

**PROPERTY**

Wilson Bowden Developments Ltd.  
Plot Q, Kingsway Business Park,  
Rochdale

**Energy Statement**

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Plot Q, Kingsway Business Park,  
Rochdale

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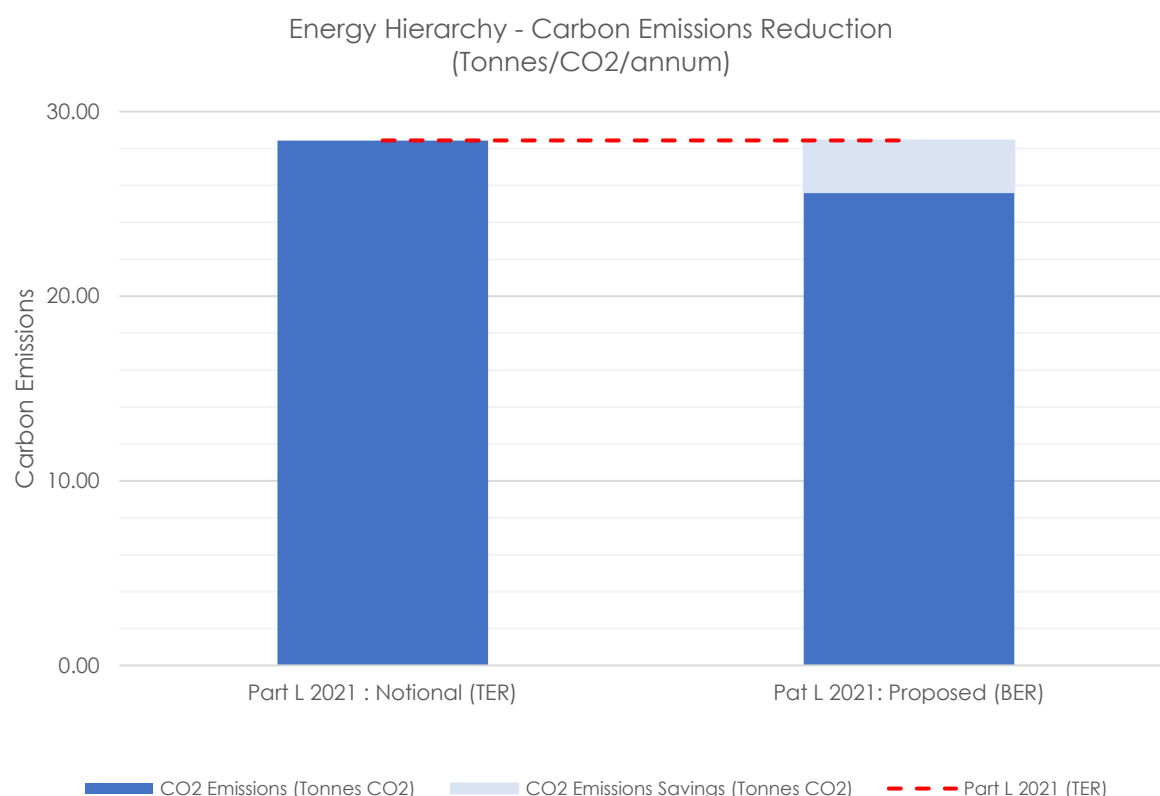
## EXECUTIVE SUMMARY

This Energy Statement has been produced in support of a Planning Application for the Proposed Plot Q Development off Michael Faraday Avenue, Kingsway Business Park, Rochdale in accordance with Rochdale Borough Council's Core Strategy (2016) Policies G1 – G2.

This Energy Statement outlines the Proposed Development's approach to energy efficiency and renewable energy strategies using Dynamic Thermal Modelling (DSM). The Proposed Development will adopt the use of an energy hierarchy in order to meet current National best practice standard and Rochdale Borough Council's objectives for energy, carbon dioxide and the adaptability to the likely effects of Climate Change.

The Proposed Development envelope and services will be specified to exceed the minimum standards set in Part L (Volume 2) to ensure energy consumption via space heating/cooling is reduced. In addition, passive solar considerations have formed an integral part of the Proposed Development design. Analysis has been carried out on the facades to ensure solar gains and heating loads are reduced, hence providing a more comfortable internal environment for occupants.

This Energy Statement proposes to reduce the regulated energy and carbon dioxide emissions of the Proposed Development by a total of **15.93%** and **9.42%** respectively via ASHP (VRF) and PV (**108.00 kWp**) when compared with Part L 2021 (Volume 2) of the Building Regulations Target Emissions Rate Baseline. This complies with the National target to exceed the Part L 2021 TER Baseline and thus demonstrate compliance with Rochdale Borough Council's requirement of adhering to the energy hierarchy that reflects national policy, targets, and requirements.



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## 1. INTRODUCTION

### Instruction

- 1.1 BWB Consulting (BWB) was instructed by Wilson Bowden Developments Ltd. (the Client) to carry out an Energy Statement in support of a Planning Application for the Proposed Development known as Plot Q, Kingsway Business Park, Rochdale.

### Development Description

- 1.2 The Proposed Development (**Figure 1.1**) comprises a warehouse distribution/production unit with first floor office and core facilities. The Site is located within the Kingsway Business Park. The wider area includes additional warehouse units to the north and residential units to the east of the Site.

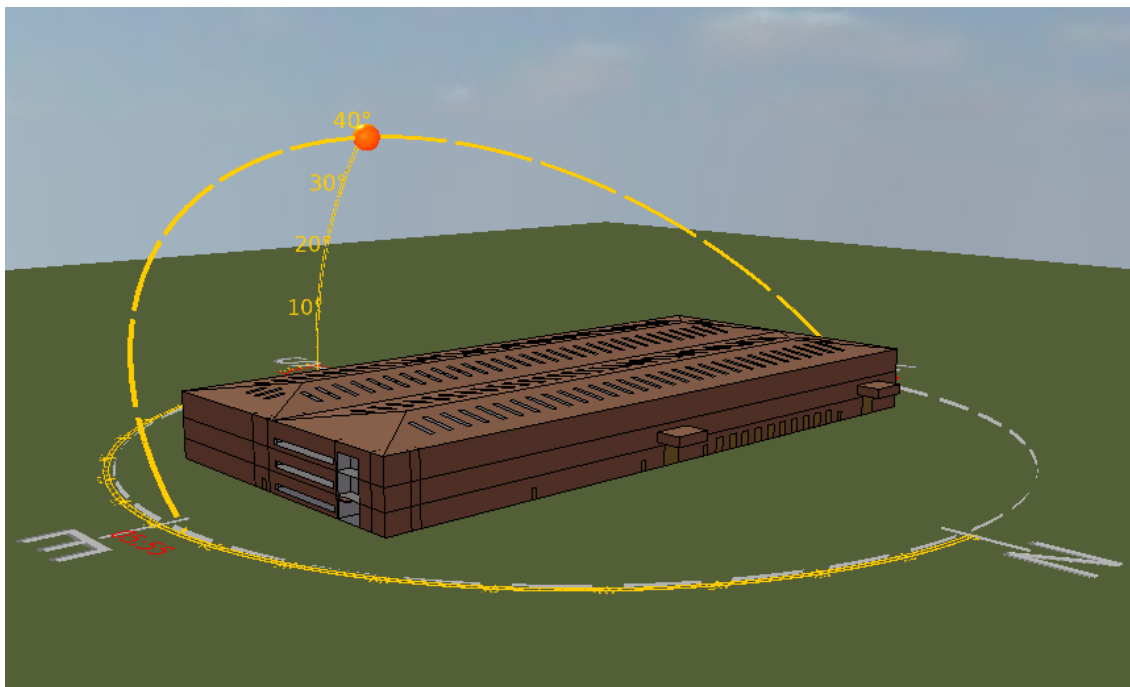


Figure 1.1: Proposed Development Thermal Model in IES VE

### Purpose of the document

- 1.3 The purpose of this Energy Statement is to demonstrate that climate change mitigation measures will be integrated into the scheme's design and that the proposed measures are appropriate to the site environment and energy demands of the development.
- 1.4 This document will describe the policy context to which the Energy Statement responds before presenting the baseline carbon dioxide emissions and demonstrating how it is proposed to reduce these through a: lean energy efficient design; clean energy supply; and green on-site renewable energy generation.
- 1.5 This document also identifies and highlight the key sustainable practices to be incorporated into the design and construction of the development in accordance with the current national best practice, regional and local policy guidance.

## **Modelling Methodology (Apache DSM)**

- 1.6 Energy models using the ApacheSim Dynamic Simulation Modelling (DSM) National Calculation Methodology (NCM) have been produced to predict the carbon dioxide emissions from the Proposed Development.
- 1.7 DSM is one of the Government adopted methodologies for calculating the energy performance of non-domestic buildings within the UK. Unlike SBEM (Simplified Building Energy Model), DSM is a much more accurate tool providing full annual simulation performed multiple times per hour using real hourly weather data.
- 1.8 Performing the DSM calculation involves creating a three-dimensional model of the proposed non-domestic development and then populating the model with the fabric and services specification.
- 1.9 The DSM calculation is then run to simulate the Proposed Development energy consumption and resultant carbon dioxide emissions due to the predicted operation of the development over a typical year.
- 1.10 The DSM calculations have been performed to inform this Energy Statement and to produce the most accurate estimate of the site carbon dioxide emissions. Consequently, this report details the thermal element, controlled fittings and building services specification upon which the calculations have been performed.
- 1.11 Criterion 1 of Building Regulations Approved Document Part L (Volume 2) 2021 requires calculation of the Building Emission Rate (BER) using Energy Model to demonstrate that the building will have a Carbon Dioxide Emissions Rate of no more than the Target Emission Rate (TER), which is also calculated within DSM using the building and a notional specification.
- 1.12 The baseline CO<sub>2</sub> emissions are equivalent to the Building Regulations Approved Document Part L worst allowable Target Emissions Rate (TER) calculated within the DSM assessments of the Proposed Development.

## **Information Used**

- 1.13 The analysis presented in this report is based solely on the architectural drawings and model received from DLA Architecture at the time of the first revision.

## 2. POLICY CONTEXT

### Introduction

- 2.1 This section of the Energy Statement reviews relevant policies at the international, national, regional, and local levels in relation to energy efficiency and renewable energy generation and discusses key issues for this Statement.

### Climate Change

- 2.2 Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional, and global climates. These changes have a broad range of observed effects that are synonymous with the term.



