
Paul Butler Associates

Environmental Standards Statement

Proposed Development of 33 New Build Dwellings @ 42-46 Drake Street,
Rochdale, OL16 1NU

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1 Executive Summary

This Environmental Standards Statement has been prepared by Watt Energy on behalf of Paul Butler Associates to support a planning application for the development at 42-46 Drake Street, Rochdale, OL16 1NU. The statement specifically addresses the following Rochdale Borough Council (RBC) approved climate change planning policies, as stipulated in the Rochdale Core Strategy (October 2016):

- **Core Strategy Policy G1 – Tackling and Adapting to Climate Change**
- **Core Strategy Policy G2 – Energy and New Development**
- **Core Strategy G3 – Renewable and Low Carbon Developments**

The statement details how the development will incorporate sustainable design and resource efficiency in line with the Energy Hierarchy, so to meet the policy requirements and council targets whilst reducing its overall environmental impact. All figures used within this report have been based on the most recent issue of drawings and modelled using SAP 10.2 to accurately predict Energy Usage and CO₂ reductions.

In relation to the planning documents and policies outlined above, the development is required to be **Zero Carbon**.

In order to achieve compliance, the development has been designed with a holistic low energy design concept involving a fabric first approach. The U-values, design air permeability and ventilation targets all aspire to Passive House design standards along with the consideration and application of low zero carbon renewable technologies.

Following the LZC feasibility assessment, it is proposed that the development will also benefit from a **42kWp PV array and Dimplex Edel Air Source Heat Pump Hot Water (ASHPHW)** unit to each flat.

As a result of the above the predicted site wide reduction in CO₂ over Part L 2022 of the Building Regulations can be summarised as:

- **92.7% with SAP 10.2 carbon factors**

Although the development falls short of the zero-carbon target, it has assessed all potential MEP options, maximised building fabric with Passivhaus design standards and all suitable roof space has been allocated towards PV provision with a 210m² PV array. The development can be classed as highly sustainable with an all-electric heating and hot water system and is looking to achieve a **low carbon** and **carbon neutral** status by obtaining energy from renewable sources by signing up to a Green Tariff system and paying close attention to reducing its potential embodied carbon to the highest extent possible. Clearly the development is highly sustainable and a pillar for sustainable design.

This statement also examines how the design, specification and characteristics of the proposal will contribute to sustainability and meet the relevant objectives outlined within the National Planning Policy Framework (NPPF) 2023, in addition to the RBC approved core strategy planning policies outlined above. The sustainability measures assessed included:



- Flood Risk Zone
- Green and Blue Infrastructure
- Sustainable Drainage Systems (SUDs)
- Internal Water Efficiency
- Waste Management
- Materials
- Pollution Control

In relation to the planning target centred around carbon emissions reduction, the proposed development is achieving a **92.7%** reduction in these emissions, over the Part L1 2022 of the Building Regulations. The development has strived to meet the RBC zero carbon target by maximising all potential MEP solutions, surpassing Passivhaus energy demand requirements through energy efficiency measures and can be classed as a low carbon and carbon neutral development.

2 Planning Statement

The following statement relates to the proposed residential development at 42-46 Drake Street, Rochdale.

2.1 The Site and Proposed Development

The site is located centrally within Rochdale. The site occupies approximately 0.04 hectares of land. A plan, with the site's extents denoted by the red outline seen in Figure 1 (shown later in this subsection).

The site is bounded to the east by Drake Street, Nelson Street to the south and Church Lane to the west and is adjacent to existing commercial and residential units. The current use of the site is open space. The quality of the space is poor, and it is under-utilised. It is a piece of land that is accessible to the public.

The proposal is for a residential-led mixed use development consisting of 33 new build apartments and one ground floor commercial unit. The apartments will be a mix of 30 one bedroom and 3 studio apartments (use class C3). Also provided will be associated ancillary facilities including a refuse/recycling store and bike store.



Figure 1: Site Plan

2.2 Relevant Policies and Guidance

2.2.1 Local Planning Policy

2.2.1.1 Rochdale Core Strategy

Rochdale's Core Strategy was adopted on 19 October 2016. It's the lead document in the Local Plan is the key Development Plan Document (DPD) guiding the measures assessed in this report.

G1 – Tackling and Adapting to Climate Change

G1 - Tackling and adapting to climate change

We will address climate change and ensure growth does not increase CO2 emissions by:

- Locating growth in areas which are likely to minimise the need for travel and which are well served by public transport, services and infrastructure;
- Expecting all development and regeneration schemes to be well connected to surrounding areas and facilities by sustainable means of transport (Policy T2);
- Encouraging and promoting renewable energy developments, including standalone and community developments, that do not, by virtue of their scale, siting, construction or operation, cause harm to the local area, its character and environmental assets and adjoining uses, which cannot be satisfactorily mitigated (Policy G3);
- Promoting the efficient re-use of buildings, especially those of heritage value, and the recycling of construction waste;
- Ensuring that development does not cause unacceptable harm to the borough's peatlands and woodlands, and encouraging their restoration and responsible management;
- Promoting sustainable waste management through the operation of policies in the Core Strategy and Greater Manchester Joint Waste Plan;
- Making the best use of open space to contribute to climate change mitigation and adaptation; and
- Securing planning obligations for energy infrastructure and climate change adaptation measures.

