4.2 demonstrates that the area is at low risk from surface water flooding as well, with a chance of flooding of between 0.1% and 1% each year.

In accordance with **Policy EN14** the proposed residential development is not considered to be in an area at high risk of flooding.

4.3 Materials



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

- Materials with a low environmental impact throughout their life cycle will be prioritised for the main building elements. Plus, materials with associated Environmental Performance Declarations (EPDs) will be favoured;
- Materials will be sourced in accordance with a Sustainable Procurement Plan (SPP). A SPP includes sustainability aims, objectives and strategic targets to guide procurement activities;
- Responsibly sourced materials from suppliers operating an Environmental Management System and procuring timber verified by either the Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification standard (PEFC) will be prioritised;
- Material selection will be carefully considered to avoid the use of toxic materials, such as Volatile Organic Compounds (VOCs) and contribute towards creating a healthy indoor environment;
- Excavated material (such as soil and substructural elements) from construction works will be used, where practical, for landscaping purposes.

Local sourcing of construction materials where feasible and viable will minimise the impact of carbon dioxide emissions associated with the transportation of materials. In addition to this, **materials with low levels of embodied carbon will be prioritised in accordance with Policy EN4.**

4.4 Water Efficiency

The proposed dwelling will be designed to reduce mains / potable water consumption and will include the following water efficient designs and equipment:

- A water efficiency strategy will be determined for the site and will include for the provision of 'A' rated appliances as a minimum;
- In order to reduce water demand, the sanitary fixtures will be specified to achieve a calculated daily consumption of <110 litres/person/day; and,
- A water meter on the mains water supply to the dwelling will be specified to monitor and manage consumption.

Efficient water fixtures will be specified throughout the dwelling such as low flow taps and dual flush WCs in order to reduce water consumption.

4.5 Ecology and Biodiversity

Due to the constraints of the site, there are limited opportunities to enhance the site's ecological status. However, the following measures will be considered throughout the technical design stage process:



- Existing trees to the west of the site, will be protected during the construction process;
- Additional planting, will prioritise the inclusion of native species; and
- The large garden will provide suitable habitat opportunities for a range of insects.

In accordance with Policy **EN15**, the client commits to identify and implement reasonable opportunities to enhance, restore and create new biodiversity, either on-site or adjacent to the site

4.6 Waste Management

4.6.1 Construction Waste

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

- Prior to commencement of the above ground construction phase, a site waste management plan (SWMP) will be produced by the developer to limit the on and off-site environmental impacts of construction:
- The SWMP will detail:
 - Recycled and secondary materials;
 - Waste reduction;
 - Waste segregation;
 - Waste recovery; and,
 - Waste disposal.
- This development will promote the minimisation of waste arising and seek to maximise the use of recycled materials in construction.

The **principal contractor will implement sound environmental management practices** and consideration for neighbouring sites during their activities on-site.

4.6.2 Operational Waste

The operational waste strategy for the scheme focuses on the segregation of waste at source, in order to maximise the potential for the residents to recycle. All residents will be informed on collection frequency, as well as guidance on local recycling facilities to assist with the management and storage of waste.

The proposed waste management strategy has been developed in compliance with the policies of Manchester City Council:

- Waste will be segregated at source with the help of split bins to receive multiple streams of waste – general, recyclables and compost; and,



- Residents will be required to take their waste to the designated refuse area, to be collected by refuse operators on the designated collection day.

The proposed development will seek to **minimise waste and promote recycling**, during both construction and occupation.

4.7 Pollution

To reduce the dwelling's impact on the surrounding communities and environments, the proposals will include the following:

- The external lighting strategy will be designed to reduce unnecessary light pollution through effective design, energy consumption and nuisance to neighbouring properties; and,

The principal contractor will put measures in place to ensure that the surrounding area will not be polluted as a direct result of the activities on site during the construction phase.