Figure 2.1: Climate Change Pollution

- 2.3 Changes observed in Earth's climate since the early 20th century are primarily driven by human activities, particularly fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere, raising Earth's average surface temperature. These human-produced temperature increases are commonly referred to as global warming. Natural processes can also contribute to climate change, including internal variability (e.g., cyclical ocean patterns like El Niño, La Niña, and the Pacific Decadal Oscillation) and external forcing (e.g., volcanic activity, changes in the Sun's energy output, variations in Earth's orbit).
- 2.4 Scientists use observations from the ground, air, and space, along with theoretical models, to monitor and study past, present and future climate change. Climate data records provide evidence of climate change key indicators, such as global land and ocean temperature increases; rising sea levels; ice loss at Earth's poles and in mountain glaciers; frequency and severity changes in extreme weather such as hurricanes, heatwaves, wildfires, droughts, floods, and precipitation; and cloud and vegetation cover changes, to name but a few (**Figure 2.1**).

## United Nations Framework Convention on Climate Change

- 2.5 The international mechanism for addressing climate change is the United Nations Framework Convention on Climate Change (UNFCCC). Signed in 1992 at the United Nations Conference on Environment and Development, the Convention constitutes the foundational climate agreement that has provided the platform for most subsequent international climate agreements. The Kyoto Protocol, which was signed in 1997 and which entered into force in 2005, was the first implementation of measures under the UNFCCC until 31 December 2020. The protocol was superseded by the Paris Agreement. Its supreme decision-making body, the Conference of the Parties (COP), meets annually to assess progress in dealing with climate change.

## The Paris Agreement

- 2.6 The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the 2015 United Nations Climate Change Conference in 2015 and entered into force in 2016 (**Figure 2.2**). The 196 Parties to the UNFCCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future.



Figure 2.2: United Nations Framework Convention on Climate Change

- 2.7 The Paris Agreement builds upon the Convention and for the first time brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

- 2.8 To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century. The Paris Agreement works on a 5-year cycle of increasingly ambitious climate action carried out by countries. Countries are required to submit their plans for climate action known as nationally determined contributions (NDCs).

### **The Paris Agreement and Nationally Determined Contributions**

- 2.9 Through the Paris Agreement, Parties also agreed to a long-term goal for adaptation – to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals.
- 2.10 NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

### **United Kingdom's (UK's) Nationally Determined Contributions**

- 2.11 The UK's initial target under the Paris Agreement of 2015, when it shared a common plan on emissions with the EU, was a 53% cut by 2030. However, this was considered insufficient, and the UK also had a domestic carbon budget under the Climate Change Act, requiring a 57% reduction on average from 2028 to 2032.

## **United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contribution**



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Figure 2.3: United Kingdom's Nationally Determined Contribution

- 2.12 In December 2020, the UK announced a significant increase in its carbon emissions reduction target, aiming for a 68% cut compared to 1990 levels before 2030. This represents the UK's nationally determined contribution towards meeting the Paris Agreement.
- 2.13 The UK had already committed to reducing carbon emissions to zero by 2050, with an interim target of 53%. In April 2021, at the climate summit, the U.K. government confirmed its plan to put the U.K. on course to meet its target of reaching net zero carbon emissions by 2050. This commitment demonstrates the UK's dedication to addressing climate change and reducing greenhouse gas emissions.

### Climate Change Act

- 2.14 The Climate Change Act (2008) sets a legally binding target for reducing UK CO<sub>2</sub> emissions by at least 80% on 1990 levels by 2050. It established the Committee on Climate Change, responsible for setting binding interim carbon budgets for the Government over successive five-year periods.



Figure 2.4: The Sixth Carbon Budget

- 2.15 To meet these targets, the government has set five-yearly carbon budgets, which currently run until 2032. The carbon budgets restrict the amount of greenhouse gas the UK can legally emit in a five-year period. The UK is currently in the fifth carbon budget period (2028 to 2032).
- 2.16 The Climate Change Committee (CCC) published its recommendation on the level of the Seventh Carbon Budget in February 2025 (**Figure 2.4**).

## Planning and Energy Act

- 2.17 The Planning and Energy Act (2008) allows local planning authorities' policies to impose reasonable requirements for a proportion of energy used in developments to be from renewable and low carbon sources in the locality of the development. This means local planning authorities have the power to set local energy efficiency standards for new homes that go beyond the minimum standards set through the Building Regulations.

## UK Sustainable Development Strategy

- 2.18 The UK is committed to the delivery of the Sustainable Development Goals. The 2030 Agenda for Sustainable Development is a historic global agreement to eradicate extreme poverty, fight inequality and injustice and leave no one behind. Agreed by world leaders at the UN in 2015, the 17 Sustainable Development Goals (SDGs) succeed the Millennium Development Goals (MDGs).



Figure 2.5: The Sustainable Development Goals (SDGs)

- 2.19 It provides an ambitious, globally agreed, shared blueprint for the world to see by 2030 and is centred around the 17 Sustainable Development Goals (also known as the Global Goals or SDGs) – **Figure 2.5**.
- 2.20 The UK Sustainable Development strategy acts as an overarching document from which a range of specific policies and legislation was derived.
- 2.21 One of the keys aims of this strategy is to recognise the threats of climate change and ensure that the UK develops a strategy to mitigate and adapt to this phenomenon. The strategy will be implemented at a national level through the development of more specific strategies at a government department or sector level.

## Building Regulations

- 2.22 Whilst not planning policy, the Building Regulations and specifically Approved Document Part L: Conservation of Fuel and Power has relevance to the requirements for energy efficiency and carbon emissions of new buildings. The primary mechanism for reducing carbon emissions in new commercial development is progressive changes to Part L aiming to deliver zero carbon buildings.
- 2.23 On this basis, a minimum requirement for the reduction in carbon emissions to be delivered by new buildings' is set within the Building Regulations, with each update requiring lower carbon emissions than the previous version to achieve compliance.
- 2.24 The update in June 2022 required new buildings other than dwellings to achieve 27% reduction in carbon emissions over the 2013 (with 2016 amendments) Regulations respectively. This uplift is regarded as a first step towards making all buildings 'net zero ready' from 2025 when the Future Buildings Standard comes into effect, mandating a 75% reduction in emissions.

## Approved Document Part L Volume 2: Buildings other than Dwellings 2021

- 2.25 This approved document took effect on 15 June 2022 for use in England. Part L amendments introduce a new principal performance metric measuring energy efficiency. 'Primary energy' will be used in combination with CO<sub>2</sub> metrics to assess compliance with Part L. Primary energy calculations take into account factors such as the efficiency of the building's heating system; power station efficiency for electricity; and energy used to produce fuel and deliver it to the building.

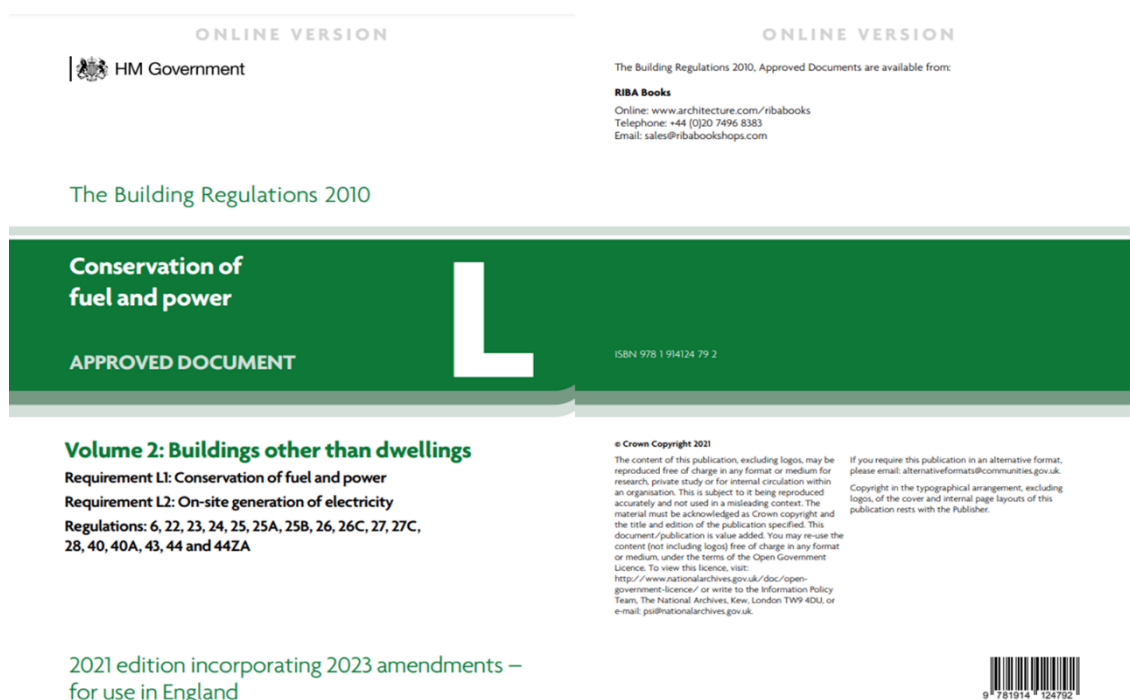


Figure 2.6: Approved Document L, Conservation of fuel and power (Volume 2: 2021)

## **The Future Building Standard**

- 2.26 The Future Buildings Standard: 2021 Consultation on changes to Part L is a document published by the UK government in January 2021, outlining proposed changes to Part L (Conservation of fuel and power) and Part F (Ventilation) of the Building Regulations. The main goal is to improve the energy efficiency of buildings and reduce carbon emissions. Key points from the consultation include proposed measures to:
- 2.27 The consultation sought feedback from industry professionals, architects, engineers, and other stakeholders to refine the proposed changes before implementing them as part of the 2025 Future Buildings Standard.

## **Clean Growth Strategy**

- 2.28 The UK's Clean Growth Strategy is a government plan published in 2017, aimed at cutting greenhouse gas emissions while driving economic growth. The strategy outlines a comprehensive approach to decarbonize all sectors of the UK economy, including power, transport, and buildings, while ensuring a secure and affordable energy supply for businesses and consumers.
- 2.29 The Clean Growth Strategy is a critical component of the UK's efforts to meet its legally binding climate change targets, grow the low-carbon economy, and create new economic opportunities for businesses and workers across the country.

## **National Design Guide**

- 2.30 The UK's National Design Guide is a government document published in 2019 and updated January 2021, which sets out the principles and standards for creating well-designed, sustainable, and beautiful places across the country. The guide aims to promote good design practices in the planning and development process, addressing various aspects of the built environment.

## **National Planning Policy Framework**

- 2.31 The National Planning Policy Framework (NPPF) is a key document in England's planning system, first published in 2012 and updated several times since. It sets out the government's planning policies and provides guidance on how these should be applied in England. The NPPF covers various aspects of planning, including housing, the economy, transport, and the environment. Its core principles include: a presumption in favour of sustainable development, encouraging local authorities to plan for and approve new development where possible.