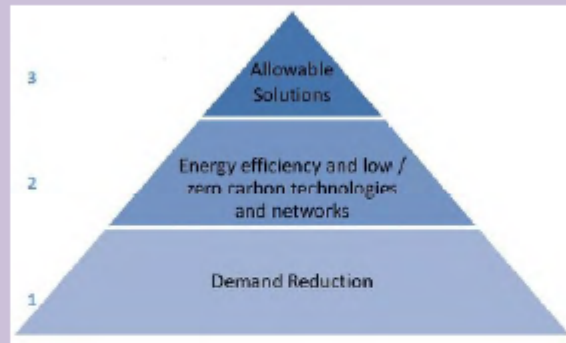
New developments will be expected to:

- a. Be zero carbon in line with national targets and definitions;
- b. Adhere to the 'energy hierarchy' as outlined in policy G2, being designed in such a way that ensures that buildings require the minimum amount of energy to function over their lifetime;
- c. Reduce CO2 emissions through the use of renewable and low carbon decentralised energy technologies and networks. This will be through both on-site provision in new developments and through connection to local networks;
- d. Address the impacts of climate change by incorporating comprehensive adaptation measures, including:
 - i. suitable measures, such as urban greening, for tackling the 'urban heat island' effect;
 - ii. where possible, the opening up of covered and culverted sections of waterways and provision of new water features, to help cooling and provide biodiversity, landscape and flood prevention benefits;
 - iii. the incorporation of appropriate water conservation and management measures, such as Sustainable Drainage Systems (SuDS), including ensuring that the rate of run-off on 'greenfield' sites is not increased and on 'brownfield' sites is significantly reduced, and avoiding the use of impermeable surfaces;
 - iv. the retention of existing trees wherever possible and the taking of all appropriate opportunities to plant trees and other suitable vegetation on site; and
 - v. the incorporation of 'green roofs' wherever possible, such as with flat roofs.

G2 – Energy and New Development

G2 - Energy and new development

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



1. **Demand Reduction** – Achieve the maximum possible reduction in demand for energy through building design (i.e. the use of passive systems). At the design stage of new developments, every effort should be made to ensure that buildings use as little energy as possible throughout their lifetimes, using siting, orientation, layout, construction and landscaping to optimise use of natural passive systems such as solar gain and natural lighting, shading, ventilation and cooling to minimise heating, cooling and lighting demands. Green roofs and green walls should be incorporated into developments wherever feasible.
2. **Energy efficiency and low / zero carbon technologies and networks** – Design to maximize energy efficiency, and use on-site or linked low or zero carbon technologies or direct connection to a low or zero carbon heat source (not necessarily on-site).
3. **'Allowable solutions'** – use wider energy efficiency / CO2 reduction measures, which could include developer contributions, to compensate for 'residual emissions' not addressed by 1 or 2 above.

G3 – Renewable and Low Carbon Developments

G3 - Renewable and low carbon energy developments

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

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

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

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

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

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

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

Planning permission will only be granted if:

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

2.2.2 National Planning Policy

The NPPF (Revised December 2023) sets out the Government’s planning policies for England and how these are expected to be applied. The overall emphasis of the NPPF is to reiterate the Government’s key objectives, including securing sustainable development.

The NPPF defines the purpose of the planning system as being to contribute to the achievement of sustainable development. It explains at Paragraph 8 that there are three dimensions to sustainable development. These are economic, social and environmental and should be pursued simultaneously through the planning system.

Paragraph 10 states that at the heart of the Framework is a presumption in favour of sustainable development.

2.3 Sustainable Design Strategy

2.3.1 Energy and Carbon Emissions

Building Services Strategy

In response to the policy requirements and climate change plan targets set out in section 2.2, developments should aim to assist and achieve the following carbon reduction targets:

1. Achieve a Zero Carbon Status for the development.

To achieve the most accurate calculations and estimates, the proposed units have been modelled using *SAP 10.2* the governments Standard Assessment Procedure for residential dwellings.

The proposed strategy for minimising energy use and carbon emissions is based on the energy hierarchy described in CIBSE Guide F 2012 (Energy efficiency in buildings). The energy hierarchy has been adopted for the development to ensure that the correct approach to design is taken to promote an energy-efficient low carbon solution (see figure 2). This has ensured that the benefits of effective methods of energy use reduction have been maximised first. The approach adopted is as follows:



Fig 2: Energy Hierarchy

Minimise energy demand – Implement passive design measures and optimise the building envelope in terms of orientation, air tightness, and insulation. For example, the proposal is targeting a low carbon classification through a holistic low energy design concept as it will be designed with a fabric first approach whereby standards designed to exceed Building Regulations compliancy are aspired to for all fabric U-values and air permeability targets.

Meet demands efficiently – Specification of energy efficient decentralised plant, heating, ventilation, lighting, and system controls to facilitate efficient operation. For example, each dwelling has been designed with an all-electric system in the form of a heat pump to contribute to the de-gasification of the housing stock.

