



**ELEMENT
SUSTAINABILITY**

ROYLE ROAD, ROCHDALE

ENERGY AND CARBON STATEMENT

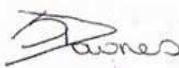
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ELEMENT
SUSTAINABILITY

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ELEMENT SUSTAINABILITY

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Appendix A – Whole Life Cycle Assessment



1. ENERGY AND CARBON PROFORMA

Figure 1.1 – Energy and Carbon Proforma¹

Energy and Carbon Proforma		GMCA GREATER MANCHESTER COMBINED AUTHORITY	
Residential			
Major development (+10 homes)			
Version 1.0			
Project Name: Royle Road, Rochdale			
Application ref: TBC			
Date: 30/03/2025			
	Ref. name	Royle Road, Rochdale	
	No. dwellings	76	
	Area (m ² GIA)	5,798	
	Target values	Building 1	
Minimise energy demand	Space heating demand (kWh/m ² GIA/yr)	≤ 15 (flats) ≤ 20 (houses)	13.7
	Calculation methodology used to calculate space heating demand and confirmation that this covers all homes/blocks		Predictive energy model
	Form factor per building	≤ 2	1.3
	Average external wall U-value (W/m ² K)	≤ 0.15	0.18
	Average window U-value (W/m ² K)	≤ 1 (triple)	1.4
	Air permeability rate (m ³ /h/m ² @ 50 Pa)	≤ 1	4
Maximise energy efficiency	Energy use intensity (kWh/m ² GIA/yr)	≤ 35	28.02
	Calculation methodology used to calculate energy use intensity and confirmation that this covers all homes/blocks		Predictive energy model
Use renewable energy	PV footprint area (% of ground floor space)	≥ 40	40%
	Annual renewable energy generation (kWh/m ² building footprint/yr)	-	43.85
	Renewable energy balance (%)	-	41.16
	Total energy used (kWh/yr)	-	123,548
	Total energy generated on-site (kWh/yr)	-	50,848
Use low carbon energy	Fossil fuel free (yes/no)	Yes	Yes
	Heat source	Electric	Electric
	Low Carbon Heat Appraisal completed	Yes	Yes
	Heat network suitability	-	Yes
	Exemption requested	-	n/a
	Efficiency of heating system (SCOP)	≥ 3.5	3.33
Reduce overheating risk	Carbon content of heat (gCO ₂ /kWh)	≤ 100	53
	Have Part O overheating requirements been met without the use of mechanical cooling?	Yes	Yes
	If no, how many homes are cooled?	Yes	Zero
Minimise embodied carbon	Has a CIBSE TM59 assessment been carried out using DSY2 and DSY3 weather files? Have any additional passive measures been included as a result?	Yes	DSY1 - Yes
	Upfront embodied carbon (kgCO ₂ e/m ² GIA)	≤ 500-600	
	List top three materials with the highest upfront embodied carbon emissions (kgCO ₂ e/m ² GIA): Material 1	-	93.1
	Material 2	-	88.9
	Material 3	-	22.5
Lifecycle embodied carbon (kgCO ₂ e/m ² GIA) - for large major developments only	-	389.82	
Offsets	Offset contribution (£)	-	n/a

¹ The following assumptions have been made for the PV generation:

- 2m² PV panels produce 500 watts
- 1kWp of PV generates 438.5 kWh/year, based on a SAP10.2 average.



2. INTRODUCTION

Element Sustainability has been commissioned by BMC Rochdale Ltd to review the sustainability and energy performance of the proposed residential development located on Royle Road in Rochdale.

The purpose of this statement is to summarise the relevant policy background and requirements of Rochdale 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 Rochdale 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 meets the criteria outlined by the council that the developer commits to implement at the site.



3. DEVELOPMENT PROPOSALS

3.1 Development Site Description

The site is located within a residential area off Royle Road in Rochdale and comprises recently cleared land. Existing residential dwellings lie to the south and west.

Figures 3.1 and 3.2 below present the pre-development site plan and the proposed site plan.

Figure 3.1 – Pre-Developed Site

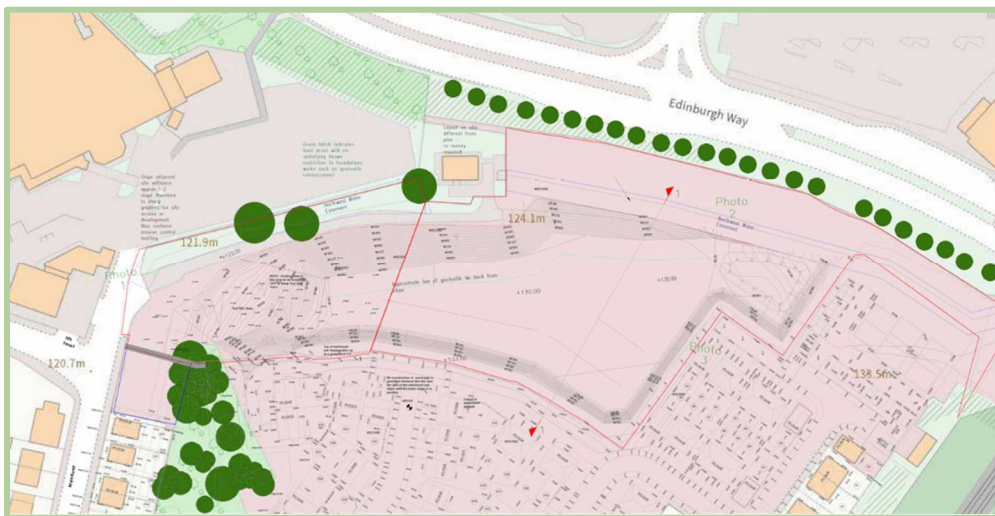


Figure 3.2 – Proposed Site Plan



3.2 Development Proposals

The proposed development will include a new build apartment block comprising seventy-six apartments with a mix of one and two-bedroom dwellings.

Figures 3.3 to 3.10 present the proposed elevations and floor plans for the planned development.

Figure 3.3 – Proposed West Elevation



Figure 3.4 – Proposed East Elevation



Figure 3.5 – Proposed Front and Rear Elevation



Figure 3.6 – Proposed Ground Floor Plan

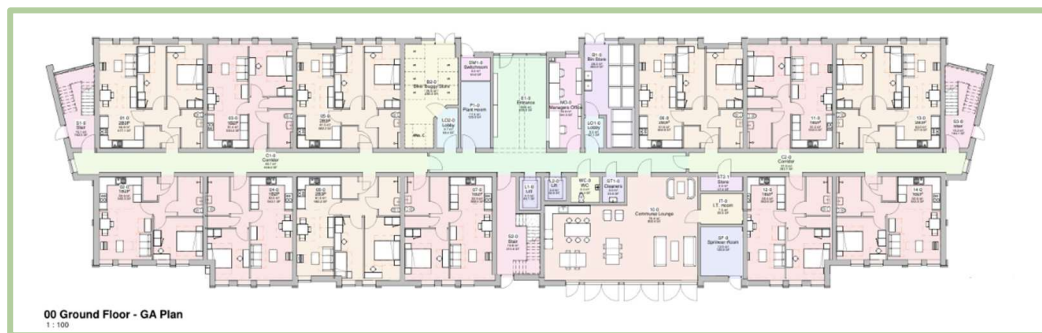


Figure 3.7 – Proposed First Floor Plan



Figure 3.8 – Proposed Second Floor Plan



Figure 3.9 – Proposed Third Floor Plan



Figure 3.10 – Proposed Fourth Floor Plan



4. POLICY REVIEW

4.1 National Planning Policy

The National Planning Policy Framework was revised on 12th December 2024 and sets out the government's planning policies for England and how these are expected to be applied.

The purpose of the planning system is to contribute to achieving sustainable development. The planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways, as set out below:

An economic role – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

A social role – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations, and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

An environmental role – to protect and enhance our natural, built and historic environment, including effectively using land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low-carbon economy.

These objectives should be delivered through the preparation and implementation of plans and the application of the policies in this Framework. Planning policies and decisions should play an active role in guiding development towards sustainable solutions, but in doing so should take local circumstances into account, to reflect the character, needs and opportunities of each area.

4.2 Local Planning Policy

4.2.1 Rochdale Adopted Core Strategy

The Core Strategy for the Rochdale borough was adopted on 19th October 2016 and is the lead document in the Local Plan. All other documents that make up or support the Local Plan need to meet the vision, strategies and policies outlined in the Core Strategy. Therefore, the following policies are relevant to the proposed scheme:

P3 - Improving design of new development: The council will require all new developments, including associated landscaping, regardless of location in the borough, to adhere to high standards of design. The following design principles should be adhered to wherever relevant:

- Ensure a development is easy to move through and get around, especially for pedestrians, cyclists, public transport, disabled people and emergency service vehicles;
- Minimise impact upon the environment, and help adapt to the impacts of climate change, by re-using existing buildings and materials (maximising the benefits of existing embodied energy) and utilising sustainable drainage; and,



- Reduce the monotony and visual impact of car parking areas by using substantial and well-integrated landscaping.

G1 - Tackling and adapting to climate change: The Council will address climate change and ensure growth does not increase carbon dioxide (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;
- 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 mitigated;
- 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:

- Be zero carbon in line with national targets and definitions;
- 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;
- 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;
- Address the impacts of climate change by incorporating comprehensive adaptation measures, including:
 - Suitable measures, such as urban greening, for tackling the 'urban heat island' effect;
 - 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;



- The incorporation of appropriate water conservation and management measures, such as Sustainable Drainage Systems (SuDS), to ensure that the rate of run-off on 'greenfield' sites is not increased, and on 'brownfield' sites is significantly reduced, and avoids the use of impermeable surfaces;
- The retention of existing trees wherever possible and the taking of all appropriate opportunities to plant trees and other suitable vegetation on site; and,
- The incorporation of 'green roofs' wherever possible, such as on developments with flat roofs.

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:

- 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.
- Energy efficiency and low / zero carbon technologies and networks – Design to maximise 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); and,
- 'Allowable solutions' – use wider energy efficiency / CO₂ reduction measures, which could include developer contributions, to compensate for 'residual emissions' not addressed by the above points.

4.3 Supplementary Planning Documents

4.3.1 Sustainable Design and Construction

This document is a Supplementary Planning Document (SPD) which was approved by Rochdale Council on 10th October 2016. This SPD deals specifically with ensuring that the principles of Sustainable Design and Construction are implemented through development in accordance with local and national policy.

The focus of this SPD is on the environmental considerations, since the other themes (economic and social) are covered by other SPDs.

The following policies are considered to be particularly relevant, and the key section of the Core Strategy is chapter 4, which includes the key Core Strategy policies:

- CG1;
- CG2; and,
- CG3.



Materials -

Developers are encouraged to select materials for their environmental performance, but how they are sourced also has consequences up the supply chain.

Materials should be sourced to take into account indirect carbon emissions, such as: those involved in the extraction/cultivation, manufacture and handling processes; and subsequent, in-life emissions resulting from the use of those materials in development.

Waste Policy -

Consideration will be given to how development proposals set out waste reduction, reuse, recycling and recovery, in preference to disposal. On-site facilities for waste management during construction should be provided so that reuse and recycling are maximised efficiently.

Climate Change and Renewable Energy -

The design and construction of development in Rochdale should reflect approaches to reduce the causes of climate change (principally CO₂/greenhouse gas emissions) and to adapt to the range of impacts that our changing climate presents at the local and site-specific level.

Taking into account paragraphs 4.43 and 4.44 of the core strategy, which stress flexibility, decentralised² and renewable energy supplies, changing targets and a goal of decoupling growth from CO₂ emissions, the policy continues to relate to the provision of or contribution to additional decentralised, renewable or low carbon energy sources to reduce CO₂ emissions. The 10% rule will therefore be applied to current (and emerging) Building Regulation Part L standards.

Sustainable Drainage -

Surface water runoff is also limited by Core Strategy policy CG2.2c. These limit run-off on greenfield development to the equivalent rate/volume for the undeveloped land; for previously developed land, it must be as close as reasonably practicable to the greenfield runoff rate and not exceed 50% of the rate prior to the new development.