## **Planning Policy Guidance (The Guidance)**

- 2.32 The UK's Planning Policy Guidance (PPG) is a collection of documents that provide detailed guidance on various aspects of the planning system in England. These documents support the National Planning Policy Framework (NPPF) and offer practical advice on implementing planning policies.

- 2.33 The Planning Policy Guidance plays a crucial role in supporting the effective implementation of planning policies and promoting sustainable development in England.

### **Net Zero Strategy: Build Back Greener**

- 2.34 The UK's Net Zero Strategy: Build Back Greener (**Figure 2.7**) is a comprehensive government plan published in 2021, outlining the country's pathway to achieve net zero emissions by 2050. The strategy focuses on decarbonising all sectors of the UK economy while promoting sustainable growth and job creation. The Net Zero Strategy is a critical component of the UK's efforts to combat climate change and transition to a sustainable, low-carbon economy.

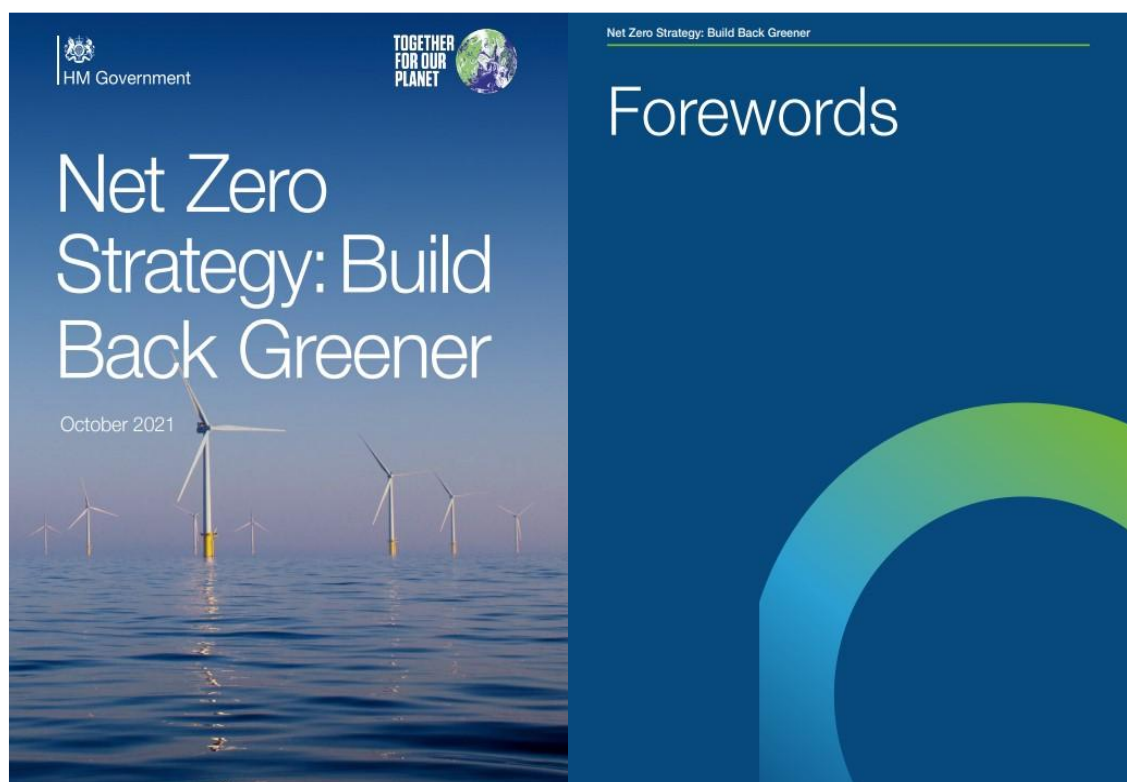


Figure 2.7: Net Zero Strategy: Build Back Greener)

### **Heat and Buildings Strategy**

- 2.35 The UK's Heat and Buildings Strategy is a government plan published in 2021, outlining the country's approach to reducing emissions from homes and workplaces. The strategy focuses on improving energy efficiency and transitioning to low-carbon heating technologies.

## Rochdale Adopted Core Strategy 2016

- 2.36 The Rochdale Core Strategy (**Figure 2.8**) was adopted by Rochdale Borough Council in October 2016. The RDP sets out a spatial vision and strategy for the sustainable growth of Rochdale for the period 2016 to 2028, and is used to guide decisions on planning, development and regeneration in Rochdale. The RDP replaced the policies in the Unitary Development Plan (UDP) June 2006.
- 2.37 The key policies of the RDP in terms of Sustainable Development policies and targets are as follows: Policies G1 (Tackling and adapting to climate change) and G2(Energy and new development).

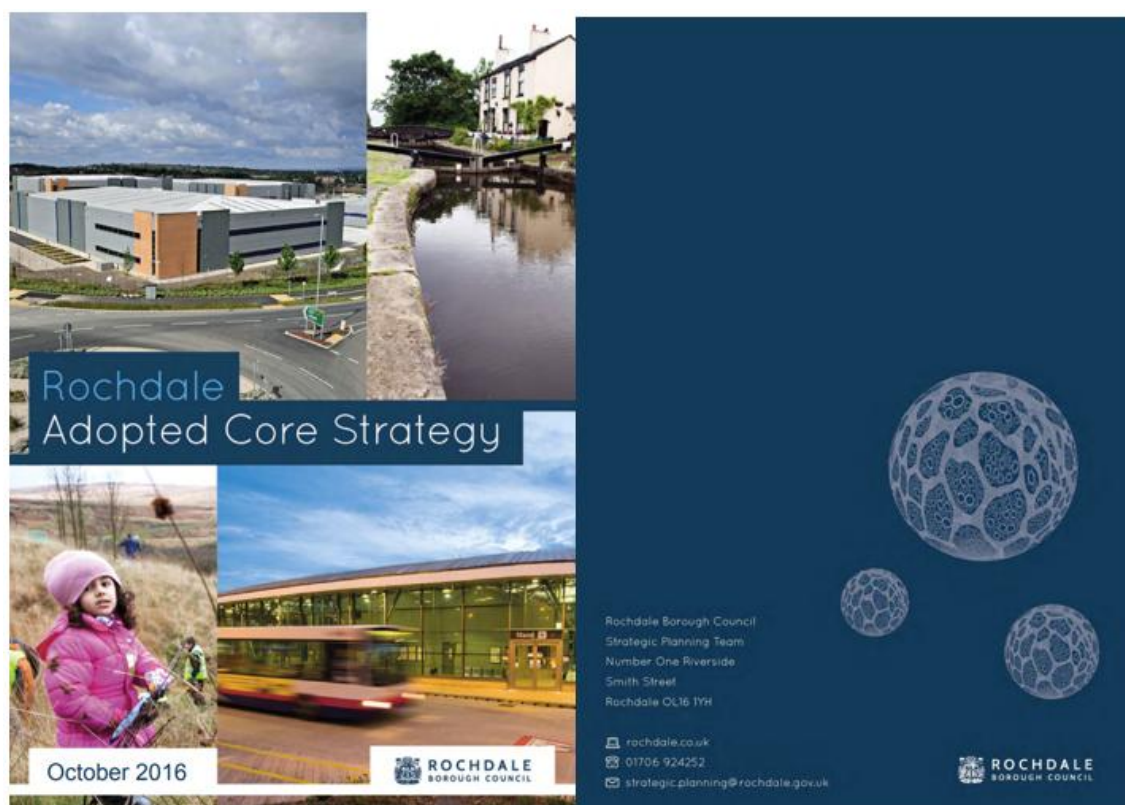


Figure 2.8: Rochdale Adopted Core Strategy

- 2.38 Policy G1 requires new developments to address the impacts of climate change. And reduce carbon emissions through the use of renewable and low carbon energy technologies. Developments should address the impacts of climate change.
- 2.39 Policy G2 outlines an energy hierarchy in which all new developments should adhere. The hierarchy requires developments to prioritise demand reduction, followed by the implementation of energy efficient and low and zero carbon technologies and networks.

## Climate Emergency

- 2.40 In July 2019, the Rochdale Borough Council declared a climate emergency with the aim of becoming a carbon neutral Borough by 2050 in line with the Mayor and Government's targets.

### 3. BASELINE: TARGET ENERGY AND CO<sub>2</sub> EMISSIONS

- 3.1 The baseline energy demand and CO<sub>2</sub> emissions due to end-uses by Building Regulations have been calculated using the National Calculation Methodology (NCM) ApacheSim Dynamic Simulation Modelling (DSM) 2021.
- 3.2 Unlike SBEM (Simplified Building Energy Model), DSM is a much more accurate tool providing full annual simulation performed multiple times per hour using real hourly weather data.

#### Baseline Energy and Carbon Dioxide Emissions (TER)

- 3.3 DSM calculations have been performed to generate the energy demand and resultant CO<sub>2</sub> emissions of the Proposed Development.
- 3.4 Please note that all total figures include regulated consumption assessed within Building Regulations only, equipment energy (appliances, including equipment and small power) is not calculated within Building Regulations as the developer is unable to directly influence this end-use.
- 3.5 The baseline regulated energy and CO<sub>2</sub> emissions are equivalent to the Building Regulations Approved Document Part L worst allowable Target Emissions Rate (TER) calculated within the DSM assessment of the Proposed Development.
- 3.6 **Table 3.1** and **3.2** shows the baseline energy demand and carbon emissions for each strategy. Refer to **Appendix 1** for the baseline BRUKL document:

Table 3.1: Baseline Energy Demand (TER)

| BASELINE (TER): ENERGY DEMAND |                          |
|-------------------------------|--------------------------|
|                               | Energy Demand (kWh/year) |
| Heating                       | 156,608.55               |
| Cooling                       | 415.13                   |
| Auxiliary                     | 4,981.58                 |
| Lighting                      | 36,842.97                |
| Hot Water                     | 40,682.94                |
| TOTAL PART L BASELINE (TER)   | 239,531.16               |

Table 3.2: Baseline Carbon Dioxide Emissions (TER)

| BASELINE (TER): CARBON DIOXIDE EMISSIONS |                                                          |
|------------------------------------------|----------------------------------------------------------|
|                                          | CO <sub>2</sub> Emissions (Tonnes CO <sub>2</sub> /year) |
| TOTAL PART L BASELINE (TER)              | 28.64                                                    |

## 4. ENERGY AND CO<sub>2</sub> REDUCTION STRATEGY METHODOLOGY

- 4.1 The design of the Proposed Development has been developed to reduce its annual energy consumption, provide energy in an environmentally friendly way, and to minimise its annual CO<sub>2</sub> footprint.
- 4.2 To achieve this, the Proposed Development will adopt an energy hierarchy (**Figure 4.1**) approach to meet the requirements of Rochdale Core Strategy.
- Use Less Energy (**Be Lean**); then
  - Supply Energy Efficiently (**Be Clean**); and finally
  - Use Renewable Energy (**Be Green**).