Particular attention is being paid to the wellbeing of occupants. The ventilation strategy has been developed to minimise noise ingress from the proposed location as far as possible while minimising the risk of overheating.

Additional Renewable Energy Measures

Opportunities for incorporating low and zero carbon technologies (LZCT) have been considered for this development. The viability of several separate technologies was examined in a LZCT study (see section 3).

Efficient and Sustainable Design Measures

In line with the above Sustainable Design Strategy, the following Energy Efficient design measures are specified.

- High levels of insulation throughout with minimal thermal bridges
- Passive solar gains and internal heat sources
- Excellent level of airtightness
- Good indoor air quality by openable windows

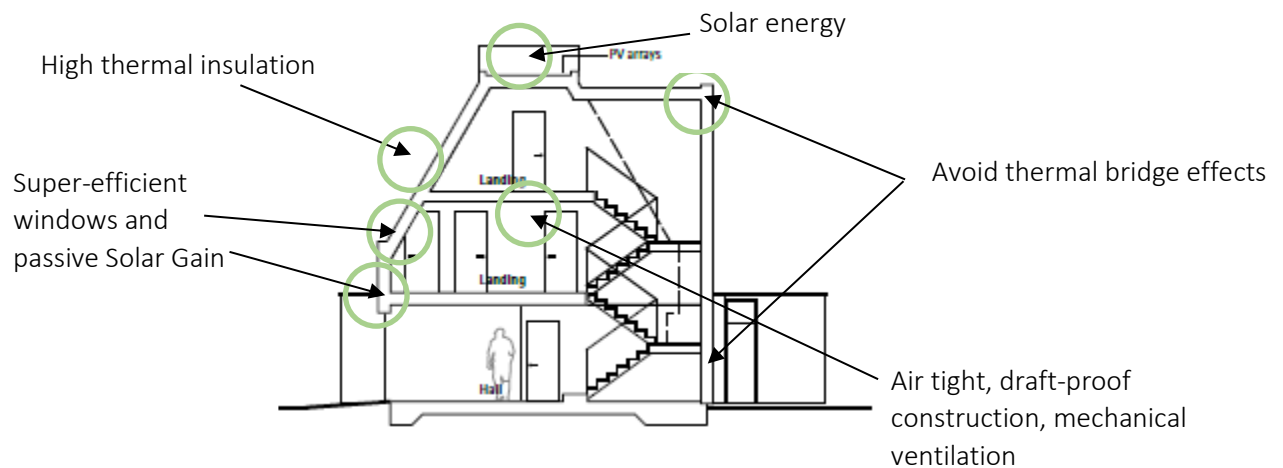


Fig 3. Efficient Design Measure examples

The Proposed specifications and key energy efficient design measures are as follows:

Residential Units:

- Ground floor U-values of $0.1 \text{ W/m}^2\text{K}$
- External Wall U-values of $0.15 \text{ W/m}^2\text{K}$
- Flat Roof U-values of $0.12 \text{ W/m}^2\text{K}$
- Low Triple Glazed Window U-values of $0.8 \text{ W/m}^2\text{K}$
- 100% low energy lighting throughout
- 100% efficient electric panel heaters to each flat
- MVHR – Vent Axia Sentinel Kinetic FH to each flat
- Air Permeability Rate of $1\text{m}^3/\text{hm}^2$ in all flats

2.3.2 Choice and Impact of Renewable Technology

All reasonable technologies were investigated for their suitability to the site and development; please refer to section 3 for details.

In addition to energy efficiency measures, it is proposed that the development will feature the following Low/Zero carbon Technologies:

- Dimplex Edel ASHPHW units implemented in the core cupboard of each dwelling
- 42kWp Site Wide PV Array (Approx. 105no. 400W Panels) implemented onto the roof of the apartment block

The above LZC contribution has provided an **89.2%** reduction in CO₂ following Energy Efficiency Measures.

- Energy Saving from onsite LZC Technologies = **64223.3 kWh/Yr**
- CO₂ Saving from onsite LZC Technologies = **12222.1 kgCO₂/Yr**

2.3.3 Energy and CO₂ Reduction Summary

A summary of all stages of the energy demand assessment from baseline figures to final carbon reduction are shown in Figures 1 & 2 below:

	SAP 10.2
Summary of CO₂ Emission Reductions	Total CO₂ emissions (kgCO₂/year)
Carbon Factors (Gas / Electric)	0.210 / 0.136
Baseline emissions	20143.3
Improved emissions (after application of energy efficiency measures) - residual emissions	13699.1
Improved emissions (after incorporation of renewable energy technology) % CO ₂ displaced in total	1477.0
% CO ₂ displaced in total	92.7%
% CO ₂ displaced by energy efficiency measures	32.0%
% CO ₂ displaced by renewable energy	89.2%

Table 2: Summary of CO₂ Reductions



	Energy demand (kWh pa)	Energy saving achieved (%)	Regulated CO ₂ emissions (kg pa)	Saving achieved on residual CO ₂ emissions (%)
Building Regulations Part L compliance (“Baseline” energy demand & emissions)	98030.3		20143.3	
Proposed scheme after energy efficiency measures (“Residual” energy demand & emissions)	75083.5	23.4%	13699.1	32.0%
Proposed scheme after on-site renewables	10860.2	85.5%	1477.0	89.2%
Proposed scheme offset for financial contribution or other “allowable solution”			0	0
Total savings on residual emissions				89.2%

Table 3. Total Energy and Carbon Emissions Savings Based on SAP 9.0 Carbon Factors



For a full Breakdown of the figures and calculations please see Appendix A – Energy Demand Assessment Spreadsheet.