Biodiversity -

A well-designed network of green infrastructure (GI) is an important component of creating better places, and development proposals should be designed and considered in the context of their part in that network.

In considering development plans for approval, the council will assess their impact on areas of biodiversity, green infrastructure; and the landscaping within a site will be assessed for its suitability.

² For clarity, “decentralised” is to be understood in a context of renewable/ low carbon energy. E.g., a diesel generator is not a conforming provision.



4.4 Regional Planning Policy

4.4.1 Places For Everyone

Places for Everyone (PfE) is the joint development plan of nine Greater Manchester local authorities (Bolton, Bury, Manchester, Oldham, **Rochdale**, Salford, Tameside, Trafford, and Wigan) dealing with strategic planning issues including jobs, homes, transport, and the natural environment.

All nine authorities adopted the PfE Plan on 21st March 2024. Therefore, this is now part of the statutory development plan for each of the nine PfE authorities.

As a result, the following policies have been considered as part of the proposed development:

Policy JP-S1: Sustainable Development: To help tackle climate change, development should aim to maximise its economic, social and environmental benefits simultaneously, minimise its adverse impacts, utilise sustainable construction techniques and actively seek opportunities to secure net gains across each of the different objectives.

In bringing forward previously developed sites for development, particular attention will be paid to tackling land contamination and stability issues, ensuring that appropriate mitigation and remediation is implemented to enable sites to be brought back into use effectively.

Addressing Climate Change -

Greater Manchester's Vision is to be at the forefront of action on climate change and to make its fair contribution to international commitments by becoming a carbon neutral city region by 2038.

To meet the carbon commitments, the following will be required:

- Be carbon neutral by 2038;
- Hold cumulative carbon dioxide emissions to within the council's carbon budget; and,
- Initiate a programme of mitigation to reduce emissions including by:
 - Significantly upscaling solar photovoltaic energy;
 - Reducing heat demand in homes;
 - Moving away from carbon intensive gas as the primary source of heat; and,
 - Increasing biofuel use.
- In supporting Greater Manchester's ambitions, climate change is a key theme running throughout the plan, rather than being reduced to a single policy, and it is only through this combination of actions that it can be properly addressed. In particular:
 - Methods to de-carbonise the city region through new and existing development, effective land management and through the provision of infrastructure and new technologies Policy JP-S2 'Carbon and Energy'; and,
 - The delivery of renewable and low carbon energy schemes Policy JP-S3 'Heat and Energy Networks'.



Carbon and Energy -

- Meeting the 2038 carbon neutrality target will require a radical transformation across a range of sectors to drive carbon reduction. Within this, new development will have a critical role to play and all new homes and commercial/industrial buildings will need to achieve net zero carbon by 2028.
- It is expected that development in the plan area will apply a net zero carbon approach to operational emissions up until 2028, thereafter emissions in construction should be considered. Minimum carbon reduction targets will be set in line with the Future Homes Standard of 80% or until such a time this is superseded.
- From 2025, applicants will need to demonstrate carbon reductions have been maximised with an opportunity to offset any residual carbon to a carbon offset fund. The approach will be reviewed in line with future standards as they are introduced.
- By following the energy hierarchy, new development will need to achieve net zero carbon through the maximisation of on-site measures first. However, in circumstances where a development has demonstrated that the hierarchy has been followed and there are no reasonable alternatives to meet the minimum carbon reductions, then payment to offset remaining emissions will also be required. Such payments should be expected to fund other carbon saving programmes within Greater Manchester to help meet the 5 Year Environment Plan targets.

Policy JP-S 2 – Carbon and Energy: The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including:

- Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured;
- Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities;
- An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable;
 - Be net zero carbon, which applies:
 - From adoption to regulated operational carbon emissions;
 - From 2025, development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions.
 - Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which, in order of importance, seeks to:
 - Minimise energy demand;
 - Maximise energy efficiency;
 - Use renewable energy;



- Use low carbon energy; and,
 - Utilise other energy sources.
- From 2025 any residual carbon emissions that cannot be fully mitigated onsite should be offset, in agreement with the relevant local planning authority, through a financial contribution to a carbon offset fund;
- As an interim measure, development should be consistent with the 2021 Part L Building Regulations unless superseded by changes to building regulations and/or national or local planning policies.
 - Where practicable, prioritise connection to a renewable energy/heating/cooling network in the first instance or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels at a later date; and,
- For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced;
- For non-residential developments, achieve at least BREEAM excellent standard (or equivalent) for the 'Ene 01 – reduction of energy use and carbon emissions' category, rising to 'BREEAM Outstanding' equivalent for ENE 01 from 2028;
- Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximise reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate measures for post-occupancy evaluation. Whole life cycle emissions should be considered where possible.
- Districts' Local Plans may set out specific carbon emission reduction and energy demand targets within Local Plans.

Policy JP-STRAT14 - A Sustainable and Integrated Transport Network: New development will have a significant role in delivering a sustainable and integrated transport network in order to reduce car dependency and increase levels of walking, cycling and public transport.

Policy JP-S3 – Heat and Energy Networks: The provision of decentralised energy infrastructure is critical to the delivery of our objectives for low carbon growth, carbon reductions and an increase in local energy generation. The following measures will help to achieve this:

1. Delivery of renewable and low carbon energy schemes will be supported with particular emphasis on the use of decentralised energy networks in areas identified as “Heat and Energy Network Opportunity Areas”. These have been identified where:
 - a. Existing heat/energy networks are operational or have been commissioned;
 - b. Sufficient density of existing heat demand occurs; and,
 - c. Significant future development is proposed at the strategic development locations.
2. Within the identified “Heat and Energy Network Opportunity Areas”, unless it can be demonstrated that there are more effective alternatives for minimising carbon emissions or such connection is not practicable or financially viable.



Policy JP-S4 - Flood Risk and the Water Environment: An integrated catchment-based approach will be taken to protect the quantity and quality of water bodies with reference to the North West River Basin Management Plan and managing flood risk, by:

- Working with natural processes and adopting a natural flood management approach to slow the speed of water drainage and intercept water pollutants;
- Locating and designing development to minimise the impacts of current and future flood risk, including retrofitting or relocating existing developments, infrastructure and places to increase resilience to flooding;
- Expecting developments to manage surface water runoff through sustainable drainage systems and as close to the source as possible;
- Development should achieve greenfield run-off rates unless it is demonstrated to be impracticable; and,
- Ensuring that sustainable drainage systems:
 - Are designed to provide multifunctional benefits wherever possible, including for water quality, nature conservation and recreation;
 - Avoid adverse impacts on water quality and any possibility of discharging hazardous substances to the ground;
 - Are delivered in a holistic and integrated manner, including on larger sites split into different phases; and,
 - Are managed and maintained appropriately to ensure their proper functioning over the lifetime of the development.
- As a minimum, residential development should meet the mandatory water efficiency standard of 125 litres/person/day as set out in Building Regulations. District local plans may and should consider setting a tighter water efficiency standard of 110 litres/person/day where there is a clear local need, with reference to national guidance on housing optional technical standards.

Policy JP-S6 - Resource Efficiency: The achievement of a circular economy and a zero-waste economy will play a key role in meeting Greater Manchester's ambition of becoming a leading green city region by 2038. The following measures will help achieve this:

- Development and implementation of the Zero Waste Strategy for Greater Manchester, which promotes overall reduction in the level of waste produced and supports resource efficiency within the Plan area in order to gain the maximum value from the things we produce;
- Recognition of the role of existing infrastructure in managing our waste and protecting such facilities to ensure adequate waste management capacity is maintained; and,
- Using sustainable design and construction techniques to reduce carbon emissions, adapt and future proof to the impact of climate change, reduce and recycle waste and minimise water use.

Policy JP-G2 – Green Infrastructure Network: A strategic approach will be taken to the protection, management and enhancement of Greater Manchester's Green Infrastructure in order to protect and enhance the ecosystem services which the Green Infrastructure Network provides, including flood management, climate change mitigation and adaptation.



Wherever practicable, opportunities to integrate new and existing green infrastructure into new development will be taken to protect, enhance and expand the green infrastructure network.

Policy JP-G6: Urban Green Space: To ensure there is an appropriate scale, type, quality and distribution of accessible urban green space that can support a high quality of life and other important green infrastructure functions:

- Existing urban green space will be protected and enhanced in balance with other considerations; and
- Developers and other stakeholders will be required to deliver new high quality urban green spaces.

Development should be designed to support the positive use of nearby green spaces, such as by offering a high-quality setting, providing natural surveillance, and facilitating easy access by walking and cycling.

Policy JP-G7 - Trees and Woodland: the aims and objectives of the Greater Manchester Tree and Woodland Strategy, aiming to significantly increase tree cover, protect and enhance woodland, and connect people to the trees and woodland around them.

This will be done through local planning and associated activities such as:

- Where development would result in the loss of existing trees, requiring replacement on the basis of two new trees for each tree lost, or other measures that would also result in a net enhancement in the character and quality of the treescape and biodiversity value in the local area, with a preference for on-site provision; and,
- Protecting trees and woodland during the construction phase of development.

Policy JP-G8: A Net Enhancement of Biodiversity and Geodiversity: Through local planning and associated activities a net enhancement of biodiversity resources will be sought, including, where relevant, by:

- Increasing the quality, quantity, extent and diversity of habitats, particularly priority habitats identified in national or local biodiversity action plans and those that support priority species;
- Improving connections between habitats, to protect and enhance the provision of corridors, ecological networks (including Nature Recovery Networks) and steppingstones that enable the movement of species, especially as the climate changes;
- Enhancing the management of existing habitats, including through habitat restoration, avoiding habitat fragmentation and combating invasive species;
- Protecting sites designated for their nature conservation and/or geological importance, with the highest level of protection given to international and then national designations;
- Facilitating greater access to nature, particularly within urban areas;
- Supporting the development and implementation of the Great Manchester Wetlands Nature Recovery Network; and,



- Safeguarding, restoring and sustainably managing our most valuable soil resources, tackling soil degradation/erosion and recovering soil fertility.

Development will be expected to:

- Follow the mitigation hierarchy of:
 - Avoiding significant harm to biodiversity, particularly where it is irreplaceable, through consideration of alternative sites with less harmful impacts, then
 - Adequately mitigating any harm to biodiversity, then
 - Adequately compensating for any remaining harm to biodiversity.
- Achieve a measurable net gain in biodiversity of no less than 10%; and,
- Development proposals should be informed by the findings and recommendations of the appropriate biodiversity/ecological assessment(s) in the PfE evidence base and/or any updated or appropriate biodiversity/ecological assessments submitted as part of the planning application process.

Policy JP-P1 - Sustainable Places: The aim is to become one of the most liveable city regions in the world, consisting of a series of beautiful, healthy and varied places, each having the following key attributes that all development, wherever appropriate, should be consistent with:

- Distinctive, with a clear identity that:
 - Conserves and enhances the natural environment, landscape features, historic environment and local history and culture;
 - Enables a clear understanding of how the place has developed; and,
 - Respects and acknowledges the character and identity of the locality in terms of design, siting, size, scale and materials used.
- Resilient, capable of dealing with major environmental events;
- Adaptable, able to respond easily to varied and changing needs and technologies;
- Durable, being built to last and using robust materials that reflect local character, weather well and are easily maintained;
- Resource-efficient with:
 - A low carbon footprint;
 - Efficient use of land;
 - Minimised use of new materials; and,
 - High levels of recycling,
- Supported by critical infrastructure, such as energy, water and drainage and green spaces; and,
- Functional and convenient, enabling people and uses to act efficiently with minimal effort, and responding to needs relating to servicing, recycling facilities, refuse collection and storage.



4.5 Climate Emergency

In 2019, Rochdale Council declared a climate emergency and committed to play its part in tackling climate change. In response to this, the council adopted their climate change strategy setting out the council's plans.

Measures set out in the strategy include:

- Reducing carbon emissions across buildings and the fleet; and,
- Ensuring new developments take climate change targets into account.