Figure 4.1: Energy Hierarchy

- 4.3 Energy saving measures following the Fabric First Approach is encouraged. This will reduce energy demand and consequently the energy bills by investing in improving the building fabric's thermal properties and using efficient building services. This is often referred to as 'Be Lean'.
- 4.4 The Fabric First approach provides protection against fluctuations in both gas and electricity supply tariffs by inherently reducing energy consumption and expands the number of suitable energy generation and delivery options.
- 4.5 Further improvements in building services, over and above the minimum requirements to comply with Building Regulations Part L, can reduce energy demand further and shall be described within the 'Be Clean' section. This includes identifying the Proposed Development site heat/cooling demand, investigating existing/planned decentralised energy and heat network, and the potential for a new heat district network as part of the Proposed Development.
- 4.6 An investigation into a combined heat and power (CHP) system shall also be conducted based on the Proposed Development estimated annual baseload. CHP systems generate electricity from burning fossil fuels and capture the heat generated in the process for heating purposes. In order for CHP technology to be appropriate the site needs to have a suitable base-load heat demand.
- 4.7 Finally, the use of on-site renewable technologies will be assessed to offset the development's residual energy demand and CO<sub>2</sub> emissions. The use of the energy hierarchy will help to reduce the size of any on-site renewable technologies required by ensuring that energy consumption and CO<sub>2</sub> emissions is driven out of the scheme by the Fabric First approach.

## 5. BE LEAN: ENERGY EFFICIENT DESIGN MEASURES

- 5.1 Energy demand and CO<sub>2</sub> reduction has been considered in three stages: layout and orientation; building fabric; and building services. The proposals to reduce energy at each of these stages are described within this section.

### Layout and Orientation Analysis

- 5.2 The opportunities for orientation and layout of this site have been maximised. The occupied spaces are orientated such that the glazing shall be on the south-east façade.
- 5.3 These orientations are ideal for occupied areas as they provide an optimum balance between beneficial solar gains, diffuse/natural lighting whilst avoiding the risks of overheating. This strategy will help reduce the demand for artificial lighting and saves energy. It will also help to create a visually stimulating and productive environment for building occupants.

### Building Fabric Analysis

- 5.4 In order to reduce the demand for heating and cooling energy, it is proposed to construct the development with a highly thermal efficient building envelope. To meet Building Regulations Approved Document Part 201 (Volume 2) Standard and to ensure the development is future proofed for the longer term and ready to meet the Future Building Standard from 2025, the Proposed Development shall be well insulated with measures taken to achieve a high degree of air tightness.
- 5.5 The development fabric elements making up the envelope shall therefore be specified to exceed the minimum standards set in Part 2 (Volume 2) to ensure energy consumption via space heating and cooling is reduced. **Table 5.1** shows the proposed level of performance in comparison with the worst allowable standards for each element.

Table 5.1: Proposed Fabric Specification

| PROPOSED FABRIC SPECIFICATION |                                           |                                           |                            |
|-------------------------------|-------------------------------------------|-------------------------------------------|----------------------------|
| Element                       | Proposed U-values                         | Part L 2021 Worst Allowable U-values      | Percentage Improvement (%) |
| Ground Floor                  | 0.11 W/m <sup>2</sup> .K                  | 0.18 W/m <sup>2</sup> .K                  | 38.89 %                    |
| External Wall                 | 0.26 W/m <sup>2</sup> .K                  | 0.26 W/m <sup>2</sup> .K                  | 00.00%                     |
| Roof                          | 0.18 W/m <sup>2</sup> .K                  | 0.18 W/m <sup>2</sup> .K                  | 00.00 %                    |
| Glazed Windows (inc. frame)   | 1.40 W/m <sup>2</sup> .K                  | 1.60 W/m <sup>2</sup> .K                  | 12.50 %                    |
| Rooflight                     | 1.80 W/m <sup>2</sup> .K                  | 2.20 W/m <sup>2</sup> .K                  | 18.18%                     |
| Solid Pedestrian Door         | 1.60 W/m <sup>2</sup> .K                  | 1.60 W/m <sup>2</sup> .K                  | 0.00 %                     |
| Vehicle Access Door           | 1.30 W/m <sup>2</sup> .K                  | 1.30 W/m <sup>2</sup> .K                  | 0.00%                      |
| Air Permeability              | 3.00 m <sup>3</sup> /(hr.m <sup>2</sup> ) | 8.00 m <sup>3</sup> /(hr.m <sup>2</sup> ) | 62.50 %                    |

- 5.6 The ground floor u-value calculation is based on a perimeter to area (P/A) ratio calculation as detailed in **Appendix 2**.
- 5.7 Light and Solar Transmittance (g-values) are factors that measure the amount of light and solar energy that pass through glazed openings. They are important as they affect the control of solar gains and availability of natural light into the building.
- 5.8 **Table 5.2** shows the proposed light and solar transmittance values recommended for the Proposed Development.

Table 5.2: Proposed Light and Solar Transmittance Specification

| PROPOSED GLAZING SPECIFICATION |                        |                                 |                                |
|--------------------------------|------------------------|---------------------------------|--------------------------------|
| Element                        | Description/<br>Notes  | Proposed Solar<br>Transmittance | Proposed Light<br>Transmission |
| Window                         | Proposed specification | 0.29                            | 0.60                           |
| Rooflight                      | Proposed specification | 0.40                            | 0.71                           |

- 5.9 In addition to the Proposed Development improved envelope u-values, a key area of construction which could result in a significant reduction in heating demand are junction details where two elements of the development envelop meet (thermal bridging).
- 5.10 The Proposed Development has been modelled using ApacheSim Dynamic Simulation Modelling (DSM). For DSM software, the non-repeating thermal bridge [Psi ( $\Psi$ )] heat losses for each element (including windows etc) is automatically allowed for by adding 10% to the standard area weighted average U-values. Consequently, for the Proposed Development DSM analysis, an additional 25% heat loss is automatically added to make an allowance for the extra conduction via non-repeating thermal bridges in accordance with BS EN ISO 14683. Thus, an Alpha value of 25% within the BRUKL document can be observed.
- 5.11 The Proposed Development will be designed to make use of best practice design (such as construction joint details calculated by a suitably competent person following the guidance detailed in BR 497 or from a reputable non-government database containing independently assessed thermal junction details) to minimise thermal bridging, energy losses, and reducing CO<sub>2</sub> emissions.
- 5.12 Therefore, it is proposed that the details between different envelope elements should be carefully designed in order to maintain continuity of insulation.

### Building Services Analysis

- 5.13 The following services are proposed for the development in order to reduce energy consumption and carbon dioxide emissions through energy efficient equipment and services strategy.

### Space Heating and/or Cooling:

- 5.14 Space heating/cooling to the offices are provided via a Variable Refrigerant Flow (VRF) system with a minimum seasonal efficiency of 340% in heating mode and 510% in cooling mode – Refer to chapter 7 for further details.
- 5.15 Space heating to all other core areas within the Proposed Development (WCs and circulation areas) are provided via electric panel heaters with a seasonal efficiency of 100%. In order to further reduce the energy demand, all heating system would be provided with local time and local temperature.
- 5.16 The calculation assumes space heating shall also be provided to the warehouse area (shell) via an Air Source Heat Pump with a heating efficiency of 250% in accordance with the Non-Domestic Building Services Compliance Guide (NDBSCG) and in line with the ongoing decarbonisation of the UK electricity grid.

### Domestic Hot Water:

- 5.17 Domestic hot water to the core areas is provided via a stand-alone electric water heater with a 15 litres storage and a storage loss of 0.05670 kWh/l/day assumed. Domestic hot water to the warehouse area (shell) is assumed to be provided via an Instantaneous Electric Water Heater in accordance with the NDBSCG

### Ventilation:

- 5.18 Ventilation to the office areas are provided via a Mechanical Ventilation Unit with 85.00% efficient heat recovery. Such Mechanical Ventilation Unit with heat recovery system can significantly reduce the winter heat demand by pre-heating supply air with extract air. The system shall therefore be selected to have a specific fan power (SFP) of no greater than 1.50 Watt/litres/second [W/(l/s)].
- 5.19 Extract ventilation to the WCs and Kitchenettes shall be selected to have a specific fan power (SFP) of no greater than 0.30 W/(l/s) with a flow rate of 6 l/s assumed per WC/urinal and 15 l/s for the kitchenette.

### Lighting:

- 5.20 Lighting to the office areas is proposed to be served by LED lightings with efficacy of no less than 120 lumens per circuit Watt.
- 5.21 Lighting to all other core areas are proposed to be served by LED lightings with efficacy of no less than 100 lumens per circuit Watt.
- 5.22 Lighting to the lifts and warehouse is proposed to be served by LED lightings with efficacy of no less than 95 lumens per circuit Watt in accordance with the NDBSCG.
- 5.23 It is proposed that lighting to the office area shall be provided with photoelectric dimming and PIR (passive infra-red) sensors to provide man-on-off control with a

parasitic power of no greater than 0.10 W/m<sup>2</sup>. This is to ensure that artificial lightings shall not be fully utilised when there is sufficient natural light or space is unoccupied.

- 5.24 It is proposed that lighting to the WCs and circulation shall be provided with PIR (passive infra-red) sensors to provide auto on-off control with a parasitic power of no greater than 0.10 W/m<sup>2</sup>. This is to ensure that artificial lightings shall not be utilised when spaces are unoccupied.
- 5.25 It is assumed that lighting to the warehouse area (shell) shall be provided with photoelectric dimming and PIR sensors to provide auto-on-off control with a parasitic power of no greater than 0.30 W/m<sup>2</sup>. This is to ensure that artificial lightings shall not be fully utilised when there is sufficient natural light or space is unoccupied in accordance with the NDBSCG and the Building Regulations.

#### Metering:

- 5.26 It is proposed that all Proposed Development's services shall be fitted with metering which will communicate meaningful information, enabling the building occupier to address and adjust the system to satisfy the requirements of paragraph 5.17 of Part L (Volume 2) of the Building Regulations.

#### Power Factor Correction:

- 5.27 A power factor correction device can adjust the wavelength of the electricity supply to ensure that minimal electrical energy is wasted within the building. However, no power factor correction system has been assumed/proposed for the Proposed Development.