Baseline energy demand

‘Standard Assessment Procedure - SAP 2012’ was used to produce example SAP reports to generate the figures used within the calculations.

Baseline energy demand (kWh pa)	98030.3
Baseline carbon emissions (kg pa)	20143.3

Be Lean stage

The following table demonstrates how the development achieves the reduction in carbon dioxide emissions from energy efficiency measures.

Energy savings from energy efficiency measures (kWh pa)	22946.8
Emission savings from energy efficiency measures (kg pa)	6444.2
Total regulated emissions after CHP savings and energy efficiency measures (kg pa) (“residual emissions”)	13699.1

Be Clean stage

The heating and cooling hierarchy has been applied to the design process of the development. It has resulted in large focus on energy efficiency measures and as can be seen in Figure 1.

Energy savings from the use of CHP systems (kWh pa)	-
Emission savings from the use of CHP systems (kg pa)	-
Total regulated emissions after CHP savings (kg pa)	13699.1

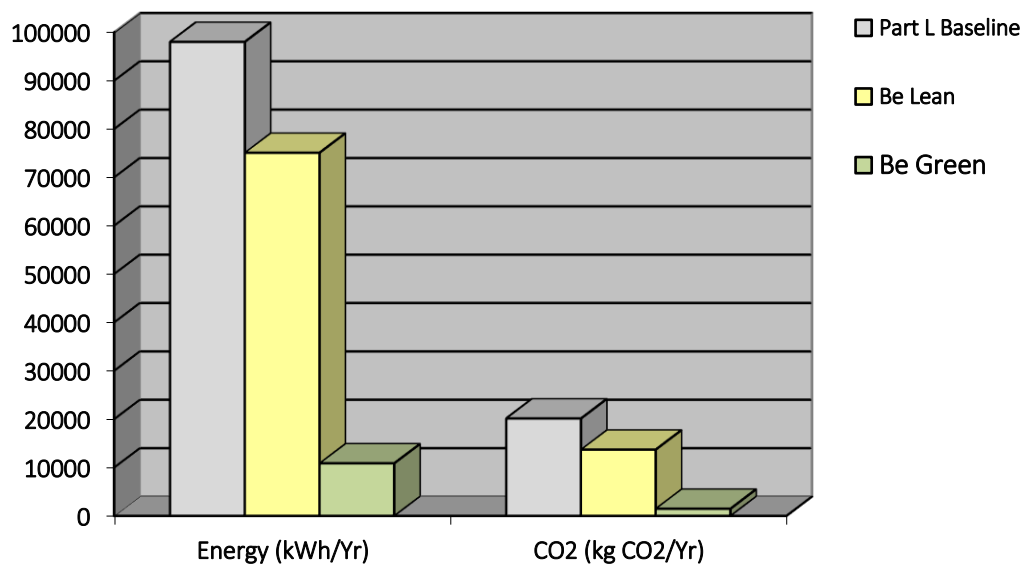


Be Green stage

The following table demonstrates how the development achieves the reduction in carbon dioxide emissions from LZC technologies.

Energy saving from the use of renewables (kWh)	64223.3
Saving on residual emissions from the use of renewables (kg)	12222.1
Saving on residual emissions from the use of renewables (%)	89.2%

The chart below illustrates the improvements over the Part L Compliant Baseline:



2.4 Adaptation to Climate Change

In addition to the primary building design and fabric, many other issues that will influence creating a Sustainable Development, including flood prevention, material use, waste minimisation and transport.

All the sections of creating a sustainable development should be taken into consideration from the start of the development and promoted throughout the building construction on site in order to maximise their benefits. Additionally, features which enable more efficient usage should also be specified to encourage the building users to maintain efficient use once construction has been completed.