4.8 Transport

A review of the most appropriate and sustainable modes of transport has been conducted to assess the feasibility of each transport option available to the future occupiers of the proposed development. The conclusions that can be drawn from this appraisal are as follows:

4.8.1 Public transport

- The closest bus is located directly outside the site, along Slack Road (Andrew Road stops).
- Abraham Moss is the closest Metrolink stop to the site, which can be accessed via a twenty-five-minute walk.
- The nearest railway station to the proposed development is Manchester Victoria, which can be accessed within a one-hour walk, fifteen-minute cycle or ten-minutes-drive via car. This provides national links.

4.8.2 Cycling and walking

- The site benefits from an excellent pedestrian infrastructure within the vicinity of the site. There are lit footways and crossing points linking the site to the surrounding area.
- The general topography of area is reasonably flat, which should assist in encouraging visitors of the proposed development to travel by bike.
- There are also a range of local amenities within both suitable walking and cycling distances.

Due to the site's proximity to local amenities and the presence of public transport services within easy walking distance, **the site is considered to be well located to encourage trips to be made on foot, bicycle or via public transport.**





5. ENERGY STRATEGY

The energy strategy for this dwelling prioritises an enhanced 'fabric led' solution coupled with the inclusion of boilers and low carbon technology. An enhanced building fabric specification allied to efficient servicing and controls, plus renewable energy technology will achieve compliance with the new build carbon dioxide emission reduction and fabric energy efficiency targets stipulated by Building Regulation, Part L Approved Document Volume 1 and Manchester City Council.

Details of the proposed energy strategy are presented below.

5.1 Build Fabric and Thermal Performance

The standard measurement of heat transfer through a given building material or construction type is the U-value ($\text{W/m}^2\text{K}$). The lower the U-value, the more slowly heat transfers and is lost out of a building. In buildings, heat loss generally occurs through the following main areas and elements of the construction:

- Ground floor;
- External walls;
- Roofs;
- Doors and windows;
- Thermal bridging; and,
- Uncontrolled ventilation.

The proposed material specification that will be incorporated throughout the scheme to limit heat loss and ensure efficient operation of the dwelling is presented in Table 5.1.

Table 5.1 – Proposed Fabric Specification

Item	Specification
External Wall	$U=0.18 \text{ W/m}^2\text{K}$
Ground Floor	$U=0.13 \text{ W/m}^2\text{K}$
Roof	$U=0.11 \text{ W/m}^2\text{K}$
Door	$U=1.00 \text{ W/m}^2\text{K}$
Windows	$U=1.20 \text{ W/m}^2\text{K}$
Air Permeability	$4.00\text{m}^3/\text{hm}^2 \text{ (@}50\text{Pa.)}$
Cold Bridge	Bespoke Details & Psi values

This enhanced material specification and design will provide the following benefits:

- **High performance thermal insulation** will ensure low U-values for all heat loss elements and will minimise heat loss through the building's thermal envelope;
- **Thermally efficient, 'A' rated, double glazed windows** will be specified with argon gas fill and low emissivity coatings to limit heat loss through the pane. Thermal breaks will be incorporated within the frames of the vision panels to further limit heat loss. The glazing g



value will be specified to optimise beneficial solar gains but limit the propensity for the dwelling to overheat;

- **Low air tightness** (design air permeability targeting $4.00\text{m}^3/\text{hm}^2$) will minimise uncontrolled ventilation. This will reduce heat losses and provide high levels of occupant comfort;
- **Improved cold bridging junctions** will significantly improve the emission rate of the dwelling through the provision of insulation, limiting heat losses that occur at the junctions between building elements and around openings. 'Bespoke' psi values have been used to achieve a low y-value, thus minimising heat loss through cold bridge junctions; and,
- **Thermal mass** (associated with this type of construction) helps stabilise the internal temperature and provides a largely self-regulating environment, reducing the risk of overheating and the need for mechanical cooling in summer. Furthermore, this daily cycle of absorbing and releasing heat continues on a year-round basis and can reduce the energy needed to keep a building warm during the heating season. This works through the ability of thermal mass to capture and recycle heat and incidental heat gains.

This enhanced fabric specification will **deliver a Building Regulation, Part L Approved Document Volume 1 (2021) compliant scheme for all aspects of the proposed development**. It ensures an inherently energy efficient development, focussing upon limiting demand side reductions in accordance with the energy hierarchy.