## 6. BE CLEAN: SUPPLYING ENERGY EFFICIENCY

- 6.1 The next stage in the energy hierarchy focuses on efficiently and cleanly supplying energy - primarily through low-carbon heating solutions such as connecting to existing or planned heat networks or developing future-proofed communal systems - to reduce CO<sub>2</sub> emissions.

### Heat Network

- 6.2 District heating offers a circular and integrated approach to energy use. By connecting buildings to a shared energy centre, these networks allow heat to be generated, stored, distributed, and reused more efficiently than individual systems. This reduces reliance on primary energy sources and minimises energy waste across the system.
- 6.3 Heat is typically produced in a central energy centre - which may use technologies such as combined heat and power (CHP), large-scale heat pumps, or waste heat recovery - and is then pumped through a network of super-insulated pipes to connected buildings. Within each building, a heat exchanger replaces the need for individual systems such as heat pump or boilers, providing space heating and domestic hot water.

### Connection to Existing or Planned District Heat Networks

- 6.4 A feasibility study, as illustrated in **Figure 6.1**, has been undertaken to assess the potential for connecting the Proposed Development to an existing or planned district heating network. The findings indicate that there are no operational or planned heat networks within a 500-metre radius of the site, significantly limiting the opportunity for connection.

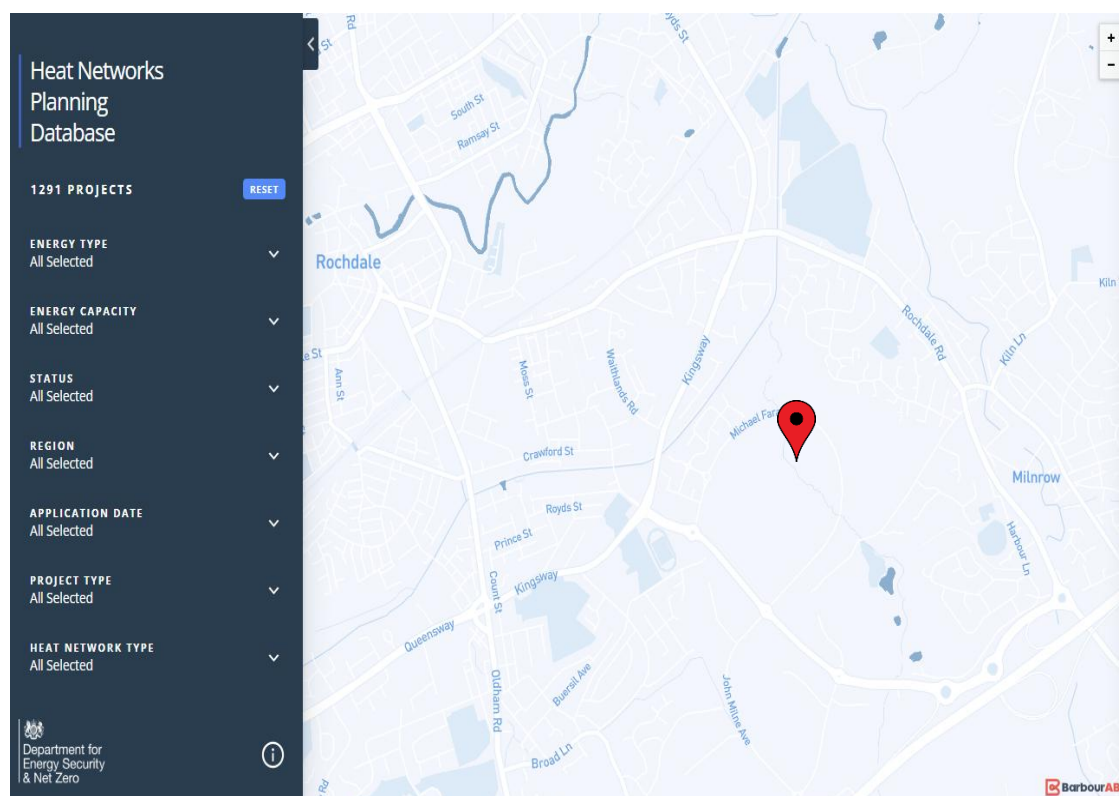


Figure 6.1: Proposed Development Site Heat Network Map

### Developing New Communal or District Heating Systems

- 6.5 The potential for a new site-wide heat network - illustrated in **Figure 6.2**, has been considered. Such a system would typically be served by a central energy centre, potentially utilising low-emission technologies such as combined heat and power (CHP) or large-scale heat pumps. Heat would be distributed to connected buildings via a network of super-insulated underground pipes, with each building equipped with a heat exchanger to provide space heating and domestic hot water, replacing the need for individual heating systems.
- 6.6 However, this option is not considered viable due to the scale of the development. Developments of this size often face challenges with centralised heat networks, including higher capital and operational costs, reduced system efficiency, and potential occupant dissatisfaction due to limited control and responsiveness of centralised systems.



Figure 6.2: District Heating Network

- 6.7 CHP systems generate electricity by burning fossil fuels and simultaneously capture the heat produced during the process for use in space heating and domestic hot water. CHP is most effective in developments with a consistent, year-round heat demand, allowing both the electricity and heat outputs to be fully utilised.
- 6.8 Historically, gas-engine CHP has been a key enabler of district heat networks due to its relatively high efficiency and lower carbon intensity compared to grid electricity. While some CHP systems can be future proofed for hydrogen integration, this technology is not considered suitable for the Proposed Development. The site is located within an Air Quality Management Area (AQMA), and the combustion-based nature of CHP could contribute to local air pollution, particularly nitrogen oxides (NO<sub>x</sub>). Additionally, the rapid decarbonisation of the UK electricity grid has reduced the carbon advantage of on-site electricity generation, further limiting the viability of CHP as a low-carbon solution for this development.

## 7. BE GREEN: PROPOSALS FOR RENEWABLE ENERGY GENERATION

### Low and Zero Carbon Feasibility Study

- 7.1 The next stage in the energy hierarchy is investigating opportunities for producing, storing, and using renewable energy on-site. Generating low carbon energy onsite can reduce reliance on fossil fuels & minimises energy lost through transmission, contributing to security of supply and better connections between energy demand and generation.
- 7.2 An initial renewable energy options assessment has been undertaken using the Renewable Energy Sources Estimation Tool (RESET) – **Figure 7.1** which accompanies the CIBSE TM38 'Renewable Energy for Buildings' guidance document. This toolkit is intended for use at the earliest stages of design, when ideas are being considered and the outline direction of the design is developed, to identify the most promising renewable technology options for a given development or building. This is the key stage for some of the most important decisions relating to overall appearance, orientation, building mass and ventilation strategy, which can also influence decisions about renewable energy sources.

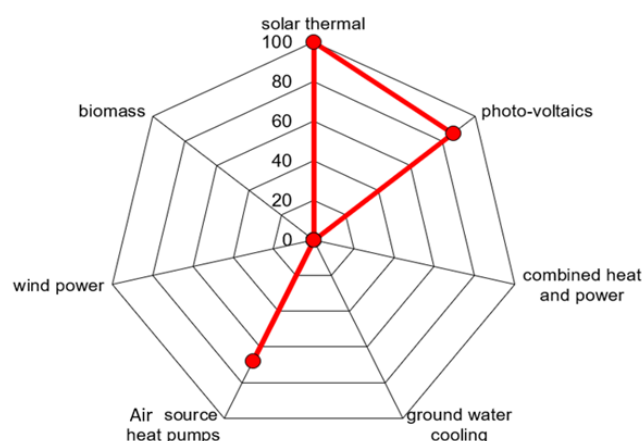


Figure 7.1: Initial Renewable Energy Feasibility

- 7.3 The initial assessment has been undertaken to judge the feasibility of renewable energy technologies from the outset, enabling viable technologies to be promoted and others to be ruled out from further consideration. The initial assessment demonstrates that Solar Thermal; Photovoltaic Panels; and Air Source Heat Pumps (ASHP); are all feasible technologies for the Proposed Development Site.
- 7.4 A further detailed review (**Table 7.1**) of potential low carbon renewable energy technologies has also been carried out to determine potential technologies which could be incorporated into the Proposed Development Site.
- 7.5 The detailed assessment further demonstrates that renewable technologies with a high opportunity include PV and ASHP. Technologies such as Solar Thermal, GSHP, WSHP, Waste Heat, Wind Turbine etc have been discounted at this stage based on a balanced consideration of the policy requirements, financial viability, and technical feasibility.

Table 7.1: Renewable Energy Feasibility Matrix

| TECHNOLOGY                                                                                                    |                                                                                                                                                                                             | FEASIBILITY SUMMARY TABLE MATRIX |               |                |                |              |                   |                                                                                                                                                                                                      |   |
|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------|----------------|----------------|--------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| LZC technologies                                                                                              | Description                                                                                                                                                                                 | Noise Issue                      | Visual Impact | Internal Space | External Space | Capital Cost | Maintenance Issue | Site Feasibility                                                                                                                                                                                     |   |
| Solar PV Panels<br>          | Solar PV are solar cell systems that convert sunlight directly into electricity. They should be installed within 45° of due south ideally at a 30-35° angle.                                | ●                                | ●             | ●              | ●              | ●            | ●                 | There is suitable shade free roof space available with sufficient electricity demand. This technology is considered suitable for the Proposed Development.                                           | ✓ |
| Solar Thermal Collector<br>  | Solar Thermal are devices that uses energy from the sun to warm water for storage in a hot water cylinder. They should also be installed within 45° of due south ideally at a 30-35° angle. | ●                                | ●             | ●              | ●              | ●            | ●                 | Whilst this technology can be considered suitable for the Proposed Development Solar PV is preferable due to its versatility, cost effectiveness, and scalability for a wide range of applications.  | ✗ |
| Ground Source Heat Pump<br> | Ground Source Heat Pumps (GSHP) work by absorbing natural heat from the ground and transferring the heat into buildings to provide heating, cooling, and domestic hot water.                | ●                                | ●             | ●              | ●              | ●            | ●                 | Large area of land required for pipework which is subject to a full ground survey to determine geology. More beneficial to large scale development proposal and is cost prohibitive for this scheme. | ✗ |
| Air Source Heat Pump<br>   | Air Source Heat Pump (ASHP) extracts heat from the outside air and transfer the heat into buildings to provide heating, cooling, and domestic hot water.                                    | ●                                | ●             | ●              | ●              | ●            | ●                 | ASHP can provide simultaneous heating and DHW at a very high efficiency. There is suitable external space available. This technology is considered suitable for the Proposed Development.            | ✓ |