2.4.1 Flood Risk Zone

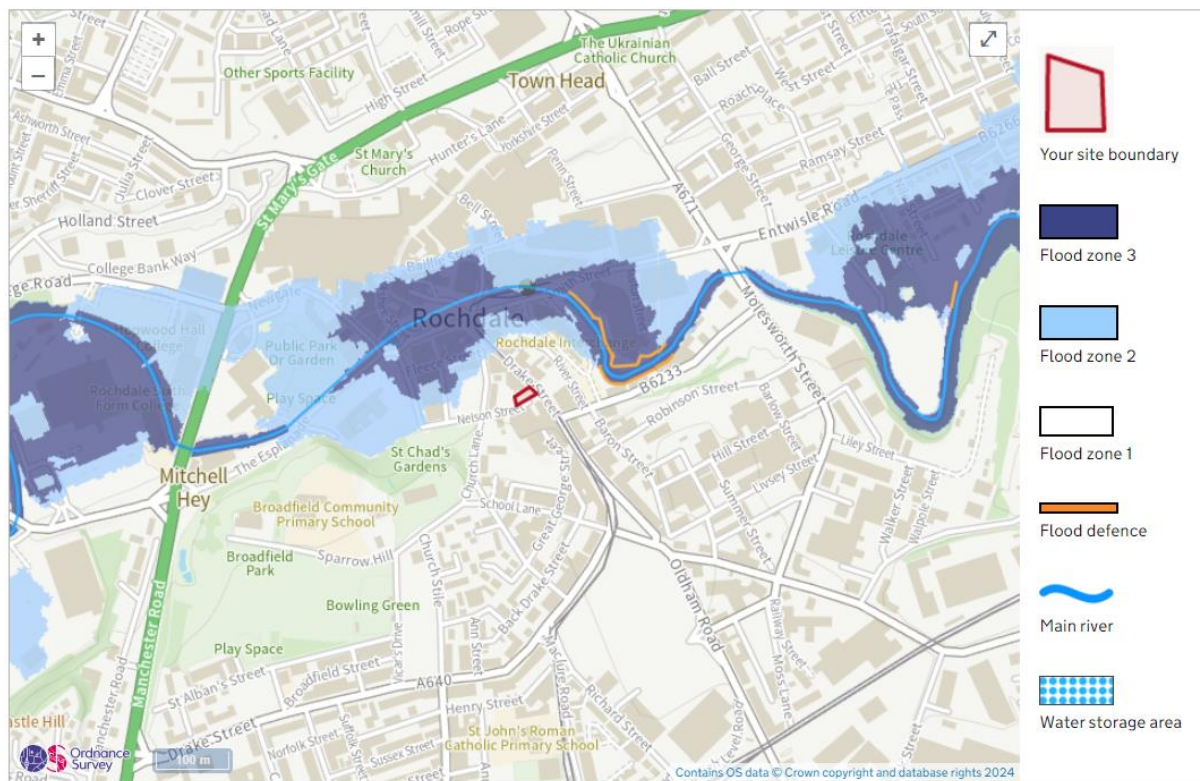


Fig 4: Flood Risk Map

The above map and snippet have been taken from a Government licenced flood risk map for the site. It can be seen that the site is located within flood risk zone 1 and therefore has minimal to no risk of flooding.

2.4.2 Green Blue Infrastructure

2.4.2.1 Sustainable Drainage Systems (SUDs)

Even though it has been shown that the proposed scheme is located on a site with a low to zero flood risk, it should still be ensured that the levels of surface water run-off do not increase from the existing development to the proposed, especially due to the new scheme having a different footprint and potentially resulting in new areas of impermeable surfacing. Therefore, a drainage strategy assessment should be undertaken, by a suitably qualified professional, to assess the feasibility of introducing on-site SUDs measures, that will reduce surface water run-off and any flood risks associated.

By incorporating SuDs, flood risk can be managed and mitigated. Section 1.1 of the SuDs Manual (Ciria C753) states the following:

“Sustainable drainage systems (SuDs) can deliver multiple benefits.

Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural

aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.”

The general concept of SuDS is to manage the flood and pollution risks in developed areas. This is done by efficiently managing surface water run-off by either slowing down the surface water run-off, or by reducing the quantity of surface water run-off. There are different methods to achieve this such as:

- Harvesting – capturing rainwater and facilitate its use within the development
- Infiltrating – rainwater infiltrates into the ground
- Storing – capturing rainwater and control the flow through the means of storing and releasing it slowly i.e. attenuation
- Conveying & treating – capturing rainwater and removing any contaminants, then convey the flow towards a downstream system

The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 3 below:

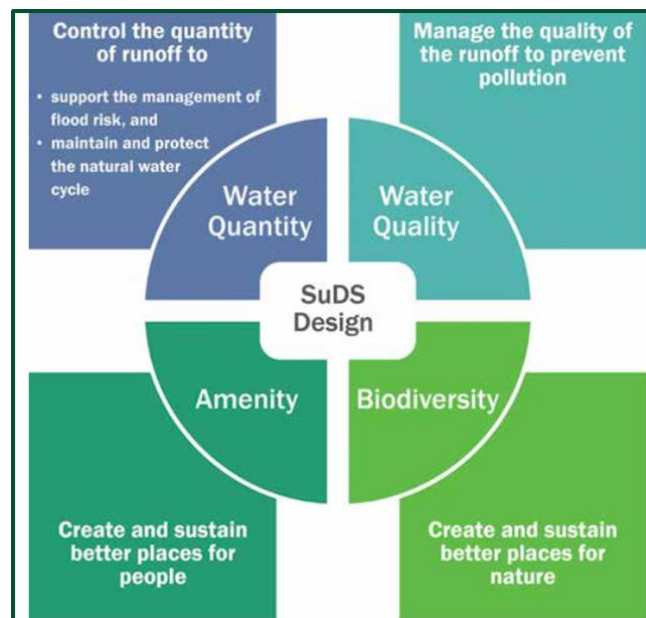


Fig 5. Representation of figure 2.1 of the SUDs Manual

SuDS are increasingly gaining popularity as a holistic solution to a wide range of pressing issues including flood risk, water pollution, groundwater depletion, biodiversity loss and urban decline.