5.2 Building Services

The proposed mechanical and electrical specification that will be incorporated to ensure efficient servicing of the dwelling is presented in Table 5.2.

Table 5.2 – Proposed Mechanical and Electrical Specification

Item	Specification
Lighting	100% 'Low E' / LED
Ventilation	Intermittent Extract Fans
Space Heating	Worcester Greenstar 4000 Combi Boiler
Water Heating	From Combi Boiler
Heating Controls	Time and Temperature Zone Control
Renewable Energy Systems	Photovoltaic modules – See Section 6 for details

The mechanical and electrical specification will provide the following benefits:

- **Low energy and LED lighting** will be specified in order to maximise operational efficiencies and lifespan of the fittings. LEDs operate with an estimated energy efficiency of up to 90% when compared to traditional lighting and conventional light bulbs. This means that about c.90% of the electrical energy is converted to light, rather than wasted heat as in conventional bulbs.
- **Sophisticated heating controls** including time and temperature zonal control will ensure the efficient delivery of heat to further reduce the dwelling's energy demand; and,



- **Intermittent Extract Ventilation** will be specified in the dwelling, which will draw moisture laden, stale air out of the rooms and maintain a healthy living environment.

This mechanical and electrical specification **will deliver a Building Regulation Part L Approved Document Volume 1 (2021) compliant scheme** for all aspects of the Proposed Development.



6. PROPOSED RENEWABLE ENERGY SOLUTION

An analysis of the most appropriate renewable energy options has been undertaken to ensure compliance with Building Regulation Part L.

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

- Solar hot water;
- Photovoltaics (PV);
- Wind;
- Air source heat pumps;
- Ground source heat pumps; and,
- Biomass heating.

A review of the development proposals and site location concludes that the Photovoltaic Panels (PV) are feasible for this scheme, as detailed below in Table 6.1:

Table 6.1 – Renewable Technologies Review

Technology	Description	Advantages & Limitations	Feasibility
Solar Hot Water	Solar Hot Water utilises the energy in sunlight and diffuse daylight to heat water for use in buildings. The main component of any solar water heating system is the collector, which absorbs the radiant energy of the sun and converts it to heat energy.	✓ Low maintenance. ✓ Feasible for small scale developments.	No - This technology is not considered to be a feasible option for this site as these solar thermal technologies make only a relatively limited contribution to reducing the building's energy demand and carbon dioxide emissions. Furthermore, there are potential problems associated with routing the pipework through the dwelling.
Photovoltaics (PV)	Photovoltaic (PV) panels harness solar thermal energy and convert it into electricity which can then be used within a building. The panels may be roof or floor mounted and orientated in a southerly direction to enable this technology to operate efficiently.	✓ Low maintenance. ✓ Easy to integrate into buildings design. ✓ Cost of PV is constantly dropping. ✗ Panels ideally facing south at 30° tilt for optimum efficiency. ✗ Overshadowing will reduce performance. ✗ Can require significant roof space.	