|                                                                                                                          |                                                                                                                                                                                                                             |   |   |   |   |   |   |                                                                                                                                                                                                                                                    |   |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <p>Water Source Heat Pump</p>           | <p>Water Source Heat Pump (WSHP) uses submerged pipework to absorb energy from water sources such as lakes, ponds, rivers, aquifers, mine water etc to provide heating and hot water into buildings.</p>                    | ● | ● | ● | ● | ● | ● | <p>There are no potential enough water sources (such as lakes, ponds, rivers, aquifers, mine water) on or nearby the Proposed Development site. Hence, this technology is not considered feasible.</p>                                             | ⊗ |
| <p>Geothermal Energy Plant</p>          | <p>Geothermal energy is the heat that comes from the sub-surface of the earth. It is a reliable and constant source of low-carbon, renewable heat. The heat is then used to heat buildings and to generate electricity.</p> | ● | ● | ● | ● | ● | ● | <p>Large area of land required for pipework which is subject to a full ground survey to determine geology. More beneficial to large scale development proposal subsidised by the Government. Hence, this technology is not considered feasible</p> | ⊗ |
| <p>Wind Turbine</p>                    | <p>A wind turbine turns wind energy into electricity using the aerodynamic force from the rotor blades. The electricity generated is then used to power building electricity demands including appliances.</p>              | ● | ● | ● | ● | ● | ● | <p>Provided the average wind speed in the area of the Site is 4.4 m/s at 10m hub height (<math>\geq 5.0</math> m/s required for further investigation), this technology is not feasible for the site.</p>                                          | ⊗ |
| <p>Hydro, Wave &amp; Tidal Power</p>  | <p>Hydropower – also known as hydroelectric power or hydroelectricity – harnesses energy from the natural flow of moving water, which can then be used to generate electricity to power building electricity demands.</p>   | ● | ● | ● | ● | ● | ● | <p>The Proposed Development Site is not located within a reasonable distance to a coastal location or water source. Hence, this technology is not considered feasible.</p>                                                                         | ⊗ |

|                                                                                                                              |                                                                                                                                                                                                                                            |   |   |   |   |   |   |                                                                                                                                                                                                                                                                              |   |
|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <p><b>Biomass Heating</b></p>               | <p>Biomass is a renewable energy source, generated from burning wood, plants and other organic matter, such as manure or waste. It releases carbon dioxide when burned, but considerably less than fossil fuels.</p>                       | ● | ● | ● | ● | ● | ● | <p>Biomass heating is not considered feasible for this development due to issues with fuel storage and access for delivery vehicles.</p>                                                                                                                                     | ⊗ |
| <p><b>Waste Heat</b></p>                    | <p>Waste heat is the unused heat given to the surrounding environment (in the form of thermal energy) by a heat engine in a thermodynamic process in which it converts heat to useful work.</p>                                            | ● | ● | ● | ● | ● | ● | <p>It is assumed that the use of the Proposed Development site will not involve processes which generate waste heat to be utilised in reducing fossil fuel demand.</p>                                                                                                       | ⊗ |
| <p><b>Transpired Solar Collectors</b></p>  | <p>Transpired Solar Collector is a highly efficient solar air heating system that harnesses the sun's energy to heat fresh, outdoor air for building. It is installed as an 'additional skin' to a building's southerly facing façade.</p> | ● | ● | ● | ● | ● | ● | <p>Transpired solar collectors (TSC) are mostly used in industrial applications for industrial heating, cooling, and agricultural drying. Due to the ventilation equipment requirement, the Proposed Development is not expected to incorporate TSC, hence not proposed.</p> | ⊗ |
| <p><b>Hydrogen Fuel Cell</b></p>          | <p>Hydrogen energy storage is a form of chemical energy storage in which electrical power is converted into hydrogen. This energy can then be released again by using the gas as fuel in a combustion engine or a fuel cell.</p>           | ● | ● | ● | ● | ● | ● | <p>There is limited market available, and the Proposed Development is not expected to incorporate hydrogen fuel due to technology issues including storage, transportation, &amp; utilisation of hydrogen energy.</p>                                                        | ⊗ |

## Air Source Heat Pump

- 7.6 Air source heat pumps absorb heat from the outside air. This exchange heat between the outside air and a building can be used to provide space heating in winter and cooling in the summer months.
- 7.7 The efficiency of these systems is inherently linked to the ambient air temperatures. The heat can be used to heat radiators, underfloor heating, or warm air convectors and hot water. Typically, there are two main types of ASHP, one which is refrigerant-based system (VRF) and one which is water-based system (air to water heat pumps).
- 7.8 Refrigerant-based system (VRF) have been proposed for the development as there are no technical feasibility restraints (**Table 7.2**). The efficiency of the VRF system should be no less than 340% (SCOP) in heating mode and 510% (EER/SEER) in cooling mode.

Table 7.2: ASHP (Air to Air Heat Pump) Details

| ASHP (AIR TO AIR HEAT PUMP) DETAILS |                                  |
|-------------------------------------|----------------------------------|
| System Description                  | Air to Air System                |
| Capacity (kW)                       | TBC at the detailed design stage |

## Solar Photovoltaic (PV)

- 7.9 Solar PV also known as Solar panel electricity system captures the sun's energy using photovoltaic cells. These cells convert the sunlight into electricity, which can then be used to run buildings appliances and lighting.
- 7.10 A **108.00** kWp solar PV capacity is proposed, in accordance with **Table 7.3**. The analysis is based on an indicative panel (Sunpower Maxeon 450W monocrystalline panel).
- 7.11 It is proposed that the PV array shall be located on the roof and orientated south-west mounted. Energy storage will be considered for optimising system performance and balancing surplus electrical energy production.

Table 7.3: Proposed Solar PV Panels Specification

| Proposed Solar PV Specification |              |                       |                       |
|---------------------------------|--------------|-----------------------|-----------------------|
| Orientation                     | kWp Required | No of Panels Required | Panel Area Required   |
| South-West                      | 108.00       | 240                   | 487.44 m <sup>2</sup> |

## Be Green (Renewable Energy) Results

- 7.12 **Table 7.4** to **Table 7.5** show the reduction summary of energy demand and CO<sub>2</sub> emissions due to the proposals for on-site renewable energy generation (ASHP for space heating/cooling, and PV) for the Proposed Development and this is compared to the baseline scenario. Refer to **Appendix 1** for the BRUKL output:

Table 7.4: Be Green Energy Demand Breakdown (BER)

| <b>BE-GREEN (BER): RENEWABLE ENERGY</b>     |                            |                            |
|---------------------------------------------|----------------------------|----------------------------|
|                                             | Baseline Energy<br>kWh/ yr | Proposed Energy<br>kWh/ yr |
| Heating                                     | 156,608.55                 | 141,248.66                 |
| Cooling                                     | 415.13                     | 1,971.88                   |
| Auxiliary                                   | 4,981.58                   | 2,283.23                   |
| Lighting                                    | 36,842.97                  | 57,910.91                  |
| Hot Water                                   | 40,682.94                  | 43,069.95                  |
| Solar PV                                    | -49,296.93                 | -86,555.02                 |
| Total Energy Consumption                    | 190,234.24                 | 159,929.60                 |
| <b>Part L 2021 Reduction (%) – Be Green</b> |                            | <b>15.93%</b>              |

Table 7.5: Be Green Carbon Dioxide Emissions (BER)

| <b>BE-GREEN (BER): CARBON DIOXIDE EMISSIONS</b> |                                                    |                                                    |
|-------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
|                                                 | Baseline<br>Emissions<br>Tonne/CO <sub>2</sub> /yr | Proposed<br>Emissions<br>Tonne/CO <sub>2</sub> /yr |
| CO <sub>2</sub> Emissions                       | 28.64                                              | 25.95                                              |
| <b>Total CO<sub>2</sub> Reduction (%)</b>       |                                                    | <b>9.42%</b>                                       |

- 7.13 **Table 7.4-7.5** shows the total energy and CO<sub>2</sub> emissions of the Proposed Development has been reduced by **15.93%** and **9.42%** when compared with Building Regulations Part L Baseline.
- 7.14 This complies with the National target to exceed the Part L 2021 TER Baseline and thus adheres to the energy hierarchy that reflects national policy, targets, and requirements.

## 8. CONCLUSION

- 8.1 This Energy Statement has been produced in support of a Planning Application for the Proposed Plot Q Development Michael Faraday Avenue, Kingsway Business Park, Rochdale in accordance with Rochdale Borough Council's Core Strategy (2016) Policies G1 – G2.
- 8.2 This Energy Statement outlines the Proposed Development's approach to energy efficiency and renewable energy strategies using Dynamic Thermal Modelling (DSM). The Proposed Development will adopt the use of an energy hierarchy in order to meet current National best practice standard and Rochdale Borough Council's objectives for energy, carbon dioxide and the adaptability to the likely effects of Climate Change.
- 8.3 The Proposed Development envelope and services will be specified to exceed the minimum standards set in Part L (Volume 2) to ensure energy consumption via space heating/cooling is reduced.
- 8.4 In addition, passive solar considerations have formed an integral part of the Proposed Development design. Analysis has been carried out on the facades to ensure solar gains and heating loads are reduced, hence providing a more comfortable internal environment for occupants.
- 8.5 This Energy Statement proposes to reduce the regulated energy and carbon dioxide emissions of the Proposed Development by a total of **15.93%** and **9.42%** respectively via ASHP (VRF) and PV (**108.00 kWpp**) when compared with Part L 2021 (Volume 2) of the Building Regulations Target Emissions Rate Baseline.
- 8.6 This complies with the National target to exceed the Part L 2021 TER Baseline and thus demonstrate compliance with Rochdale Borough Council's requirement of adhering to the energy hierarchy that reflects national policy, targets, and requirements.

## ***APPENDICES***

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## **APPENDIX 1: BRUKL Document**

Project name

Shell and Core

Plot Q

As designed

Date: Fri Jan 09 16:33:58 2026

## Administrative information

## Building Details

Address: Kingsway Business Park, Rochdale, OL16 4NW

## Certifier details

Name: BWB Consulting Ltd.