Drainage Hierarchy

To alleviate pressure on existing sewer networks and to address issues of climate change the following hierarchy has been developed and implemented from a planning perspective.

The Planning Practice Guidance, states that:

“generally, the aim should be to discharge surface run-off as high up the following hierarchy of drainage options as reasonable practicably:

1. *Into the ground (infiltration)*
2. *To a surface water body*
3. *To a surface water sewer*
4. *To a combined sewer”*

The “Building Regulations Approved Document H” refer to this discharge hierarchy.

Description	Benefit
Flood risk management	SuDS aim to have an attenuating affect by slowing down and storing surface water run-off
Drainage resilience	Future proofing designed to be resilient against climate change
Natural flow regime protection	Mimic natural drainage arrangements to emulate natural flow
Water quality	Filter out pollutants and discharge cleaner water
Water reuse	Can be strategically placed to clean and capture water for reuse
Biodiversity and ecology	SuDS use vegetation and natural landscape to support biodiversity and ecology
Amenity	Improve visual integrity and desirability of the site by implementing green and blue features
Carbon reduction	SuDS can reduce carbon use throughout the life cycle including construction, maintenance, and demolition
Microclimate	Aim in reducing heat island effects
Education	Educate and engage the general public about surface water management

Table 5. Outline of types of green/blue infrastructure and associated benefit



2.4.3 Internal Water Efficiency

Part G of the Building Regulations requires all new dwellings to have an internal water consumption of no greater than 110 litres / person / day, unless specified to be less. Therefore, fittings proposed should have low flow rates, capacities, effective flush volumes etc. Example targets for these to achieve the required internal consumption are as follows:

Appliance	Unit of measure	Amount (litres)
WC (Dual flush)	Full flush volume	4
WC (Dual flush)	Part flush volume	2.6
Taps (excluding kitchen)	Flow rate l/min	5
Kitchen taps	Flow rate l/min	6
Bath	Capacity to Overflow	170
Shower	Flow rate l/min	8
Washing Machine	Litres / kg dry load	8.17
Dishwasher	Litres / place setting	1.25

Table 6. Internal Water Efficiency Flow Rates

The above rates will achieve a total internal water consumption of 106.31 with a bath present and 98.25 with only a shower present.

The specifying of 'A' rated appliances should be prioritised where possible.

2.4.4 Waste Management

2.4.4.1 Occupational Waste

Manchester City Council's Waste Storage and Collection Guidance for New Developments 2017 encourages all new developments to incorporate a waste management strategy into the build at the earliest stage possible. RBC will follow this guidance.

2.4.4.2 Construction Waste



A target of at least 90% of waste generated on site, throughout the construction stage of the development, to be diverted from landfill' will be included as part of a Construction Environmental Management Plan (CEMP) to be agreed with RBC.

The proposal will also endeavour to maximise the use of recycled materials on site, whereby further promoting the minimising of waste production.

2.4.5 Materials

The construction of new buildings and building elements has a large environmental impact in terms of both, energy, and embodied carbon of new materials. Therefore, RBC promote the prioritising of environmentally friendly materials, where possible, and encourages the use of recycled building materials. This information should also be incorporated into the SWMP mentioned in the previous subsection (Waste Management) as a means of promoting the re-using and recycling of materials.

Where new materials are to be used, careful consideration of their environmental impact should be taken. This can be achieved by ensuring that only materials that score well under The Green Guide to Specification. This useful online tool can be used as a reference that provides guidance on the relative environmental impacts for a wide range of different building specifications. The BRE's Environmental Profile Methodology determines the Life Cycle Assessment (LCA) of materials, which is what the Guide's specifications are based on.

In order to take full advantage of low impact materials, elements key to the scheme should be specified to achieve ratings of between A+ and C under The Green Guide's ratings. Insulation materials that are specified will also have a global warming potential (GWP) of 5 or less, with an ODP of 0. Additionally, 100% of all timber used as part of the scheme will be responsibly sourced from suppliers that are either Forest Stewardship Council (FSC) accredited, Programme for the Endorsement of Forestry Certification accredited, or a similar recognised accreditation body.

To further promote embodied energy and carbon savings, the scheme will first prioritise the reusing of any demolished materials within the site, however if this is not possible secondary priority must be given to the redirecting from landfill, in line with the waste hierarchy.

Finally, in addition to the above policy points, the development is also recommended to register with the Considerate Constructors Scheme, or a similar approved scheme.

2.4.6 Pollution Control

To reduce emissions of gases with high global warming potential (GWP) and nitrogen oxide (NOx) into the atmosphere, new buildings will be specified with insulating materials that have a GWP of less than 5. This will follow throughout the development to reduce the impact that the construction phase has upon climate change.

Additionally, the following measures will be implemented:

- Pollution Prevention Guidance will be adhered to in respects of air (dust) and water (ground and surface) pollution during the demolition and construction phase.
- External light fittings will be controlled through a time switch, or daylight sensor, to prevent operation during daylight hours to limit the impact of artificial lighting for the development's residents and surrounding environment.