4.6 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 documents are 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.

The minimum energy performance requirements shall be approved and expressed in accordance with the methodology for:

- New dwellings, in the form of target CO₂ emission rates;
- New dwellings, in the form of target fabric efficiency rates; and,
- New dwellings in the form of target primary energy rates.

4.7 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:

Rochdale Core Strategy

- Policy P3
- Policy CG1
- Policy CG2
- Policy CG3

Sustainable Design and Construction SPD



Places for Everyone

- **Policy JP-S1:** Sustainable Development
- **Policy JP-S2:** Carbon & Energy
- **Policy JP-STRAT14:** A Sustainable and Integrated Transport Network
- **Policy JP-S3:** Heat and Energy Networks
- **Policy JP-S4:** Flood Risk and the Water Environment
- **Policy JP-S6:** Resource Efficiency
- **Policy JP-G2:** Green Infrastructure Network
- **Policy JP-G6:** Urban Green Space
- **Policy JP-G7:** Trees and Woodland
- **Policy JP-G8:** A Net Enhancement of Biodiversity and Geodiversity
- **Policy JP-P1:** Sustainable Places

Rochdale Climate Emergency Declaration

Building Regulations, Part L (2021 edition)

Approved Document Volume 1: Dwellings

Rochdale Borough Draft Local Plan

The proposed policies within the Rochdale Borough Draft Local Plan align with and support the strategic framework set out in the Places for Everyone (PfE) plan. The updated policies and their links to PfE are set out below:

- **Policy S1:** Sustainable and Energy Efficient Development
 - Links to PfE **Policy JP-S2**
- **Policy S2:** Climate Resilience
 - Links to PfE **Policy JP-S2** and **Policy JP-S4**
- **Policy S3:** Renewable and Low Carbon Energy Infrastructure
 - Links to PfE **Policy JP-S2** and **Policy JP-S3**
- **Policy S4:** Managing Water Resources and Flood Risk
 - Links to PfE **Policy JP-S4**
- **Policy S5:** Reducing the Impact of Pollution, Contamination and Land Instability
 - Links to PfE **Policy JP-S1**



5. ENERGY STRATEGY

5.1 CIBSE TM54 Modelling and Energy Demand

To demonstrate the energy performance of the proposed development, CIBSE TM54 assessments have been carried out for five representative apartment types within the development. The modelling provides a robust indication of the expected space heating and overall energy demand.

5.1.1 Overview

The climate emergency is driving a critical need to deliver high-performance buildings, with operational energy use aligned to net-zero targets. To achieve this, design teams require tools and techniques that can reliably model in-use energy performance based on design proposals and guide the development of more efficient design strategies.

Traditional compliance modelling, such as Part L, SAP and SBEM calculations, focuses only on regulated energy use and therefore does not provide an accurate prediction of how buildings will perform once occupied. This gap between compliance predictions and real-world energy consumption has led to significant performance shortfalls.

The CIBSE TM54 assessment methodology addresses this issue by providing a structured methodology for producing more realistic estimates of operational energy use. It enables engineers and consultants to account for the factors typically overlooked in compliance modelling, including:

- Unregulated loads (small power, equipment, IT);
- Occupant behaviour (schedules, density, usage patterns);
- Heating, cooling, ventilation and domestic hot water performance;
- Lighting and controls;
- HVAC efficiencies and part-load operation; and,
- Variations in system assumptions and scenarios.

By incorporating these elements, TM54 analysis helps to close the gap between Part L predictions, expected operational performance, and actual in-use energy consumption.



5.1.2 Geometry and Site Details

Five representative dwellings were chosen to reflect the range of apartment layouts and orientations across the development. These have been listed out in Table 5.1.

Table 5.1 – Representative Dwellings

Reference	Floor area (m ²)	Description	Façade Aspect
02 - 00 (1B2P)	50.50	One bed two-person, ground floor corner apartment.	South & West
09 - 00 (2B3P)	61.60	Two bedroom three-person, ground floor mid apartment	North
07 - 02 (2B3P)	62.00	Two bedroom three-person, mid floor mid apartment	North
08 - 04 (1B2P)	52.80	One bed two-person, top floor mid apartment.	South
15 - 04 (2B3P)	63.20	Two bedroom three-person, top floor corner apartment	North & East

The energy demand for these dwellings was calculated using DesignBuilder, a dynamic building simulation modelling (DSM) software package widely used for CIBSE TM54 assessments. This software allows detailed modelling of building fabric, ventilation, internal gains and heating system performance to produce predictions of regulated energy use. See Figures 5.1 and 5.2 for example apartments.

Figure 5.1 – Example Ground Floor Apartment 3D Elevation (02 – 00)

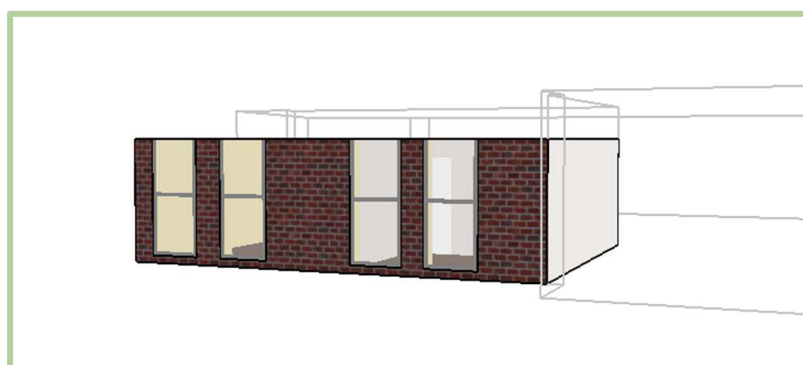
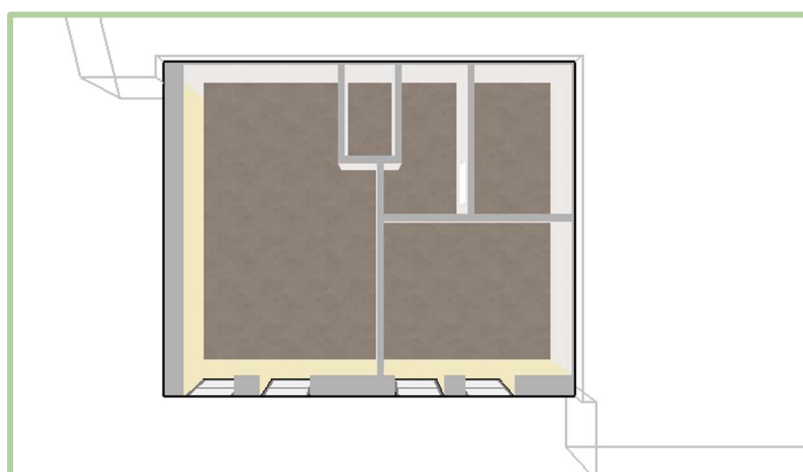


Figure 5.2 – Example Ground Floor Apartment 3D Layout (02 – 00)



5.1.3 Data Inputs and Internal Gains

Tables 5.2 to 5.4 present the proposed specifications and data inputs used within the dynamic simulation modelling calculations, which underpin the energy performance results in Table 5.5.

Table 5.2 – Proposed Fabric Specification

Item	Proposed Specification
Walls (external)	U=0.18
Ground Floor	U=0.12
Roof	U=0.11
Glazing (Standard)	U=1.40 G-value=0.50
Air Permeability m ³ /hm ² (@50Pa.)	4.00

Table 5.3 – Proposed Mechanical and Electrical Specification

Item	Proposed Specification
Lighting	100% LEDs
Ventilation	MVHR Heat recovery efficiency: 70%
Space Heating	Communal Air Source Heat Pump CoP 3.33
Water Heating	Communal Air Source Heat Pump CoP 3.33

Table 5.4 – Internal Gains

Item	Description	Note
Occupancy	Internal heat gains from people, based on occupancy density, activity level, and operational schedules.	Model inputs for density and schedules are defined on a zone-by-zone basis. Occupancy density has been based off the number of assumed residents, for example the occupancy of a two-bed three-person apartment is assumed to be three people.



Item	Description	Note
Lighting	Heat gains from fixed lighting systems, estimated using defined lighting loads, control strategies, and operating hours. Lighting schedules should be aligned with occupancy patterns.	The building has been specified with efficient LEDs. The lighting in the houses has been modelled with a power density of 2W/m ² -100 Lux.
Small Power	Heat gains from plug loads and equipment, which can be highly variable and are often difficult to predict, particularly when future occupiers are unknown. For this TM54 encourages the use of benchmark data.	Equipment power density varies by room type. Bedrooms are modelled with a power density of 2W/m ² with a radiant fraction of 0.20. Kitchen / lounge spaces are modelled with a power density of 10W/m ² and radiant fraction of 0.50.

5.1.4 Results

Table 5.5 presents the predicted delivered energy demand results.

Table 5.5 – CIBSE TM54 Predictive Energy Demand Results

Reference	Space Heating (kWh/m ² /year)	Lighting (kWh/m ² /year)	Small Power (kWh/m ² /year)	DHW (kWh/m ² /year)	Total (kWh/m ² /year)
02 - 00 (1B2P)	3.19	3.66	18.37	2.80	28.00
09 - 00 (2B3P)	4.31	3.67	16.10	2.77	26.87
07 - 02 (2B3P)	2.74	3.68	17.15	2.76	26.33
08 - 04 (1B2P)	4.35	3.66	19.10	2.79	29.90
15 - 04 (2B3P)	5.98	3.68	16.53	2.80	28.99



Table 5.6 presents the space heating demand³ and total energy usage intensity (EUI) for the representative dwellings, benchmarked against the Places for Everyone (PfE) targets.

Table 5.6 – TM54 Predictive Energy Demand Results

	Space Heating Demand (kWh/m ² /year)	Energy Use Intensity (kWh/m ² /year)
02 - 00 (1B2P)	10.63	28.00
09 - 00 (2B3P)	14.36	26.87
07 - 02 (2B3P)	9.14	26.33
08 - 04 (1B2P)	14.47	29.90
15 - 04 (2B3P)	19.92	28.99
Average	13.70	28.02
Places for Everyone Target	15.00	35.00

5.2 Building Fabric and Ventilation

The standard measurement of heat transfer through a given building material or construction type is the U-value (W/m²K). 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.

This development will benefit from a material and design specification that is aligned with Building Regulation standards and will include numerous efficiency measures designed to reduce heat losses and minimise energy demand in accordance with the first principle of the energy hierarchy, including:

- ✓ High performance U - values;
- ✓ Reduced thermal bridge heat losses;
- ✓ Efficient form of construction; 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.

³ Space heating demand refers to the energy required to heat the space, while the space heating values listed in Table 6.5 represent the energy delivered to the system to meet this demand.



5.2.1 Building Form and Heat Loss Envelope

The form of the dwellings proposed for the scheme is as follows:

- A mix of one- and two-bedroom apartment types.

The calculated form factors for the representative apartment types have been calculated, as follows:

- 02 - 00 (1B2P): 1.8
- 09 - 00 (2B3P): 1.4
- 07 - 02 (2B3P): 0.4
- 08 - 04 (1B2P): 1.4
- 15 - 04 (2B3P): 1.4

5.2.2 Elevation Design and Window Proportions

The dwellings are of bespoke architectural design with a range of high specification design features and materials palette, allied to generous proportions and detailing. The glazing ratio has been assessed to ensure the dwellings do not require active cooling to mitigate the risk of overheating.

5.2.3 Heated Spaces

Two of the ground floor apartments are adjacent to unheated storerooms. The walls to these spaces will be well insulated to minimise heat loss.

5.2.4 Building Fabric Specifications and Air Permeability

The proposed material specification that will be incorporated within the dwellings to limit heat loss and ensure efficient operation is presented in Table 5.2 above.

5.2.5 Ventilation System

The apartments will benefit from whole house balanced mechanical ventilation with heat recovery. This system will maintain a healthy living environment and further reduce the heat losses and energy demand of the dwellings. MVHR systems can recover up to 90% of heat from the extracted stale air from the dwelling by using a counter flow heat exchanger, which 'pre-heats' cool incoming, fresh air. The outgoing and incoming air pass next to each other, but do not mix.