Telephone number: 0113 233 8000

Address: Whitehall Waterfront, 2 Riverside Way, Leeds, LS1 4EH

## Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.28

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.28

BRUKL compliance module version: v6.1.e.1

Foundation area [m<sup>2</sup>]: 13042.2The CO<sub>2</sub> emission and primary energy rates of the building must not exceed the targets

|                                                                                       |                         |
|---------------------------------------------------------------------------------------|-------------------------|
| Target CO <sub>2</sub> emission rate (TER), kgCO <sub>2</sub> /m <sup>2</sup> annum   | 2.76                    |
| Building CO <sub>2</sub> emission rate (BER), kgCO <sub>2</sub> /m <sup>2</sup> annum | 2.5                     |
| Target primary energy rate (TPER), kWh <sub>PE</sub> /m <sup>2</sup> annum            | 27.69                   |
| Building primary energy rate (BPER), kWh <sub>PE</sub> /m <sup>2</sup> annum          | 24.7                    |
| Do the building's emission and primary energy rates exceed the targets?               | BER ≤ TER   BPER ≤ TPER |

## The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

| Fabric element                       | U <sub>a-Limit</sub> | U <sub>a-Calc</sub> | U <sub>i-Calc</sub> | First surface with maximum value         |
|--------------------------------------|----------------------|---------------------|---------------------|------------------------------------------|
| Walls*                               | 0.26                 | 0.26                | 0.26                | 00000005:Surf[2]                         |
| Floors                               | 0.18                 | 0.11                | 0.11                | 00000004:Surf[0]                         |
| Pitched roofs                        | 0.16                 | -                   | -                   | No pitched roofs in building             |
| Flat roofs                           | 0.18                 | 0.18                | 0.18                | 00000001:Surf[70]                        |
| Windows** and roof windows           | 1.6                  | 1.4                 | 1.4                 | 00000005:Surf[1]                         |
| Rooflights***                        | 2.2                  | 1.8                 | 1.8                 | 00000001:Surf[40]                        |
| Personnel doors <sup>^</sup>         | 1.6                  | 1.6                 | 1.6                 | 00000002:Surf[1]                         |
| Vehicle access & similar large doors | 1.3                  | 1.3                 | 1.3                 | 00000001:Surf[8]                         |
| High usage entrance doors            | 3                    | -                   | -                   | No high usage entrance doors in building |

U<sub>a-Limit</sub> = Limiting area-weighted average U-values [W/(m<sup>2</sup>K)]U<sub>i-Calc</sub> = Calculated maximum individual element U-values [W/(m<sup>2</sup>K)]U<sub>a-Calc</sub> = Calculated area-weighted average U-values [W/(m<sup>2</sup>K)]

\* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

\*\* Display windows and similar glazing are excluded from the U-value check.

\*\*\* Values for rooflights refer to the horizontal position.

<sup>^</sup> For fire doors, limiting U-value is 1.8 W/m<sup>2</sup>K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

| Air permeability                             | Limiting standard | This building |
|----------------------------------------------|-------------------|---------------|
| m <sup>3</sup> /(h.m <sup>2</sup> ) at 50 Pa | 8                 | 3             |

## Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

|                                                                                              |      |
|----------------------------------------------------------------------------------------------|------|
| Whole building lighting automatic monitoring & targeting with alarms for out-of-range values | YES  |
| Whole building electric power factor achieved by power factor correction                     | <0.9 |

### 1- 01\_EPH (Core)

|                                                                                                      | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>                                                                                   | 1                  | -                  | 0.67               | -             | -             |
| <b>Standard value</b>                                                                                | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 2- 00\_VRF\_MVHR (Core)

|                                                                                                                                        | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>                                                                                                                     | 3.4                | 5.1                | 0                  | 1.5           | 0.85          |
| <b>Standard value</b>                                                                                                                  | 2.5*               | N/A                | N/A                | 2^            | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b>                                   |                    |                    |                    |               | NO            |
| * Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.                                          |                    |                    |                    |               |               |
| ^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components. |                    |                    |                    |               |               |

### 3- 02\_Air Heater (Shell)

|                                                                                                      | Heating efficiency | Cooling efficiency | Radiant efficiency | SFP [W/(l/s)] | HR efficiency |
|------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|---------------|---------------|
| <b>This system</b>                                                                                   | 2.5                | -                  | 0                  | -             | -             |
| <b>Standard value</b>                                                                                | N/A                | N/A                | N/A                | N/A           | N/A           |
| <b>Automatic monitoring &amp; targeting with alarms for out-of-range values for this HVAC system</b> |                    |                    |                    |               | NO            |

### 1- 03\_DHW\_Electric Water Heater (Core)

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|-----------------------------------------|
| <b>This building</b>  | 1                        | 0.057                                   |
| <b>Standard value</b> | 1                        | N/A                                     |

### 2- 04\_DHW\_Electric Water Heater (Shell)

|                       | Water heating efficiency | Storage loss factor [kWh/litre per day] |
|-----------------------|--------------------------|-----------------------------------------|
| <b>This building</b>  | 1                        | -                                       |
| <b>Standard value</b> | 1                        | N/A                                     |

## Zone-level mechanical ventilation, exhaust, and terminal units

| ID | System type in the Approved Documents                                 |
|----|-----------------------------------------------------------------------|
| A  | Local supply or extract ventilation units                             |
| B  | Zonal supply system where the fan is remote from the zone             |
| C  | Zonal extract system where the fan is remote from the zone            |
| D  | Zonal balanced supply and extract ventilation system                  |
| E  | Local balanced supply and extract ventilation units                   |
| F  | Other local ventilation units                                         |
| G  | Fan assisted terminal variable air volume units                       |
| H  | Fan coil units                                                        |
| I  | Kitchen extract with the fan remote from the zone and a grease filter |

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

| Zone name         | SFP [W/(l/s)] |     |     |     |   |     |     |     |   | HR efficiency |          |
|-------------------|---------------|-----|-----|-----|---|-----|-----|-----|---|---------------|----------|
| ID of system type | A             | B   | C   | D   | E | F   | G   | H   | I |               |          |
| Standard value    | 0.3           | 1.1 | 0.5 | 2.3 | 2 | 0.5 | 0.5 | 0.4 | 1 | Zone          | Standard |
| 00_ACC WC         | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 01_MALE WC X4     | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 01_ACC WC         | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 01_FEMALE WC X3   | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 02_MALE WC X4     | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 02_ACC WC         | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 02_FEMALE WC X3   | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 01_KITCHENETTE    | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |
| 02_KITCHENETTE    | -             | -   | 0.3 | -   | - | -   | -   | -   | - | -             | N/A      |

#### Shell and core configuration

| Zone            | Assumed shell? |
|-----------------|----------------|
| 00_ACC WC       | NO             |
| 00_LOBBY        | NO             |
| 00_RISER 2      | NO             |
| 00_STAIR        | NO             |
| 00_LIFT         | NO             |
| 01_RISER 2      | NO             |
| 01_STAIR        | NO             |
| 01_MALE WC X4   | NO             |
| 01_ACC WC       | NO             |
| 01_FEMALE WC X3 | NO             |
| 01_LOBBY        | NO             |
| 02_RISER 2      | NO             |
| 02_STAIR        | NO             |
| 02_MALE WC X4   | NO             |
| 02_ACC WC       | NO             |
| 02_FEMALE WC X3 | NO             |
| 02_LOBBY        | NO             |
| 01_STAIR 2      | NO             |
| 01_RISER 01     | NO             |
| 01_KITCHENETTE  | NO             |
| 01_OFFICE       | NO             |
| 02_KITCHENETTE  | NO             |
| 02_STAIR 2      | NO             |
| 02_RISER 01     | NO             |
| 02_OFFICE       | NO             |
| 00_STAIR 2      | NO             |
| 00_RISER 01     | NO             |
| 00_WAREHOUSE    | YES            |

| General lighting and display lighting |                | General luminaire | Display light source |                      |
|---------------------------------------|----------------|-------------------|----------------------|----------------------|
| Zone name                             |                | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m²] |
|                                       | Standard value | 95                | 80                   | 0.3                  |
| 00_ACC WC                             |                | 100               | -                    | -                    |

| General lighting and display lighting |                | General luminaire | Display light source |                      |
|---------------------------------------|----------------|-------------------|----------------------|----------------------|
| Zone name                             |                | Efficacy [lm/W]   | Efficacy [lm/W]      | Power density [W/m²] |
|                                       | Standard value | 95                | 80                   | 0.3                  |
| 00_LOBBY                              |                | 100               | 100                  | 1.35                 |
| 00_RISER 2                            |                | 100               | -                    | -                    |
| 00_STAIR                              |                | 100               | -                    | -                    |
| 00_LIFT                               |                | 95                | -                    | -                    |
| 01_RISER 2                            |                | 100               | -                    | -                    |
| 01_STAIR                              |                | 100               | -                    | -                    |
| 01_MALE WC X4                         |                | 100               | -                    | -                    |
| 01_ACC WC                             |                | 100               | -                    | -                    |
| 01_FEMALE WC X3                       |                | 100               | -                    | -                    |
| 01_LOBBY                              |                | 100               | -                    | -                    |
| 02_RISER 2                            |                | 100               | -                    | -                    |
| 02_STAIR                              |                | 100               | -                    | -                    |
| 02_MALE WC X4                         |                | 100               | -                    | -                    |
| 02_ACC WC                             |                | 100               | -                    | -                    |
| 02_FEMALE WC X3                       |                | 100               | -                    | -                    |
| 02_LOBBY                              |                | 100               | -                    | -                    |
| 01_STAIR 2                            |                | 100               | -                    | -                    |
| 01_RISER 01                           |                | 100               | -                    | -                    |
| 01_KITCHENETTE                        |                | 100               | -                    | -                    |
| 01_OFFICE                             |                | 120               | -                    | -                    |
| 02_KITCHENETTE                        |                | 100               | -                    | -                    |
| 02_STAIR 2                            |                | 100               | -                    | -                    |
| 02_RISER 01                           |                | 100               | -                    | -                    |
| 02_OFFICE                             |                | 120               | -                    | -                    |
| 00_STAIR 2                            |                | 100               | -                    | -                    |
| 00_RISER 01                           |                | 100               | -                    | -                    |
| 00_WAREHOUSE                          |                | 95                | -                    | -                    |

**The spaces in the building should have appropriate passive control measures to limit solar gains in summer**

| Zone           | Solar gain limit exceeded? (%) | Internal blinds used? |
|----------------|--------------------------------|-----------------------|
| 00_LOBBY       | YES (+40.9%)                   | NO                    |
| 01_KITCHENETTE | NO (-14.5%)                    | NO                    |
| 01_OFFICE      | NO (-42.6%)                    | NO                    |
| 02_KITCHENETTE | YES (+101.4%)                  | NO                    |
| 02_OFFICE      | NO (-17.8%)                    | NO                    |
| 00_WAREHOUSE   | NO (-8.2%)                     | NO                    |

### Regulation 25A: Consideration of high efficiency alternative energy systems

|                                                                                        |     |
|----------------------------------------------------------------------------------------|-----|
| Were alternative energy systems considered and analysed as part of the design process? | YES |
| Is evidence of such assessment available as a separate submission?                     | NO  |
| Are any such measures included in the proposed design?                                 | YES |