Technology	Description	Advantages & Limitations	Feasibility
Wind Turbines	Wind generation equipment harness the wind to turn a propeller and in doing so, drive an alternator to generate electricity. The turbines may be pole or roof mounted.	✓ Low maintenance. ✓ Excess electricity can be exported to the grid. ✓ Vertical Axis Turbines can operate at wind speeds as low as 2m/s.	No – Wind turbines are considered unsuitable for this site due to a poor wind resource and lack of space to locate the turbines. Integrating these systems at height on the roof is not considered feasible due to the associated noise, vibration, and structural stresses upon the buildings. Furthermore, there are planning issues and perceived safety concerns with this technology.
		✗ A wind speed of at least 6m/s is typically required for traditional turbines to operate efficiently. ✗ Visual and noise impact risk.	
Ground Source Heat Pumps	Ground Source Heat Pumps collect low-grade heat from the ground to supply useful heat for space and water heating requirements. By applying additional energy input (in the form of electricity), it is possible to raise the temperature of the source heat to the temperature required.	✓ Highly tested and efficient technology ✓ Can be used for space and water heating. ✓ Lifespan of 20-25 years.	No – This technology is considered unsuitable for this site due to an insufficient area (based upon the proposed densities) to install a horizontal ground collector and the prohibitive costs and technical constraint of installing vertical boreholes.
		✗ Excavation works required for buried piping to be installed. ✗ Planning permission potentially required for installation.	
Air Source Heat Pump	Air Source Heat Pumps collect low-grade heat from the air to supply useful heat for space and/or water heating requirements. They operate in the same way as a ground source heat pump, by applying additional energy input (in the form of electricity), it is possible to raise the temperature of the source heat to the temperature required.	✓ Can be used for space and water heating. ✓ Highly tested and efficient technology ✓ Low maintenance. ✓ Lifespan of 20-25 years.	No – The incorporation of an air source heat pump is a technically feasible option for this development; however, it is the design team's preference to achieve compliance using alternative technologies.
		✗ Visual and noise impact risk. ✗ Reduced efficiency in cold conditions. ✗ Large outdoor space required for the heat pump unit.	
Biomass Heating	Biomass boilers typically burn wood chips or pellets as fuel to provide space heating and hot water.	✓ Almost a carbon neutral technology.	No – This technology is considered inappropriate for this type of development due to the need for a large fuel storage facility.
		✗ Frequent and large fuel deliveries. ✗ Large fuel store required. ✗ Regular maintenance.	



6.1 Photovoltaic Array (PV)

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

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

Proposed System Details -

- It is proposed that PV panels will be mounted upon the pitched roof of the dwelling and orientated west;
- A minimum of 4.50 kWp will be required.

Land use -

- There are no land use issues associated with PV technology at this site; and,
- The dwelling has sufficient roof area to accommodate the proposed PV array.

Local Planning Issues -

- There are no planning policy issues associated with this technology.

Noise Issues -

- PV is silent in operation.

Whole life cost and lifecycle impact -

- Current installed costs for PV are approximately £1,500 / kWp installed.
- Additional costs throughout the system's 30-year lifecycle are limited to:
 - Cleaning of the arrays;
 - Potential vandal damage to the arrays; and,
 - Replacement of the DC / AC inverter unit which typically have a lifespan of around 10 years.



7. CARBON DIOXIDE EMISSIONS CALCULATIONS

In order to demonstrate the environmental benefits associated with the energy strategy for the proposed dwelling, approved Standard Assessment Procedure (SAP) 10 software has been used to generate a representative energy demand model for the development. SAP software calculates the regulated energy demand and associated carbon dioxide emissions in accordance with the requirements of Building Regulations, Part L Approved Document Volume 1 (2021) that this development will be constructed in compliance with.

7.1 Regulated Energy Performance Calculations

Table 7.1 below presents a summary of the results, which show the dwelling emission rate and (regulated) energy demand performance associated with the proposed energy strategy for the dwelling.

Table 7.1 – Calculated Regulated Dwelling Emission Rates

	Slack Road
Dwelling DER (kgCO ₂ /m ² /yr.)	10.32
Dwelling TER (kgCO ₂ /m ² /yr.)	10.36
% DER Reduction over AD: Volume 1 (2021)	0.39
Dwelling DPER (kWh/m ² /yr.)	54.07
Dwelling TPER (kWh/m ² /yr.)	54.18
% DPER Reduction over AD: Volume 1 (2021)	0.20
Dwelling DFEE (kWh/m ² /yr.)	40.63
Dwelling TFEE (kWh/m ² /yr.)	41.55
% DFEE Reduction over AD: Volume 1 (2021)	2.23

The dwelling will incorporate an enhanced material specification along with high quality design and construction standards, in order to improve the energy efficiency of the dwelling through a 'fabric led' energy strategy, allied to efficient to efficient renewable and low carbon technologies.

This proposed material specification coupled with the proposed PV array will improve upon the minimum compliance under Volume 1: Dwellings Approved Document L (2021) fabric and primary energy targets by a minimum of 2.23% and 0.20% respectively.