5.2.6 Space Heating Demand

To demonstrate the environmental performance of the proposed new-build dwellings, CIBSE TM54 assessments have been undertaken for five representative dwelling types. This sample provides a robust and reliable indication of the overall expected performance of the development.



The space heating demand for the dwelling types has been calculated, as follows:

- 02 - 00 (1B2P): 10.63 kWh/m²/year
- 09 - 00 (2B3P): 14.36 kWh/m²/year
- 07 - 02 (2B3P): 9.14 kWh/m²/year
- 08 - 04 (1B2P): 14.47 kWh/m²/year
- 15 - 04 (2B3P): 19.92 kWh/m²/year
- Average space heating demand = **13.70 kWh/m²/year**

From 2025, the Places for Everyone policy sets maximum space-heating demand thresholds of 15 kWh/m²/year for flats. The assessed representative dwellings in this proposed development have been calculated to perform with an average space-heating demand of 13.70 kWh/m²/year.

5.3 Maximise Energy Efficiency

5.3.1 Energy Use Intensity

Representative CIBSE TM54 models have been calculated for five dwelling types. This provides the regulated energy demand of the dwelling types within the scheme.

The energy use intensity (EUI) of a home or building is the total amount of energy (regulated and unregulated) it uses for all purposes in kWh/year, divided by the gross internal floor area (GIA) in m². The EUI has been calculated prior to the inclusion of the PV array.

Both regulated plus unregulated energy demand have been calculated for the purposes of the Energy Use Intensity (EUI) calculation. The EUI for the representative dwelling types has been calculated, as follows:

- 02 - 00 (1B2P): 28.00 kWh/m²/year
- 09 - 00 (2B3P): 26.87 kWh/m²/year
- 07 - 02 (2B3P): 26.33 kWh/m²/year
- 08 - 04 (1B2P): 29.90 kWh/m²/year
- 15 - 04 (2B3P): 28.99 kWh/m²/year
- Average Energy usage intensity = **28.02 kWh/m²/year**

The updated *Places for Everyone* guidance sets a target for Truly Affordable Net Zero (TANZ) social rent homes to achieve a maximum energy use intensity of 35 kWh/m²/year.

We understand that the intent of the Energy Use Intensity target is to set out, for all developments (excluding small minor developments) the EUI value of 35kWh/m²GIA.yr as a target through which applicants can demonstrate compliance with the 'Maximise energy efficiency' element of policy JP-S2 (which applies to all new developments).

The Royle Road Development has demonstrated improvement in this key performance indicator.



5.3.2 Efforts to Reduce Energy Use of Equipment

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 emission reductions for the scheme.

Detailed measures are presented in Chapter 6 of this report, but in essence, the energy strategy focuses on a holistic approach to improving the buildings' performance by applying a fabric-led strategy, allied to renewable and low carbon technology.

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

- High performance thermal insulation;
- Low air permeability;
- Air Source Heat Pumps;
- Mechanical Ventilation with Heat Recovery;
- Solar photovoltaic array;
- Sophisticated heating controls;
- Appliances and white goods specified will be highly energy efficient; and,
- Each dwelling will be specified with a smart meter to enable occupant to effectively monitor and manage their energy consumption.

The proposed specification will improve upon the metrics and key performance indicators stipulated within Greater Manchester Combined Authority, Places for Everyone documents.



5.4 Renewable Energy Generation

The operational efficiency of the development will be optimised via the use of efficient mechanical and electrical (M&E) systems allied to low carbon and renewable energy generation.

The proposed building services that will be incorporated in the development to ensure efficient servicing is presented in Table 5.8. The exact M&E specification will be refined further into the development cycle at the technical design stage (RIBA Stage 4), post planning approval.

Table 5.8 – Proposed Mechanical and Electrical Specification

Item	Specification
Lighting	100% LEDs
Ventilation	MVHR <i>Heat recovery efficiency: 70%</i>
Space Heating	Communal Air Source Heat Pump <i>Effective CoP 3.33</i>
Water Heating	Communal Air Source Heat Pump <i>Effective CoP 3.33</i>
Heating Controls	Time and Temperature zone control
Renewables	Photovoltaic Array

5.4.1 Proposed Renewable Energy Generation System

Photovoltaic Array

Photovoltaic (PV) arrays have been selected as an appropriate renewable energy technology to contribute to the CO₂ emission reduction target for the development and to support the requirements stipulated within Places for Everyone. 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 on the roof.



Figure 5.7 shows an indicative PV layout for the roof of the apartment block, based on the required PV area. The layouts are subject to change and demonstrate that sufficient roof area is available to meet the Places for Everyone policy criteria.

Figure 5.7 – Proposed Roof allocation for PV

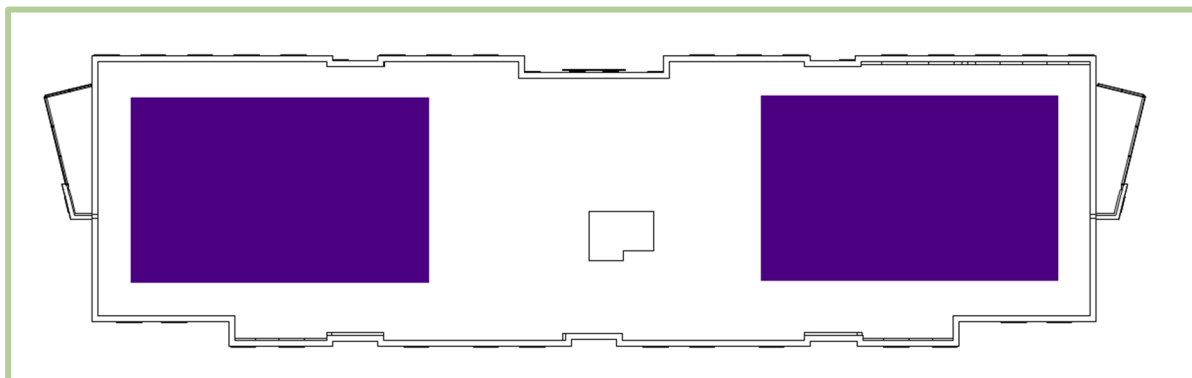


Table 5.9 – Proposed PV Area

	Alder
Ground Floor Area (m ²)	1159.60
Proposed PV Area (m ²)	463.84
PV Footprint area (% of ground floor area)	40%

Land Use –

- There are no land use issues associated with PV technology at this site;
- The development has sufficient roof area to accommodate the PV arrays; and,
- The PV arrays can be installed as part of the roof system in order to minimise the visual impact.

Local Planning Issues –

- There are no planning policy issues associated with this technology and this type of technology is favoured under the PfE requirements.

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 thirty-year lifecycle are limited to:
 - Cleaning of the arrays; and,
 - Replacement of the DC / AC inverter unit which typically have a lifespan of around ten years.



Air Source Heat Pumps

The proposed communal Air Source Heat Pump (ASHP) system is a highly energy-efficient solution for meeting the development's space heating and domestic hot water demands. The system comprises a centralised array of external heat pump units, which extract heat from the ambient air and transfer it via heat exchangers into a communal distribution network. This network supplies low-temperature hot water to individual dwellings for space heating and domestic hot water generation via interface units.

By utilising low-carbon ambient energy, the system significantly reduces energy consumption and associated emissions compared to conventional gas-fired heating systems, while also aligning with the transition to all-electric developments.

The proposed communal ASHP system provides the following benefits:

- A highly energy-efficient centralised system, reducing overall electrical demand and associated carbon dioxide (CO₂) emissions across the development;
- A low operational carbon solution due to the high coefficient of performance (CoP) of heat pump technology. ASHPs are a well-established and reliable technology, with an anticipated lifespan of circa 15–20 years with appropriate maintenance;
- The removal of fossil fuel infrastructure from the development, enabling the scheme to benefit from the ongoing decarbonisation of the UK electricity grid and resulting reductions in operational carbon emissions over time; and,
- A communal system configuration that supports future connection to, or integration with, wider low-carbon heat networks, where available.

5.5 Low Carbon Heating

5.5.1 Fossil Fuel Free

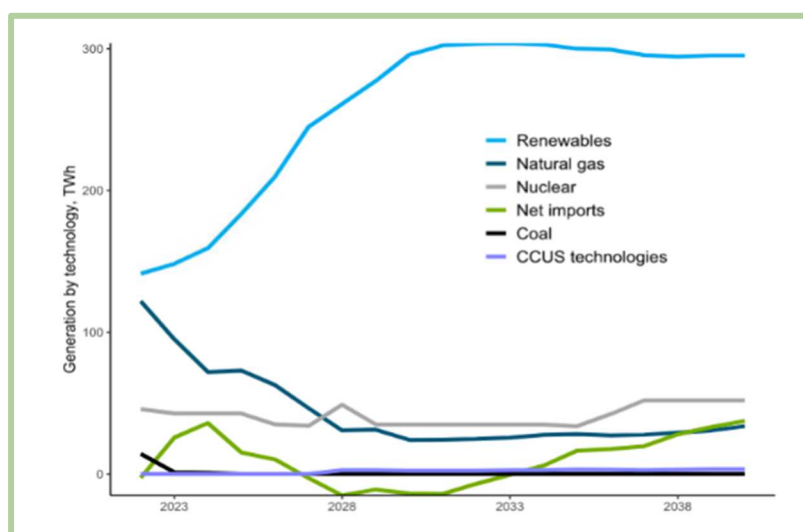
The scheme will be fossil fuel free.

As the UK electricity grid's CO₂ footprint continues to improve, so too would the carbon dioxide emissions associated with the operational phase of the proposed scheme, which benefits from highly efficient systems.

UK grid mix electricity carbon emissions will decrease significantly by 2035, with the carbon intensity of electricity generation falling by 93% between 2020 and 2035. This is due to the progressive shift away from fossil fuels, as demonstrated in Figure 5.8.



Figure 5.8 - Electricity Generation by Fuel Source, TWh



Source – BEIS, Energy and Emissions Projections

The energy strategy proposed for the scheme uses a combination of air source heat pumps and photovoltaics. The air source heat pumps are highly efficient systems that utilise grid electricity to provide space and water heating. The use of heat pumps will ensure that fossil fuels converted and distributed through the National Grid as electrical energy will be consumed cleanly and efficiently.

Therefore, this will further support the schemes move towards operational net zero carbon in accordance with the Places for Everyone requirements.

5.5.2 Proposed Heating and Hot Water System

The proposed specification includes a communal ASHP system, which will provide a low-carbon solution for both space heating and domestic hot water across the development.

5.5.3 Proposed Cooling System

There will be no active cooling specified within the properties.

Natural ventilation will be provided by openable windows. Compliance has been demonstrated with Building Regulations Approved Document O: Overheating and CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes without the requirement of active cooling.



6. FULL LOW CARBON HEAT APPRAISAL

This Full Low-Carbon Heat Appraisal has been prepared to support the planning application for the development at Royle Road, Rochdale.

It assesses the predicted performance of the proposed heating system, against the Key Performance Indicators (KPIs) required for major scale developments such as this.

The development falls under Places for Everyone **Location Case 3**, which applies to sites that are not within an existing low carbon heat network or a planned low carbon heat network **but are within a low carbon heat network opportunity area**.

As this scheme is to provide seventy-six apartments, it is considered a Major application. This triggers the need for a Full Low Carbon Heat Appraisal comparing a set of Key Performance Indicators (KPIs) against the proposed system. This can be seen in Table 6.2.

For Major applications, the energy carbon requirements, are as follows:

1. Non fossil fuel based system proposed, and,
2. The carbon content of heat (delivered) is less than 100gCO₂/kWh

Policy JP-S3 states that all major applications falling under Cases 1, 2, or 3 will be required to include a comparison of the proposed heating system against selected alternatives, including a low-carbon heat network and an on-site communal heating system.