Sound insulation will be specified to achieve Building Regulation Part E compliance standard (this will be verified by pre-completion testing) in addition to meeting the requirements of the council. This will reduce the impact of sound pollution for the occupants within adjoining dwellings.

3 Feasibility Assessment of Renewable Energy and Low Carbon Technologies

Solar Hot Water (Thermal)

Solar water heating systems are one of the more familiar renewable technologies used at the moment. They use the energy from the sun to heat water, most commonly for hot water needs. Solar heating systems use a heat collector that is usually mounted on a roof in which the sun heats a fluid. This fluid is used to heat water that is stored in either a separate hot water cylinder or in a twin-coil hot water cylinder (the second coil is used to provide additional heating from a boiler or other heat source).

Solar hot water panels could be used however, PV will provide slightly better savings and avoid the need for water storage cylinders when compared.

Renewable Technology Not Chosen.

Photovoltaic Panels (PV)

Photovoltaic modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases of silicon. Through a process called doping, very small amounts of impurities are added to the semiconductor, which creates two different layers called n-type and p-type layers.

Certain wavelengths of light are able to ionize the silicon atoms, which separates some of the positive charges (holes) from the negative charges (electrons). The holes move into the positive or p-layer and the electrons into the negative or n-layer. These opposite charges are attracted to each other, but most of them can only re-combine by the electrons passing through an external circuit, due to an internal potential energy barrier. This flow of electrons produces a DC current.

A PV array can be mounted on the suitable roof space. The amount proposed at this stage is **42kWp Site Wide PV Array (Approx. 105no. 400W Panels)** implemented onto the main roof areas.

Chosen Renewable Technology

Ground Source Heat pumps

A heat pump is a device that takes up heat at a certain temperature and releases it at a higher temperature. The essential components of a heat pump are heat exchangers (through which energy is extracted and emitted) and a means of pumping heat between the exchangers. The effectiveness of the heat pump is measured by the ratio of the heating capacity to the effective power input, usually known as the coefficient of performance (COP). Ground-source heat pumps (GSHP) extract heat from the ground. They are classified as either water-to-air or water-to-water units depending on whether the heat distribution system in the building uses air or water. Ground source heat pumps either use long shallow trenches or deep vertical boreholes to take low grade heat from the ground and then compress it to create higher temperatures.

Ground source heat pumps would not be suitable due to the lack of land space around the properties and the associated costs.

Renewable Technology Not Viable

Air Source Heat pumps

Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, underfloor heating systems, or warm air convectors and hot water in your home. An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside.

The system performs down to air temperatures of -20°C which means that they are more than suitable for installations within the UK. Hot water and Heating can be provided 365 days a year. The hot water is produced without the aid of electrical immersions and at 55°C is more than hot enough for baths and showers.

There are two main types of air source heat pump system:

- An air-to-water system distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. So they are more suitable for under-floor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time.
- An air-to-air system produces warm air which is circulated by fans to heat your home. They are unlikely to provide you with hot water as well.

Air Source heat pumps are a good option to provide heating and cooling. A conventional ASHP will be proposed to the houses to satisfy the space heating and hot water demand whereas a Dimplex Edel ASHPHW unit is to be proposed to the apartments to satisfy the hot water demand due to space constraints.

Chosen Renewable Technology



Biomass Heating

Biomass is any plant-derived organic material that renews itself over a short period.

Biomass energy systems are based on either the direct or indirect combustion of fuels derived from those plant sources. The most common form of biomass is the direct combustion of wood in treated or untreated forms. The use of biomass is becoming increasingly common in some European countries.

The environmental benefits relate to the significantly lower amounts of energy used in biomass production and processing compared to the energy released when they are burnt. This can range from a four-fold return for biodiesel to an approximate 20-fold energy return for woody biomass. Biomass-fuels can be used to produce energy on a continuous basis (unlike renewables such as wind or solar energy) and it can be an economic alternative to fossil fuels as it is a potential source of both heat and electricity.

However, Biomass systems have particular design management and maintenance requirements associated with sourcing, transportation and storage and are therefore more commonly used in commercial developments rather than domestic installations. It can be less convenient to operate than mains-supplied fuels such as natural gas and are more management intensive and require expertise in facilities management. Sources of biomass can also fluctuate, so boilers should be specified to operate on a variety of fuels without risk of overheating or tripping out.

A communal biomass system would not be feasible for this development due to the expense associated with the necessary output to heat all dwellings on the site.

Renewable Technology Not Chosen

Wind

Wind turbines convert the kinetic energy in wind into mechanical energy that is then converted to electricity. Turbines are available in a range of sizes and designs and can either be free-standing, mounted on a building or integrated into a building structure.

The wind speed in the area is under the advised minimum and the built-up area means that a wind turbine wouldn't be feasible.

Renewable Technology Not Viable

4 Conclusion

This statement has assessed the proposed development at the 42-46 Drake Street site against the relevant climate change and sustainability policies and targets, as outlined within: the Rochdale Core Strategy (October 2016), through the following of the energy hierarchy, the modelling of the dwellings in the FSAP 10.2 software and addressing all aspects of a sustainable development. In addition, the proposal has been assessed against national sustainable design definitions to determine how it can be classified.