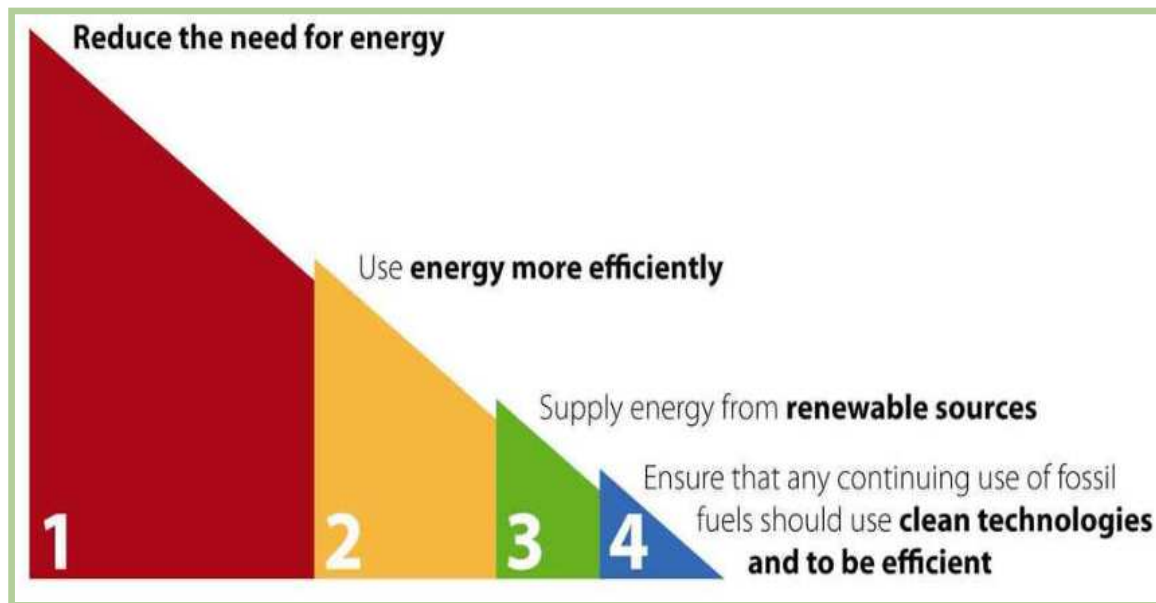
The proposed development **has the potential to secure a minimum carbon dioxide reduction rate of 0.39%**, thereby improving upon current Part L Volume 1 (2021) requirements.



7.2 Energy Hierarchy

The Energy Hierarchy has been used as a framework to guide this energy strategy to achieve practical and cost-effective carbon emission reductions. It is intended that the construction, design and specification proposed for this scheme will deliver a dwelling that is inherently efficient and cost-effective during occupation. The hierarchy prioritises such demand-side activities to reduce wastage and improve efficiency (see Figure 7.2).

Figure 7.2 – The Energy Hierarchy



First Principle

The dwelling will benefit from a material and design specification that is aligned with Building Regulation standards and includes numerous efficiency measures designed to reduce heat losses and minimise energy demand, including:

- ✓ High performance u - values;
- ✓ Reduced thermal bridge heat losses;
- ✓ Efficient form of construction, limiting heat loss areas; and,
- ✓ Low design air permeability target.

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

Second Principle

100% low energy and LED lighting provision and sophisticated control systems for the space and water heating will boost the operational efficiency of the dwelling as per the second principle of the Energy Hierarchy.



Third Principle

PV arrays will be installed on the roof of the proposed dwelling as per the third principle of the Energy Hierarchy.

Fourth Principle

The space and water heating demand will be met by the combi boiler systems. This will ensure that fossil fuels are consumed efficiently for heating purposes.