- **Case 1:** The site is within 500m of an existing low carbon heat network;
- **Case 2:** The site is within 500mm of a planned low carbon heat network;
- **Case 3:** The site is within a low carbon heat network opportunity area; or,
- **Case 4:** Any other location.

Furthermore, there is an expectation that connection to a low carbon heat network is proposed 'unless it can be demonstrated that there are more effective alternatives for minimising carbon emissions or such connection is not practicable or financially viable'.

There are four key grounds for exemption, these are as follows:

1. **Carbon grounds:** An alternative on-site heating system would be lower carbon than the carbon content of heat (delivered) of the low carbon heat network.
2. **Heating costs grounds:** Connection to the low carbon heat network would lead to heating costs for the residents which are more than 10% higher than an on-site heating system with an equal or lower carbon content of heat.
3. **Cost effectiveness grounds:** Connection to the low carbon heat network (and the installation of on-site interim heating plant if needed) would not be as cost effective as installing an on-site heating system with an equal or lower carbon content of heat.
4. **Technical/practical grounds:** There are significant technical/practical reasons why the development cannot connect.



A review was undertaken to determine whether the site lies within a District Heat Network zone, in accordance with the Places for Everyone guidance for Manchester. It was determined that the site is located within a low carbon heat network opportunity area and is therefore **classified as Case 3**, as noted above.

The blue dot in Figure 6.1 below shows the approximate site location in relation to the heat and energy network opportunity areas.

Figure 6.1 – Greater Manchester Heat and Energy Network Opportunity Areas (Site location)

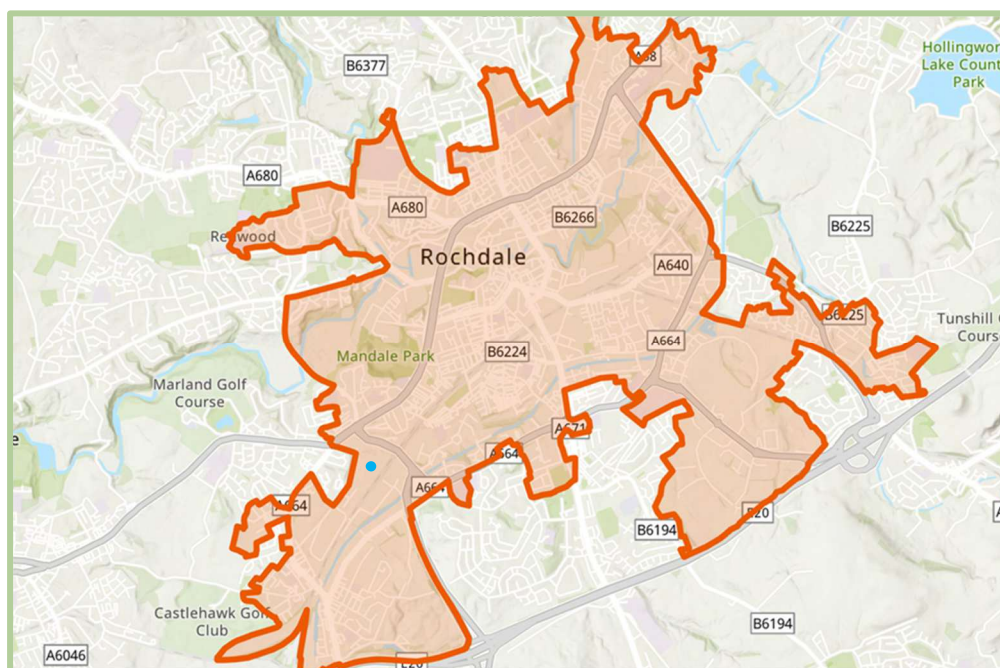
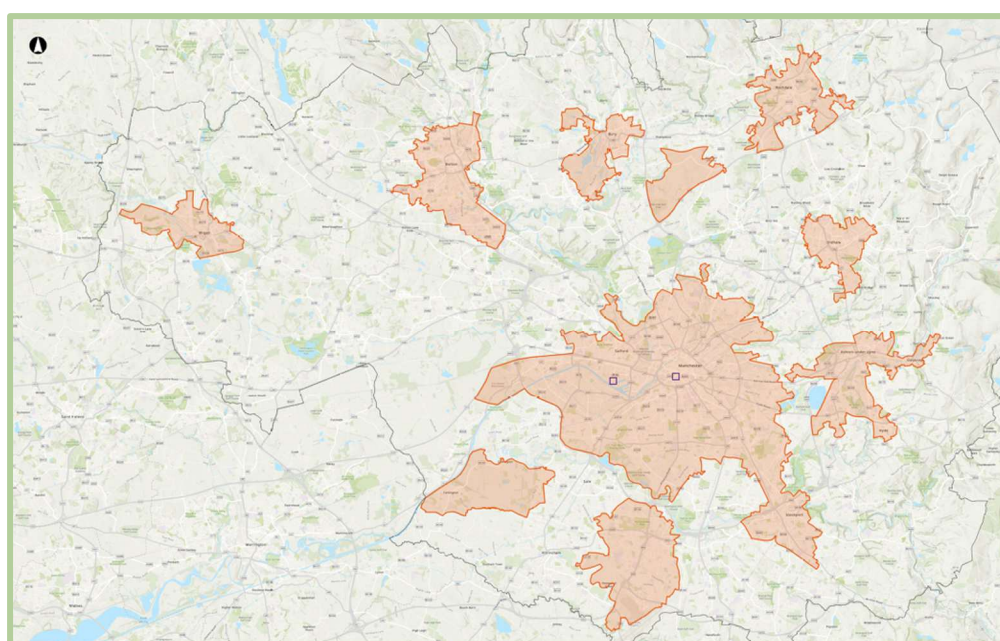


Figure 6.2 – Greater Manchester Heat and Energy Network Opportunity Areas (Full map)



6.1 KPI Assessment Summary

Table 6.1 – Proposed and Alternative Systems

	Communal Heat Network	Exhaust Air Heat Pump	Direct Electric
Space Heating	Communal ASHP ⁴ (effective COP ~ 3.33)	EAHP (COP = 2.50)	Electric Panel Heaters
Domestic Hot Water	Communal ASHP (effective COP ~ 3.33)	EAHP (COP = 3.00)	Electric Immersion
Ventilation	MVHR (70% HR efficiency)	MEV	MVHR (70% HR efficiency)

Table 6.2 – KPI Performance Assessment

	Key Performance Indicators	Communal Heat Network	Exhaust Air Heat Pump	Direct Electric
Environmental Performance	1. Fossil Fuel	No	No	No
	2. Carbon Content of Heat (gCO ₂ /kWh)	53	66	177
	3. Local Pollution	None, system is 'full electric'	None, system is 'full electric'	None, system is 'full electric'
Impact on residents / users	4. Estimated Running Costs for heating & Hot water (£/yr/apartment)	£333.91	£410.50	£614.46
	5. Estimated maintenance costs £/yr	Medium	Low	Low
	6. Estimated replacement costs £/yr	Medium	Medium	Low
	7. Additional costs compared to benchmark low carbon heating system +/- %	-19%	Benchmark	+50%
Impact on Viability	8. Estimated capital cost £/Building ⁵	£912,000	£760,000	£129,960
	9. Additional cost compared with benchmark low carbon heating system +/- %	+20%	Benchmark	-83%
Infrastructure development	10. Connection to low carbon Heat network	Potential future connection	No	No
	11. Scale of application GIA m ²	5798.10	5798.10	5798.10

⁴ Communal ASHP has been modelled with a COP of 3.50 and a 95% distribution efficiency, effective COP ~ 3.33.

⁵ The capital cost has been derived from the PfE estimate.



6.1.1 Running Costs

The estimated running cost is based on the average space heating and hot water demand derived from the representative CIBSE TM54 predictive energy calculations, multiplied by the average electricity prices for July to September 2025 as published by the House of Commons Library. These figures can be seen below:

- Average Standing charge: £0.5368/day
- Average Day rate: £0.2635/kWh

Table 6.3 – Estimated Running Cost

Estimated heating demand (Space & Water) kWh/year	Standing Charge £/year	Day rate cost £/year	Estimated running Cost £/year/typical apartment
523.64	195.93	137.98	333.91

6.1.2 Carbon Emissions

This option is considered fossil-fuel-free as it is fully electric, resulting in no local pollution at the point of use. Unlike gas boilers, which burn fossil fuels within the dwelling, producing local emissions. Furthermore, as the UK electricity grid's CO₂ footprint continues to improve, so too would the carbon dioxide emissions associated with the operational phase of the proposed scheme, which benefits from highly efficient systems. The carbon content⁶ of the proposed heating strategy is specified below:

Communal ASHP space and water heating:

- Effective efficiency of system 333% (CoP of 3.33)
- Carbon content of delivered heat: 53 gCO₂/kWh⁷

⁶ According to the 2025 Government Greenhouse Gas (GHG) Conversion Factors published by DESNZ, the carbon content of grid electricity is 0.177 kgCO₂ per kWh. This emission factor has been used to estimate the operational carbon performance of the proposed full electric heating system.

⁷ The carbon content of delivered heat has been calculated as follows:

- The carbon content of grid electricity is 177 gCO₂/kWh
- The proposed heating system has an effective CoP of 3.33, meaning 1kWh of electricity produces 3.33 kWh of heat output.
- The carbon content of delivered heat is therefore calculated as $177 \div 3.33$, which equals 53.15 gCO₂/kWh.



This Full Low Carbon Heat Appraisal demonstrates that the proposed **communal air source heat pump (ASHP) system is a suitable and compliant low-carbon solution for the development**. As a Case 3 Major application within a heat network opportunity area, there is a requirement to consider alternative systems, this comparison is presented in Table 6.2.

However, as there is currently no existing or planned heat network in the area, the proposed system has been designed to allow for potential future connection, ensuring alignment with long-term decarbonisation strategies.

The communal ASHP system is fully electric, produces no on-site emissions, and **achieves a delivered carbon intensity of 53 gCO₂/kWh**. This represents a **significant improvement over the 100 gCO₂/kWh notional benchmark set out in *Places for Everyone***, demonstrating strong carbon performance. The system also provides efficient space heating and hot water while maintaining flexibility for future network integration.

Overall, the proposal ensures compliance with Part L of the Building Regulations, delivers low operational costs, and represents a robust low-carbon heating solution in line with policy objectives.



7. OVERHEATING RISK

7.1 Overheating Risk Assessment

An overheating analysis has been undertaken for this site, covering five representative dwellings in accordance with Building Regulations Approved Document O: Overheating and CIBSE TM59: Design Methodology for the Assessment of Overheating Risk in Homes. The dynamic thermal modelling method for demonstrating compliance with requirement O1 has been followed as stipulated within the Places for Everyone guidance and Approved Document O.

Design Builder v7.2.0.032 Dynamic Simulation Modelling (DSM) Software has been used to assess the overheating risk, using the internationally approved Energy Plus Simulation Engine and the following guidance has been followed:

- CIBSE's TM59 methodology for predicting overheating risk;
- The limits on the use of CIBSE's TM59 methodology; and,
- The acceptable strategies for reducing overheating risk.

The following dwelling types have been assessed:

- 02 - 00 (1B2P)
- 09 - 00 (2B3P)
- 07 - 02 (2B3P)
- 08 - 04 (1B2P)
- 15 - 04 (2B3P)

7.2 Data Inputs and Building Model

Table 7.1 below summarises the building fabric specification which has been applied to the thermal simulation model for the dwellings. This specification is based on the fabric performance figures agreed with the design team and includes the solar transmission g-value of the glazing, which is fundamental to the results.