As part of this process, the development was designed with a fabric first approach; with U-values, design air permeability and ventilation targets all aspiring to exceed Building Regulations Part L 2022 standards. Following on from this, efficient MVHR systems were proposed for each apartment and house, to further reduce the total energy demands whilst simultaneously providing each dwelling with healthy internal environments. This approach demonstrates a holistic low energy design concept, involving very low limiting values and thus led to high-energy performance targets and being defined as a low carbon development.

Furthermore, an LZC feasibility assessment was carried out, with all suitable technologies investigated for their suitability to the site and development. The assessment determined that a 42kWp system can be proposed at this stage covering a 210m² area and Dimplex Edel ASHPHW units are to be specified to each dwelling, and would provide an additional 89.2% reduction in carbon emissions over the residual emissions: bringing the total carbon reduction to **92.7%**.

The development has strived to meet the RBC zero carbon target by maximising all potential MEP solutions, surpassing Passivhaus energy demand requirements through energy efficiency measures and can be classed as a low carbon and carbon neutral development.

The development will also be adapting to climate change by incorporating sustainable drainage measures into the design enhancing biodiversity where possible and providing cycle storage provision to residents.

In addition to the following of the energy hierarchy through the efficient design and renewable technology measures mentioned and meeting all relevant RBC carbon targets the proposal will include many sustainability measures throughout construction and once completed, which will contribute heavily to the development's sustainability performance and accord with the requirements of the NPPF. The key measures to be included and therefore can be taken from this report include:

- The proposal sits within Flood Risk Zone 1 and therefore has minimal to no risk of flooding.
- A SUDs strategy will be produced to outline all measures to be incorporated that will ensure any additional surface water is collected, treated and removed.
- Internal water efficiency will be prioritised by ensuring that efficient water fixtures are proposed so that each dwelling achieves less than 110L per person per day and 'A' rated appliances will be specified where possible.

- Waste minimisation will be targeted from throughout construction and occupational phase. It is targeted that at least 90% of construction waste will be diverted from landfill. Whilst tri-separator refuse shoots will be installed on each floor to promote recycling.
- Prioritising reusing existing materials and locally sourced materials for construction to reduce waste and transportation to landfill in addition and promote a low embodied carbon development.
- The development will also include significant cycle storage provision.

House Type/Name	GF	Mid Floor	Top Floor	TOTAL (kWh/yr)	SAP 10.2	TOTAL (kgCO ₂ /yr)
Frequency	2	24	7	33		
BASELINE Dwelling Emission Rate (DER)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor	Associated Total CO ₂ (kgCO ₂ /yr)
Main Heating Fuel Requirement (DER)	679.12	515.83	951.65	20399.7	0.210	4283.9
Secondary Main Heating Fuel Requirement (DER)				0.0	0.136	0.0
Secondary Heating Fuel Requirement (DER)				0.0	0.136	0.0
Water Fuel Requirement (DER)	2,167.56	2,176.01	2,154.83	71643.2	0.210	15045.1
Electricity Pumps Fans Requirement (DER)	86.00	86.00	86.00	2838.0	0.136	386.0
Electricity Lighting Requirement (DER)	101.43	93.19	101.43	3149.4	0.136	428.3
PV Energy Produced	-282.15	-282.15	-282.15		0.136	
TOTAL PER DEVELOPMENT				98030.3		20143.3
AFTER ENERGY SAVING MEASURES Dwelling Emission Rate (DER)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor	Associated Total CO ₂ (kgCO ₂ /yr)
Main Heating Fuel Requirement (DER)	53.69	21.09	250.99	2370.5	0.210	497.8
Secondary Main Heating Fuel Requirement (DER)				0.0	0.136	0.0
Secondary Heating Fuel Requirement (DER)				0.0	0.136	0.0
Water Fuel Requirement (DER)	1,356.39	1,356.39	1,356.39	44760.9	0.210	9399.8
Electricity Pumps Fans Requirement (DER)	744.92	744.92	744.92	24582.4	0.136	3343.2
Electricity Lighting Requirement (DER)	108.80	99.61	108.80	3369.8	0.136	458.3
						0.0
TOTAL PER DEVELOPMENT				75083.5		13699.1
FINAL Dwelling Emission Rate (DER)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor	Associated Total CO ₂ (kgCO ₂ /yr)
Main Heating Fuel Requirement (DER)	67.69	25.93	246.70	2484.6	0.136	337.9
Secondary Main Heating Fuel Requirement (DER)				0.0	0.136	0.0
Secondary Heating Fuel Requirement (DER)				0.0	0.136	0.0
Water Fuel Requirement (DER)	527.86	527.86	527.86	17419.4	0.136	2369.0
Electricity Pumps Fans Requirement (DER)	58.92	58.92	58.92	1944.4	0.136	264.4
Electricity Lighting Requirement (DER)	108.80	99.61	108.80	3369.8	0.136	458.3
TOTAL PER DEVELOPMENT				25218.2		3429.7
PV Energy Produced (DER)	-435.12	-433.74	-439.71	-14358.0	0.136	-1952.7
TOTAL PER DEVELOPMENT				10860.2		1477.0