8. CLIMATE CHANGE EMERGENCY

On 10th July 2019, a motion asking Manchester City Council (MCC) to formally declare a **climate emergency** was unanimously agreed. In support of this, the developer wishes to highlight the following measures that will form part of the specification of this development:

- An energy strategy that aligns with the Councils planning policies and Part L of the Building Regulations, in relation to carbon emissions and minimising energy consumption;
- In exceeding compliance with the current, Building Regulation Part L targets, a commitment is made to minimise demand side energy loads – in accordance with the principles of the Energy Hierarchy;
- Waste is considered to be a misuse of natural resources and also contributes a large proportion of the UK's carbon footprint;
 - A site waste management plan (SWMP) will be produced by the developer to limit the on and off-site environmental impacts of construction and,
 - This scheme will promote the minimisation of waste arising and seek to maximise the use of recycled materials in construction.
- The dwelling will be designed to incorporate features that will serve to reduce energy demand, and in turn, carbon emissions arising from access to the building:
 - Any external lighting provisions will include active sensors; and,
 - The internal specification of the dwelling will seek to minimise water demand. Water efficiency measures (such as dual flush toilets) will limit potable water demand. This will reduce water heating energy loads and cut the energy required to supply clean drinking water.
- The site is well located to encourage trips to be made on foot or via public transport. This is facilitated by:
 - Bus stop being accessible along Slack Road;
 - The nearest tram stop is Abraham Moss, which can be accessed via a twenty-five-minute walk; and,
 - Victoria Station can be accessed via a short cycle or within a one-hour walk.

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



9. CONCLUSION

This Statement has reviewed the sustainability performance of the proposed Slack Road residential development against national and local planning policies. The conclusions that may be drawn from the review are as per the following:

Sustainability Performance –

- The dwelling will be specified with **efficient water fixtures and controls**. This will achieve a calculated daily consumption of <110 litres/person/day.
- This proposed dwelling, promotes access to sustainable modes of transport with access to regular bus services along Slack Road which will contribute towards creating a highly connected and sustainable development.
- The site is in an area at low risk from flooding, with it being **located within a Flood Risk Zone 1** in accordance with **policy EN14**.
- Waste arising during construction will be minimised through the **implementation of a Site Waste Management Plan (SWMP) in accordance with Policy EN19**. The SWMP will be used to ensure that there is adequate management, and that storage of construction waste takes place in line with the Council's policies. Opportunities for the possible recycling of construction from excavation works will also be considered.
- **A Refuse Management Strategy** has been developed to manage waste and recyclables from the operational phase of the development. Source segregation will encourage the individuals to recycle and **divert waste away from landfills**.
- **Materials with low environmental impact** will be selected and local suppliers will be prioritised where possible in accordance with **Policy EN4**.

Energy Strategy –

The dwelling will be designed and specified in accordance with **the principles of the energy hierarchy** and improves upon the **carbon dioxide (CO₂) reduction targets and guidance set by Manchester City Council**:

- The proposed material and mechanical specification will **provide various benefits** including; **upgraded thermal insulation**, thermally efficient 'A' rated, double glazed windows, **improved cold bridging junctions**, and low energy lighting;
- The focus is on reducing the demand for energy by **limiting heat gains and losses through the building fabric** which includes an enhanced material specification, well beyond the regulatory requirement;
- The dwelling will integrate photovoltaics upon the roof of the proposed development.
- The proposed dwelling has the **potential to secure a minimum carbon dioxide reduction rate of 0.39%**, thereby improving upon current Part L Volume 1 (2021) and the requirements stipulated by **Manchester City Councils Core Strategy**; and,



- The scheme will also utilise **low energy lighting** and **time and temperature controls** to ensure efficient consumption.

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

- The **re-use of the piece of land** will provide a development that inherently supports **sustainable residential space with access to local amenities and sustainable modes of transport**. The reuse of the site is also an efficient use of land and resources;
- **Construction practices that minimise adverse impacts on the environment** will be adhered to including a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling, a commitment will be made to minimise waste and pollution; and,
- **Improving upon the regulatory Part L compliance criteria** will assist in lessening the impact of this development on the environment by way of reducing carbon emissions.

In conclusion, the proposed development will deliver a quality development that accords with the guidance provided within Manchester Core Strategy as well as national planning and regulatory standards.