Table 7.1 – Thermal Fabric Performance Levels

Building Element	U-Value (W/m ² K)
Walls (external)	0.18
Ground Floor	0.12
Roof	0.11
Glazing (Standard)	U=1.40 G-value = 0.50
Air Permeability m ³ /hm ² (@50Pa.)	4.00



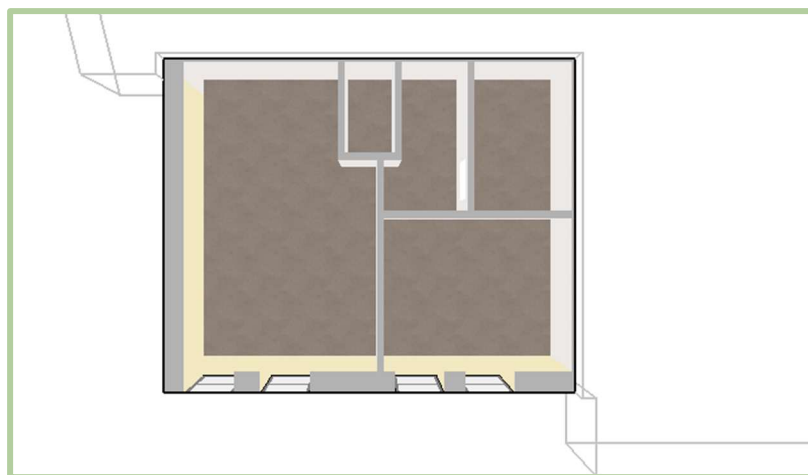
The proposed residential development is located off Royle Road in Rochdale. The site will include seventy-six dwellings, comprising a mix of one and two-bedroom apartments. See Figures 7.1 and 7.2 for model representations of two example apartment types.

The weather data used in this study is **the CIBSE DSY1 2020's, high emissions 50th percentile for Manchester** as this is the most applicable to the site.

Figure 7.1 – Example Ground Floor Apartment 3D Elevation (02 – 00)



Figure 7.2 – Example Ground Floor Apartment 3D Layout (02 – 00)



7.3 Ventilation Strategy

The dwellings will be ventilated using Mechanical Ventilation with Heat Recovery (MVHR). MVHR is a whole house ventilation system that continuously supplies fresh, filtered air to living spaces while extracting stale, moisture-laden air from wet rooms such as kitchens and bathrooms. MVHR is recognised as a low-energy ventilation solution suitable for the Future Homes Standard, as its balanced system configuration supports the specification of low-air-permeability dwellings. Additionally, openable windows are included to allow for natural ventilation.



7.4 TM59 Results

This assessment has determined the thermal comfort performance of occupied areas against the performance requirements of CIBSE TM59 for predominantly naturally ventilated homes. The results obtained from the Part O assessment of overheating risk can be seen in Table 7.3. below:

Table 7.3 – Results

Reference	Orientation	Zone	Criterion A (%)	Criterion B (hr)	Pass/Fail
Ground Floor	02 - 00 (1B2P)	BEDROOM	0.54	29.00	Pass
		KITCHENDINING	0.65	n/a	Pass
	09 - 00 (2B3P)	BEDROOM1	0.00	26.17	Pass
		BEDROOM2	0.00	21.83	Pass
		KITCHENDINING	0.00	n/a	Pass
Second Floor	07 - 02 (2B3P)	BEDROOM1	0.00	0.33	Pass
		BEDROOM2	0.00	0.17	Pass
		KITCHENDINING	0.00	n/a	Pass
Fourth Floor	08 - 04 (1B2P)	BEDROOM	0.00	9.50	Pass
		KITCHENDINING	0.00	n/a	Pass
	15 - 04 (2B3P)	BEDROOM1	0.00	1.67	Pass
		BEDROOM2	0.00	1.67	Pass
		KITCHENDINING	0.00	n/a	Pass

Overheating Mitigation Strategy

- The g-value for the representative dwelling types above is **0.50**.
- Due to security constraints **ground floor apartments** have been **modelled with a restricted opening schedule**.
- MVHR to achieve the following flow rates (expected worst case dwelling):
 - Apartment 02 – 00
 - Bedroom: 45 l/s
 - Kitchen / Living: 15 l/s
 - All other apartments
 - Bedrooms: 15 l/s
 - Kitchen / Living: 15 l/s

The results above indicate that all assessed building areas achieve a 'pass' rating when a g-value of 0.50 is applied across the representative apartments.

With these measures in place, the dwellings are considered **compliant with CIBSE TM59**.



8. CLIMATE CHANGE EMERGENCY

In 2019, Rochdale Council declared a climate emergency and committed to play its part in tackling climate change. In response to this the council adopted their climate change strategy, setting out the council's plans. Measures set out in the strategy include:

- Ensuring new developments take climate change targets into account to reduce emissions; and,
- Support Rochdale becoming carbon neutral by 2038.

In support of this, the developer wishes to highlight the following measures that will form part of the specification of this development:

Core requirements will be:

Minimise carbon emissions

- The site is well located to encourage trips to be made on foot, by bike or via public transport.
- Include electric vehicle charging stations.
- High energy efficiency standards. Materials will be selected based on their environmental performance and the method in which they are sourced. Indirect carbon emissions will therefore be considered, including those involved in the extraction/cultivation, manufacture and handling processes; and subsequent, in-life emissions resulting from the use of those materials in development as requested within the Sustainable Design and Construction SPD;
- Use renewable or low carbon energy. An energy strategy that exceeds Building Regulations, Part L Approved Document Volume 1 (2021), in relation to reducing carbon emissions and minimising energy consumption;
- In securing compliance with Building Regulation Part L, 2021 targets, a commitment is made to construct a high specification, energy efficient thermal envelope thereby minimising demand side energy loads – by the principles of the Energy Hierarchy.
- A site waste management plan (SWMP) will be produced by the developer to limit the on and off-site environmental impacts of construction waste.

Increasing Carbon Storage and Adapting to climate impacts

- New planting will be installed as part of the landscape proposals, which further increases and enhances the existing green infrastructure onsite.
- Surface water runoff will be managed through sustainable drainage systems and as close to source as possible.
- Consideration and reduction in Urban Overheating
- Good levels of natural day lighting will be achieved within the proposed development in. This will thereby reduce the need for artificial lighting and further reduce energy demand within each dwelling.



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. MATERIALS

9.1 Whole Life Cycle Assessment & Upfront Embodied Carbon

An LCA has been prepared to show compliance with Greater Manchester Combined Authority's 'Places for Everyone' (PfE) Design Guidance for Net Zero requirements. This assessment aims to show compliance with the net zero design and carbon reporting requirements set out in the 2025 guidance.

The purpose of this assessment is to assess the whole life carbon impact of the proposed scheme, in line with the Royal Institute of Chartered Surveyors (RICS) Professional Statement 2nd Edition (incorporating all life cycle modules), and to separately report on the upfront embodied carbon (lifecycle modules A1–A5), whole life cycle carbon (lifecycle modules A-C, excluding B6, B7 and D), and life cycle module D.

The Places for Everyone guidance outlines various metrics and key performance indicators (KPIs). These are used to measure success of Net Zero Carbon design and construction to provide an indication of how design decisions have influenced the carbon performance of the building.

Below are the upfront embodied carbon ($\text{kgCO}_2\text{e/m}^2$) targets outlined for residential developments in section 2: Energy and Carbon requirements of the Design Guidance for Net Zero, Places for Everyone policies.

Table 8.1 – Places for Everyone, Upfront Embodied Carbon Targets

	Minor development		Major development	
	Small minor Single home and XL extensions	Minor 2-9 homes	Major 10-149 homes	Large major +150 homes
Upfront embodied carbon ($\text{kgCO}_2\text{e/m}^2_{\text{GFA}}$) Minimise embodied carbon				

As the proposed Royle Road Scheme has seventy-two apartments, it is classified as a 'Major' development under PfE and therefore has the upfront embodied carbon target of $\leq 600 \text{ kgCO}_2\text{e/m}^2$. As shown in Table 8.2 the Royle Road development improves upon with a total of $389.82 \text{ kgCO}_2/\text{m}^2$.

The purpose of the Life Cycle Assessment is to quantify the environmental impacts of the proposed Royle Road scheme in accordance with the methodology expressed within the RICS Professional Statement – 2nd Edition (2021), and to benchmark the results against the PfE Design Guidance for Net Zero targets.



The total global warming potential for the scheme has been calculated as follows:

Table 8.2 – Results Summary

	Total – kgCO ₂ e	kgCO ₂ e/m ²
Upfront Carbon	2,644,468.28	389.82
Whole Life Carbon Assessment	5,934,237.33	477.37

	Targets	
	PfE Benchmark - kgCO ₂ e/m ²	Royle Road - kgCO ₂ e/m ²
Upfront	<600 (Residential Major Developments Targets)	389.82
Whole life	n/a	477.37

Table 8.3 – Top Three Materials with the Highest Upfront Embodied Carbon

	Upfront embodied carbon	kg CO ₂ e/m ²
Minimise embodied carbon	Material 1: Ready-mix concrete, generic, C32/40	93.1
	Material 2: Precast hollow core concrete slabs, C40/50	88.9
	Material 3: Brick-faced precast cladding panel	22.5

Table 8.3 shows the top three materials with the highest upfront embodied carbon emissions (kgCO₂e/m²GIA) being: Ready-mix concrete, generic, C32/40, Precast hollow core concrete slabs, C40/50, Brick-faced precast cladding panel, which together contribute to around 58% of the cradle to gate (A1-A3) CO₂e.

A common build specification will be applied throughout the proposed scheme.

When compared to the targets stipulated within Places for Everyone Design Guidance for Net Zero (March 2025), it is evident that **the Royle Road scheme improves upon the Places for Everyone Residential Major Development target for upfront embodied carbon.**



10. CONCLUSION

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

The development will be designed and specified following **the principles of the energy hierarchy to limit demand side energy requirements** and improve upon the **targets and guidance set by the Rochdale City Council**.

- All Places for Everyone policy carbon targets have been achieved through the proposed specification and design.
- Several measures have been implemented to ensure that the **proposed specification aligns with Places for Everyone Policy JP S2**.
- **Regulated and unregulated carbon dioxide emissions have been calculated using the CIBSE TM54 Methodology for evaluating operational energy use, and a life cycle assessment has been carried out in accordance with the RICS Professional Statement (2nd Edition).**
 - The dwellings within the proposed scheme will **benefit from a communal air source heat pump and a photovoltaic array** in order to limit the carbon emissions arising from the scheme. As the application falls under **Case 3 (with the site located within a low-carbon heat network opportunity area)**, the proposed communal heat pump **provides flexibility for future integration with a wider heat network**. This **supports the trajectory towards a net zero carbon development** and benefits from the continued decarbonisation of the electricity grid.
- Additionally, the dwellings are **compliant with CIBSE TM59 without the requirement for active cooling**.
- 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 **in accordance with Rochdale City Council's Policies CG1 and CG3**.

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



Appendix A – Whole Life Cycle Assessment





ELEMENT
SUSTAINABILITY

ROYLE ROAD, ROCHDALE LIFE CYCLE ASSESSMENT

APRIL 2026

REF: 2025.052



ELEMENT SUSTAINABILITY – ISSUE NOTES

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Title: Royle Road, Rochdale
Whole Life Cycle Assessment

Client: BMC Rochdale Limited

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Prepared by:	Checked by:	Approved by:	
			
Harry Higgins Sustainability Consultant	Stacey Downs Associate Consultant	Laurie Wills Director	

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ELEMENT
SUSTAINABILITY

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ELEMENT SUSTAINABILITY

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1. INTRODUCTION

Element Sustainability has been commissioned by BMC Rochdale Limited to undertake a Life Cycle Assessment (LCA) of the proposed construction of 75 self-contained apartments (Use Class C3), comprising 38 No.1-bedroom apartments and 37 No.2-bedroom apartments, with extra care light facilities, residents' facilities, associated landscaping, parking, a new access and internal access road Royle Road residential apartment building located in Rochdale. In order to understand what impact, the scheme will have on the environment, regarding both embodied and whole life carbon. This also enables comparisons to be made against industry benchmarks.

An LCA has been prepared to show compliance with Greater Manchester Combined Authority's 'Places for Everyone' (PfE) Design Guidance for Net Zero requirements. This assessment aims to show compliance with the net zero design and carbon reporting requirements set out in the 2025 guidance.

The purpose of this assessment is to assess the whole life carbon impact of the proposed scheme, in line with the Royal Institute of Chartered Surveyors (RICS) Professional Statement 2nd edition (incorporating all life cycle modules), and to separately report on the upfront embodied carbon (lifecycle modules A1–A5), whole life cycle carbon (lifecycle modules A-C, excluding B6, B7 and D), and life cycle module D.

The primary metric used to analyse the Global Warming Potential (GWP) of the scheme is expressed in terms of carbon dioxide equivalent (CO₂e), often referred to as carbon emissions. Whole Life-Cycle Carbon (WLC) emissions are the carbon emissions resulting from the materials, construction, and use of a building over its entire life, including its demolition and disposal.



2. PROJECT DETAILS

2.1 Project Details

The mandatory asset-related technical characteristics for the project are set out within Table 2.1 as per the requirements of the RICS Professional Statement.

Table 2.1 - Key Project Details

Category	Project Details
Project Name	Royle Road, Rochdale
Asset type	New construction – Residential Apartments
Development Proposal	Construction of 75 self-contained apartments (Use Class C3), comprising 38 No.1-bedroom apartments and 37 No.2-bedroom apartments
Gross Internal Area	5,679m ²
Number of Storeys	5 floors (including ground)
Location	Royle Road, Castleton North, Trub, Rochdale, OL11 3
Anticipated start-on-site and completion dates.	TBC

The mandatory assessment details for the project are set out within Table 2.2 as per the requirements of the RICS Professional Statement.

Table 2.1 - Key Assessment Details

Category	Assessment Details
Assessed by	Element Sustainability Limited
Date of Assessment	March 2026
Project Phase	Concept Design – Planning Stage
Assessment Scope	Fully fitted



Figures 2.1-2.3 below demonstrate the proposed elevations and Ground Floor Plan for the scheme:

Figure 2.1 – Proposed West Elevation



Figure 2.2 – Proposed Front and Rear Elevation



Figure 2.3 – Proposed Ground Floor Plan



3. LIFE CYCLE ASSESSMENT

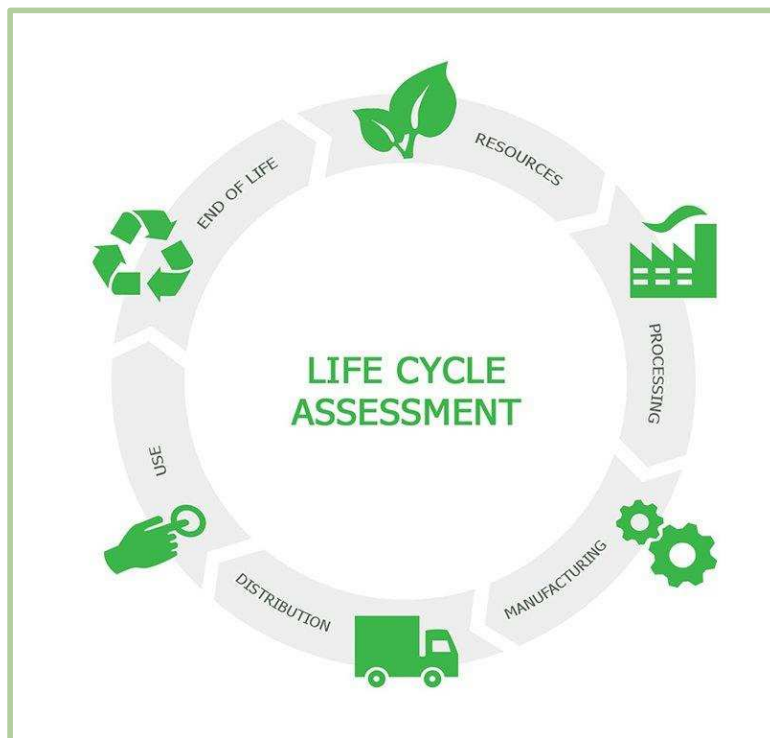
3.1 Definition

Building Life Cycle Assessment (LCA) is a science-based methodology for quantifying the lifetime environmental impacts of a building. It is used to measure and reduce the embodied, and whole-life carbon of a building. The embodied carbon refers to the emissions arising from the extraction, manufacture, transportation, installation, maintenance and disposal of all building materials.

Typically, the assessment is used to calculate the overall environmental footprint of a product and then identify design measures to reduce the carbon emissions associated with each stage of the project's lifecycle.

The following image shows a LCA model that would apply to a scheme within the built environment.

Figure 3.1 – Lifecycle Stages of a Building



Source: OneClickLCA



3.2 Methodology

The RICS Professional Statement mandates a whole life approach to reducing carbon emissions within the built environment. It is intended to standardise whole life carbon assessments and enhance consistency in outputs by providing specific practical guidance for the interpretation and implementation of the methodology stipulated by EN 15978. This assessment has been conducted in line with the RICS Professional Statement.

One Click LCA Carbon Designer 3D software was used to undertake this life cycle assessment, as it is a compliant and recognised tool to conduct life cycle assessments, in accordance with the following standards:

- BS EN 15978: 2011 – Sustainability of Construction Works – Assessment of Environmental Performance of Buildings - Calculation Method;
- ISO 14040 2006: Environmental Management – Lifecycle Assessment – Principles and Framework; and,
- ISO 14044 2006: Environmental Management – Lifecycle Assessment – Requirements and Guidelines.

Carbon Designer 3D has been used for this project due to the project being in the early stages of the design process, detailed information on the construction materials and quantities for this project were not readily available. The data used within the model were provided by the design team or extracted from the necessary plans and Concept Design (Stage 2) specification documents, as listed below:

- 4523_Royle Road.

The LCA templates selected for this assessment match the details of the materials provided and, where certain material templates were not available, a similar product was then selected from those available within the extensive One Click database.

One Click LCA default scenarios were used to facilitate the carbon calculations for this scheme, as set out below:

- Service life values were set to the 'RICS 2nd Edition Default Service Life';
- Transportation distances for materials were set to reflect UK construction best practice;
- The 'End of Life' calculation method used reflects market scenarios, which utilises the most typical method for that material in the market;
- Country specific end of life scenarios were set to 'United Kingdom – RICS V2'; and,
- The study period was set at sixty years in line with the methodology outlined in the RICS Professional Statement.

The LCA undertaken for this report will demonstrate the environmental impact of the proposed scheme in terms of its Global Warming Potential (GWP), which represents the impact of all greenhouse gases on a carbon dioxide basis emitted as a direct result of the building.



3.3 Scope

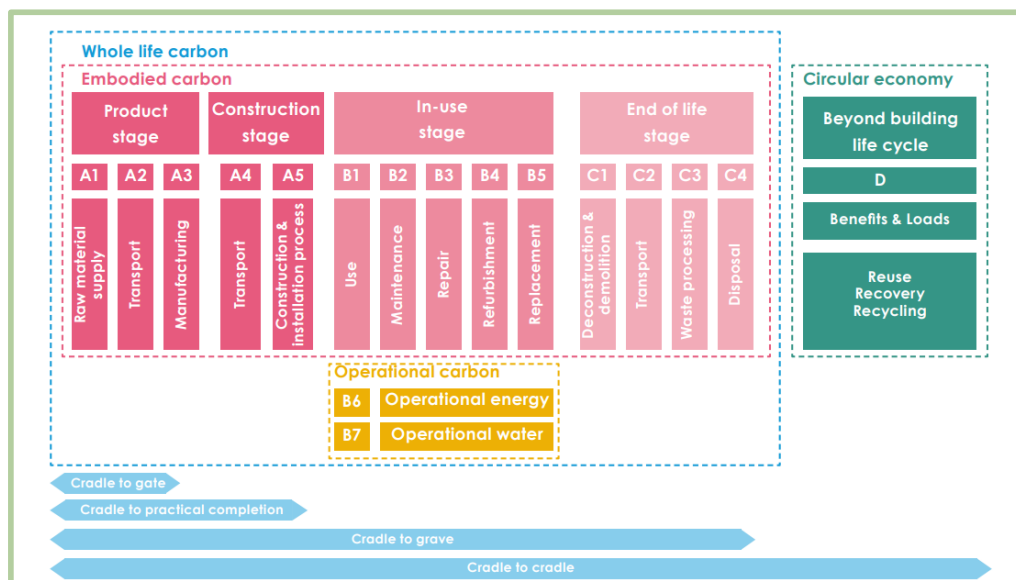
The LCA undertaken for this report will cover the (Concept) RIBA Stage 2 design and be assessed in accordance with the RICS Professional Statement 2nd Edition (2023). Consequently, all lifecycle modules have been included.

The assessment scope has therefore considered the following elements:

- Demolition;
- Facilitating Works;
- Substructure;
- Superstructure;
- Finishes;
- Fittings, Furnishings and Equipment;
- Public Health;
- Heating, Ventilation and Air Conditioning (HVAC);
- Electrical Installations;
- On Site Renewable Energy; and,
- External Works.

The 'study boundary' has been defined, as per the life cycle modules set out in Figure 3.2 below:

Figure 3.2 – EN 15978 Assessment Scope



Source: LETI Embodied Carbon Primer.

The focus of this assessment is on the environmental impacts of the project, in particular the embodied carbon of the materials sourced, and energy consumed in the manufacturing, transportation, assembly, in use and the end-of-life stages of the scheme.

3.4 Assumptions

This assessment is being conducted during RIBA Stage 2 (Concept Design); therefore, design detail is limited and will be considered further as the scheme progresses through to the Technical Design Stage. A number of assumptions were consequently used in order to complete the baseline assessment. The RICS Professional Statement has provided reasonable assumptions, based on UK average industry standard practice, which must be used during the early design phase whole life carbon assessments (WLCA's) that are to act as baselines for progressive reporting. This data should be refined during later project phases and replaced by more comprehensive and product specific information as it becomes available.



3.5 The Contingency Factor

When costing projects, it is common for contingencies to be used to reflect uncertainties. For WLCA's, there are similar uncertainties, particularly during the early design phase when far less is known about the final design and materials.

This uncertainty is managed by developing a WLCA uncertainty factor, which is made up of three component parts.

1. A contingency factor;
2. A carbon data uncertainty factor; and,
3. A quantities uncertainty factor.

3.5.1 The Contingency Factor

The contingency factor used for this assessment is aligned with the early design information listed in Table 3.2 below, which was extracted from the RICS Professional Statement.

Table 3.2 – RICS Professional Statement Default Contingency Factors

RICS project phase	RIBA stage	Default contingency factor to apply to all life cycle stages and modules	Additional uncertainty factors
Early design	0-2	15%	-
Technical design and construction	3-5	6%	Carbon data uncertainty factor and quantities uncertainty factor
Post-completion	6	0%	Carbon data uncertainty factor and quantities uncertainty factor

In order to account for uncertainty and lack of detailed or complete information, particularly during the early design phases, the contingency factor has been applied to the results for each life cycle information module and element category and reported separately in Section 4 of this report.

3.5.2 The Carbon Data Uncertainty Factor

During early design stages, it is best to use generic data to represent products and materials, as it is generally not clear which exact products will be used, and from where and which manufacturers they will be sourced. There is, therefore, considerable uncertainty as to whether the dataset chosen will accurately represent the product that is finally selected, and **it is therefore, inappropriate to use the carbon data uncertainty factor during the early design phase.**



3.5.3 The Carbon Data Confidence Score Approach

Carbon data confidence scores are calculated for each of the key products used in the asset. Key products are identified as the ten most impactful products or materials in terms of the percentage of the asset's embodied carbon impact (modules A1–A5, B1–B5, C1–C4).

However, this is only required during the technical design, construction and post-completion phases; the asset carbon confidence score produced using this method must be reported in the WLCA report, together with the percentage of the asset's overall upfront and embodied carbon for which the key products are responsible.

3.5.4 The Quantities Uncertainty Factor

A quantities uncertainty factor for key products (the most impactful products and materials used) provides an indication of the uncertainty associated with the quantities used for the WLCA.

However, this is only required during the technical design, construction and post-completion phases, when the quality of the quantities data must be assessed for each of the key products: the ten products or materials that cause the greatest impact for the asset.

3.5.5 The Whole Life Cycle Uncertainty Factor

The total percentage figure to be added to the WLCA is therefore a combination of the contingency factor, the carbon data uncertainty factor and the quantities uncertainty factor. For the purpose of this assessment, only the contingency factor will be used to determine the level of uncertainty in line with the minimum requirements of the RICS Professional Statement. It is, however, advised that the entire whole life cycle uncertainty factor is calculated at the Technical Design Stage to entirely align with the RICS Professional Statement methodology.

3.6 Limitations

The One Click LCA predictions of embodied impacts conducted in One Click LCA software, by their very nature, cannot be exact. It is not possible to track all the impacts associated with a product or service back through history. One Click LCA software has been built and tested to enable informed decisions when comparing design options. Generic environmental impact coefficients do not necessarily correspond to those of individual brands of the same product or service due to differences within industries and in the way these products and services are delivered.

Due to the nature of Whole Life Carbon Assessments, certain assumptions and default values can be used, to fill any gaps throughout the early design stages. Therefore, the service life of the materials inputted have been based on the latest guidance from the RICS Professional Statement, which in practise may vary from these values and could well be extended. Thereby reducing the overall environmental impact associated with Life Cycle Module B4 – Replacement.



4. LCA RESULTS

4.1 Embodied Carbon

Embodied carbon impacts arise from sourcing, manufacturing and installing the materials and components that make up a built asset (life cycle modules A1-A5).

To obtain a more accurate representation of the operational energy (module B6), it is recommended that a TM54: Operational Energy Performance analysis be conducted in accordance with the Chartered Institution of Building Services Engineers (CIBSE) criteria on the entire building, as for this assessment, the operational energy figure was calculated using an average figure for the various apartment types.

4.1.1 Upfront Embodied Carbon Assessment

The results of the upfront embodied carbon assessment are based on the information provided by the design team and are presented in Table 4.1 below.

Table 4.1 - GWP Impact of 'Upfront' Modules A1 to A5 (Excluding Biogenic Carbon)¹

	Total upfront embodied carbon (kgCO ₂ e)	Total kgCO ₂ e/m ²
Royle Road	2,644,468.28	389.82

4.2 Whole Life Carbon

Whole life carbon emissions are the sum total of all assets relating to GHG emissions and removals, and both operational and embodied carbon, over the life cycle of an asset, including its disposal (modules A0-A5, B1-B7, B8 optional, C1-C4, all including biogenic carbon, with A0 assumed to be zero for buildings). Overall, whole life carbon asset performance includes separately reporting the potential benefits or loads from future energy or material recovery, reuse, and recycling and from exported utilities (modules D1, D2).

4.2.1 Whole Life Carbon Assessment

The results of the whole life carbon assessment are based on the information provided by the design team and are presented in table 4.2 below.

Table 4.2 – Whole Life Cycle GWP Impact

	Total whole life carbon (kgCO ₂ e)	Module D ²
Royle Road	5,934,237.33	-752,039.89

¹ Omits carbon sequestration (biogenic carbon), in accordance with the LETI Embodied Carbon Target Alignment publication and the RICS Whole Life Carbon Assessment/ RIBA 2030 targets. Therefore, allowing for accurate comparisons to be made.

² Module [D] is communicated separately as it occurs beyond the life cycle of the project under study and also bears high inherent uncertainty regarding the future treatment of building components. It is, however, important to assess module [D] figures along with cradle to grave [A-C] figures to acquire a holistic understanding of the environmental impacts of a built project.



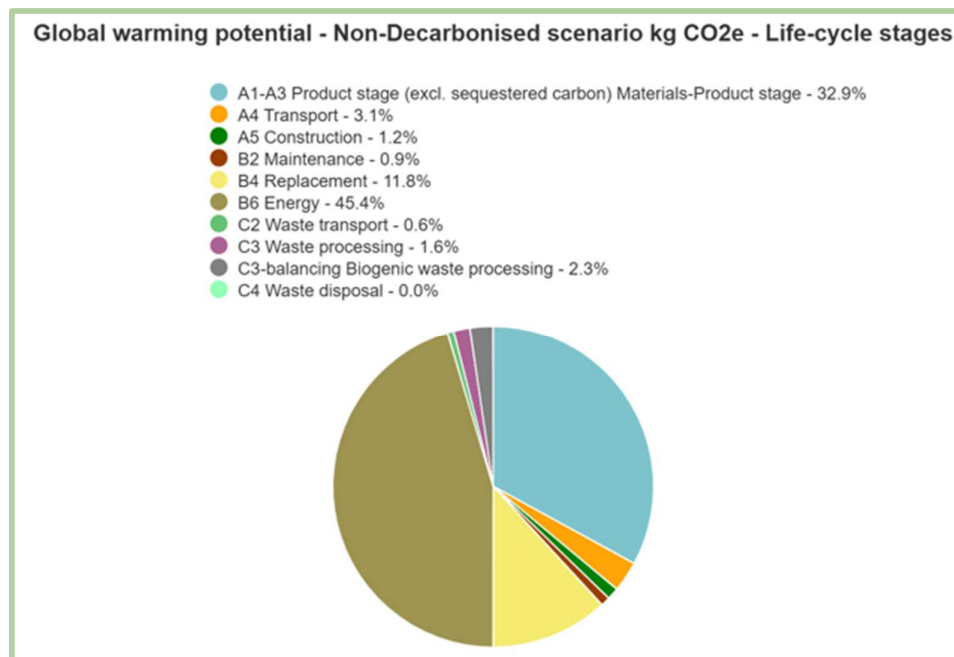
The total GWP impact per life cycle module is presented in Table 4.3.

The contingency factor used for this assessment is aligned with the early design information listed in Section 3 of this report, which was extracted from the RICS Professional Statement. For ease of reference, a 15% contingency has been applied to the non-decarbonised data as presented.

Table 4.3 - GWP Impact Per Life Cycle Modules

Module	Total KgCO ₂ e
A1-A3	2,002,791.22
A4	187,130.35
A5	72,957.3
B1-B4	909,096.22
B6	2,758,555.08
B7	-
C1	-
C2	39,068.52
C3	240,600.58
C4	201.62
Biogenic Carbon (Carbon Sequestration) ³	-642,769.13
Total	5,934,237.33
D	-752,039.89

Figure 4.1 - GWP Impact Per Life Cycle Module



³ Carbon sequestration can be included as it meets the following criteria:

1. The whole life carbon assessment of the project includes the impacts of the End-of-Life stage [C]; and,
2. The timber originates from sustainable sources - Timber sourced and processed by Grosvenor Estate own woodland and mill



It is evident from the results displayed in Figure 4.1 above that the life cycle modules B6 (regulated energy), A1-A3 (materials) and B4 (replacement) will have the most significant impact throughout the lifecycle of the project.

Life cycle modules A1 to A3 are likely to have high carbon emissions due to the high energy production processes associated with materials such as concrete and steel.

The environmental impact associated with the replacement emissions (module B4) considers the anticipated replacement of building components, including any emissions from the replacement process. The building components which are expected to be replaced the most relate to the building services and the finishes and coverings. To obtain a more accurate representation of the operational energy (module B6), it is recommended that a TM54: Operational Energy Performance analysis is conducted in accordance with the Chartered Institution of Building Services Engineers (CIBSE) criteria on the entire building, as for this assessment, the operational energy figure was calculated using the average TM54 figure for the various apartment types.



5. BENCHMARKING

Embodied carbon benchmarks and targets are a developing knowledge area; it is anticipated that, as the quantity of more accurate and detailed information becomes available, target figures may be updated.

Following the release of the (PfE), Design Guidance for Net Zero in March 2025, the Greater Manchester Combined Authority released Embodied Carbon targets for major developments as part of the Whole Life Carbon assessment required.

Targets have been created for upfront embodied carbon for both Major and Large Major Developments, which is expressed in terms of kgCO₂/m². The following lifecycle modules are required to compare accurately with these targets:

- Upfront embodied carbon: A1-A5 excluding carbon sequestration (biogenic carbon).

Table 5.1 presents the upfront embodied carbon and life cycle embodied carbon performance of the Royle Road scheme

Table 5.1 – Royle Road Results

	Upfront Embodied Carbon	Life Cycle Embodied Carbon
Royle Road	389.82 kgCO ₂ /m ²	477.37 kgCO ₂ /m ²

5.1.1 Embodied Carbon Key Performance Indicators

Places for Everyone, Design Guidance for Net Zero (March 2025) states the following broad key performance indicators for residential buildings:

Table 5.2 – Places for Everyone Upfront Embodied Carbon Comparison (Residential Buildings)

	Upfront Embodied Carbon A1-A5 (kgCO ₂ e/m ²)
Major Development: Flats	<600 kgCO ₂ /m ²
Royle Road	389.82 kgCO ₂ /m ²

Compared to the residential upfront embodied targets stipulated within Places for Everyone Design Guidance for Net Zero (March 2025), it is evident that **the proposed scheme improves upon the Places for Everyone Residential Major Development: Flats target for upfront embodied carbon.**

5.1.2 Embodied Carbon Targets

The Places for Everyone guidance outlines various metrics and key performance indicators (KPIs). These are used to measure success of Net Zero Carbon design and construction to provide an indication of how design decisions have influenced the carbon performance of the building.

Below are the upfront embodied carbon ($\text{kgCO}_2\text{e/m}^2$) targets outlined for residential developments in section 2: Energy and Carbon requirements of the Design Guidance for Net Zero, Places for Everyone policies.

Table 5.3 – Places for Everyone Upfront Embodied Carbon Targets

	Minor development		Major development	
	Small minor Single home and XL extensions	Minor 2-9 homes	Major 10-149 homes	Large major +150 homes
Upfront embodied carbon ($\text{kgCO}_2\text{e/m}^2_{\text{GIA}}$) Minimise embodied carbon				

As the proposed Royle Road Scheme has seventy-five apartments, it is classified as a ‘Major’ development under PfE and therefore has the upfront embodied carbon target of $\leq 600 \text{ kgCO}_2\text{e/m}^2$. As shown in Table 5.2 the Royle Road development improves upon with a total of $389.82 \text{ kgCO}_2\text{e/m}^2$.

Table 5.4 – Top Three Materials with the Highest Upfront Embodied Carbon

	Upfront embodied carbon	kg CO2e/m2
Minimise embodied carbon	Material 1: Ready-mix concrete, generic, C32/40	93.1
	Material 2: Precast hollow core concrete slabs, C40/50	88.9
	Material 3: Brick-faced precast cladding panel	22.5

Table 5.4 shows the top three materials with the highest upfront embodied carbon emissions ($\text{kgCO}_2\text{e/m}^2_{\text{GIA}}$) being: Ready-mix concrete, generic, C32/40, Precast hollow core concrete slabs, C40/50, Brick-faced precast cladding panel, which together contribute to around 58% of the cradle to gate (A1-A3) CO_2e .



6. CONCLUSION

The purpose of this Life Cycle Assessment is to quantify the environmental impacts of the proposed Royle Road scheme in accordance with the methodology expressed within the RICS Professional Statement – 2nd Edition (2021), and to benchmark the results against the PfE Design Guidance for Net Zero targets.

The total global warming potential for the scheme has been calculated as follows:

Table 6.1 – Results Summary

	Total – kgCO ₂ e	kgCO ₂ e/m ²
Upfront Carbon	2,644,468.28	389.82
Whole Life Carbon Assessment	5,934,237.33	477.37

	Targets	
	PfE Benchmark - kgCO ₂ e/m ²	Royle Road - kgCO ₂ e/m ²
Upfront	<600 (Residential Major Developments Targets)	389.82
Whole life	n/a	477.37

When compared to the targets stipulated within Places for Everyone Design Guidance for Net Zero (March 2025), it is evident that **the Royle Road scheme improves upon the Places for Everyone Residential Major Development: Flats target for upfront embodied carbon.**

It is recommended that further life cycle assessments are conducted at the Technical Design stage when increasing levels of detail in the design and specification of the built asset will become available. It is during this stage that uncertainties around the data used are managed using carbon data confidence scores.