# Technical Data Sheet (Actual vs. Notional Building)

## Building Global Parameters

|                                                       | Actual  | Notional |
|-------------------------------------------------------|---------|----------|
| Floor area [m <sup>2</sup> ]                          | 10378.3 | 10378.3  |
| External area [m <sup>2</sup> ]                       | 25540.8 | 25540.8  |
| Weather                                               | MAN     | MAN      |
| Infiltration [m <sup>3</sup> /hm <sup>2</sup> @ 50Pa] | 3       | 5        |
| Average conductance [W/K]                             | 6221.08 | 8020.92  |
| Average U-value [W/m <sup>2</sup> K]                  | 0.24    | 0.31     |
| Alpha value* [%]                                      | 25      | 10       |

\* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

## Building Use

### % Area Building Type

Retail/Financial and Professional Services  
 Restaurants and Cafes/Drinking Establishments/Takeaways  
 Offices and Workshop Businesses  
 General Industrial and Special Industrial Groups

### 100 Storage or Distribution

Hotels  
 Residential Institutions: Hospitals and Care Homes  
 Residential Institutions: Residential Schools  
 Residential Institutions: Universities and Colleges  
 Secure Residential Institutions  
 Residential Spaces  
 Non-residential Institutions: Community/Day Centre  
 Non-residential Institutions: Libraries, Museums, and Galleries  
 Non-residential Institutions: Education  
 Non-residential Institutions: Primary Health Care Building  
 Non-residential Institutions: Crown and County Courts  
 General Assembly and Leisure, Night Clubs, and Theatres  
 Others: Passenger Terminals  
 Others: Emergency Services  
 Others: Miscellaneous 24hr Activities  
 Others: Car Parks 24 hrs  
 Others: Stand Alone Utility Block

## Energy Consumption by End Use [kWh/m<sup>2</sup>]

|                | Actual       | Notional     |
|----------------|--------------|--------------|
| Heating        | 13.61        | 15.09        |
| Cooling        | 0.19         | 0.04         |
| Auxiliary      | 0.22         | 0.48         |
| Lighting       | 5.58         | 3.55         |
| Hot water      | 4.15         | 3.92         |
| Equipment*     | 29.76        | 29.76        |
| <b>TOTAL**</b> | <b>23.75</b> | <b>23.07</b> |

\* Energy used by equipment does not count towards the total for consumption or calculating emissions.

\*\* Total is net of any electrical energy displaced by CHP generators, if applicable.

## Energy Production by Technology [kWh/m<sup>2</sup>]

|                              | Actual      | Notional    |
|------------------------------|-------------|-------------|
| Photovoltaic systems         | 8.34        | 4.75        |
| Wind turbines                | 0           | 0           |
| CHP generators               | 0           | 0           |
| Solar thermal systems        | 0           | 0           |
| <i>Displaced electricity</i> | <i>8.34</i> | <i>4.75</i> |

## Energy & CO<sub>2</sub> Emissions Summary

|                                                     | Actual | Notional |
|-----------------------------------------------------|--------|----------|
| Heating + cooling demand [MJ/m <sup>2</sup> ]       | 110.95 | 145.94   |
| Primary energy [kWh <sub>PE</sub> /m <sup>2</sup> ] | 24.7   | 27.69    |
| Total emissions [kg/m <sup>2</sup> ]                | 2.5    | 2.76     |

| HVAC Systems Performance                                                                                                 |                   |                   |                    |                    |                   |               |               |                  |                  |      |
|--------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|--------------------|--------------------|-------------------|---------------|---------------|------------------|------------------|------|
| System Type                                                                                                              | Heat dem<br>MJ/m2 | Cool dem<br>MJ/m2 | Heat con<br>kWh/m2 | Cool con<br>kWh/m2 | Aux con<br>kWh/m2 | Heat<br>SSEFF | Cool<br>SSEER | Heat gen<br>SEFF | Cool gen<br>SEER |      |
| [ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity                                          |                   |                   |                    |                    |                   |               |               |                  |                  |      |
|                                                                                                                          | Actual            | 68.8              | 66.5               | 6.1                | 5.7               | 6.3           | 3.15          | 3.24             | 3.4              | 5.1  |
|                                                                                                                          | Notional          | 73.4              | 18.6               | 7.3                | 1.1               | 14.3          | 2.78          | 4.63             | ----             | ---- |
| [ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity    |                   |                   |                    |                    |                   |               |               |                  |                  |      |
|                                                                                                                          | Actual            | 205.1             | 0                  | 71.2               | 0                 | 0.5           | 0.8           | 0                | 1                | 0    |
|                                                                                                                          | Notional          | 175.7             | 0                  | 34.6               | 0                 | 0.7           | 1.41          | 0                | ----             | ---- |
| [ST] Unflued forced-convection air heaters, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity |                   |                   |                    |                    |                   |               |               |                  |                  |      |
|                                                                                                                          | Actual            | 107.3             | 0                  | 11.9               | 0                 | 0             | 2.5           | 0                | 2.5              | 0    |
|                                                                                                                          | Notional          | 147.4             | 0                  | 14.7               | 0                 | 0             | 2.78          | 0                | ----             | ---- |
| [ST] No Heating or Cooling                                                                                               |                   |                   |                    |                    |                   |               |               |                  |                  |      |
|                                                                                                                          | Actual            | 0                 | 0                  | 0                  | 0                 | 0             | 0             | 0                | 0                | 0    |
|                                                                                                                          | Notional          | 0                 | 0                  | 0                  | 0                 | 0             | 0             | 0                | ----             | ---- |

## Key to terms

|                   |                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------|
| Heat dem [MJ/m2]  | = Heating energy demand                                                                               |
| Cool dem [MJ/m2]  | = Cooling energy demand                                                                               |
| Heat con [kWh/m2] | = Heating energy consumption                                                                          |
| Cool con [kWh/m2] | = Cooling energy consumption                                                                          |
| Aux con [kWh/m2]  | = Auxiliary energy consumption                                                                        |
| Heat SSEFF        | = Heating system seasonal efficiency (for notional building, value depends on activity glazing class) |
| Cool SSEER        | = Cooling system seasonal energy efficiency ratio                                                     |
| Heat gen SSEFF    | = Heating generator seasonal efficiency                                                               |
| Cool gen SSEER    | = Cooling generator seasonal energy efficiency ratio                                                  |
| ST                | = System type                                                                                         |
| HS                | = Heat source                                                                                         |
| HFT               | = Heating fuel type                                                                                   |
| CFT               | = Cooling fuel type                                                                                   |

## APPENDIX 2: Ground Floor U-value Calculation

Documentation of the component

9. January 2026

Thermal transmittance (U-value)

Page 1/3

Source: **Mohammed Fatade (LCC, NDEA Level 5)**Component: **244498\_Plot Q, Kingsway**

INSIDE



OUTSIDE

Assignment: Ground floor

|                                     | Manufacturer | Name                      | Thickness<br>[m],<br>number             | Lambda<br>[W/(mK)] | Q              | R<br>[m²K/W]               |
|-------------------------------------|--------------|---------------------------|-----------------------------------------|--------------------|----------------|----------------------------|
| <input checked="" type="checkbox"/> | 1            | Rsi<br>BS EN 12524<br>Rse | Concrete, Reinforced (with 2% of steel) | 0.1750             | 2.500 <b>D</b> | 0.1700<br>0.0700<br>0.0000 |
|                                     |              |                           | <b>0.1750</b>                           |                    |                |                            |

U = 0.11 W/(m²K)

Explanation see next page

- O .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following  
**A** .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.  
**B** .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party  
**C** .. C: Data is entered and validated by the manufacturer or supplier.  
**D** .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.  
**E** .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

 U = **0.11 W/(m²K)** R<sub>T</sub> = **0.24 m²K/W**

Documentation of the component

9. January 2026

Thermal transmittance (U-value)

Page 2/3

Source: **Mohammed Fatade (LCC, NDEA Level 5)**Component: **244498\_Plot Q, Kingsway****Slab-on-ground floor according to BS EN ISO 13370****Input data:**

|           |                                         |         |                                      |
|-----------|-----------------------------------------|---------|--------------------------------------|
| $\lambda$ | Thermal conductivity [W/(mK)]           | 1.50    | (Thermal conductivity of the ground) |
| A         | Floor area [m <sup>2</sup> ]            | 9982.91 |                                      |
| P         | Exposed perimeter [m]                   | 426.95  |                                      |
| $R_i$     | Thermal resistance [m <sup>2</sup> K/W] | 0.070   | (see construction layer list)        |
| w         | Thickness of walls [m]                  | 0.23    |                                      |

Kind of edge insulation: no edge insulation

|       |                                         |      |
|-------|-----------------------------------------|------|
| D     | Depth of insulation [m]                 | 0.00 |
| $d_n$ | Thickness of insulation [m]             | 0.00 |
| $R_n$ | Thermal resistance [m <sup>2</sup> K/W] | 0.0  |

**Intermediate results:**

|              |                                              |        |
|--------------|----------------------------------------------|--------|
| $B'$         | Characteristic dimension [m]                 | 46.764 |
| $d_t$        | Equivalent thickness [m]                     | 0.650  |
| $U_o$        | Thermal transmittance [W/(m <sup>2</sup> K)] | 0.110  |
| $\Delta\Psi$ | Correction term [W/(mK)]                     | 0.000  |

 **$U = 0.11 \text{ W/(m}^2\text{K)}$** **Thermal Transmittance** **$L_s = 1101.0 \text{ W/K}$** **Steady-state thermal coupling coefficient**

Documentation of the component

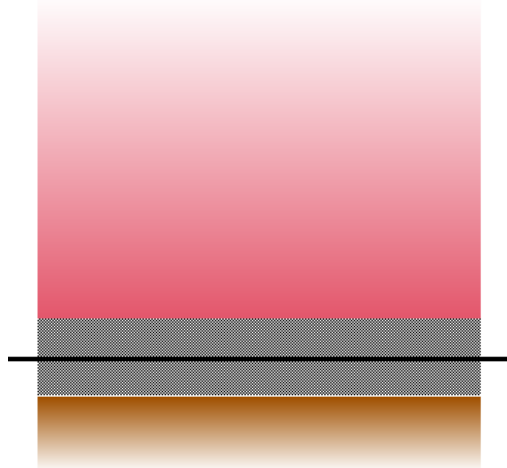
9. January 2026

Heat capacity

Page 3/3

Source: **Mohammed Fatade (LCC, NDEA Level 5)**Component: **244498\_Plot Q, Kingsway**

INSIDE



OUTSIDE

The list of materials shown below may differ from those in the U-value calculation printout. Only material layers which are used in the heat capacity calculation are listed.

Single material layers shown in the U-value calculation printout may be separated to meet the exclusion criteria:

- A .. The total thickness of the layers exceed 0.1 m.
- B .. The mid point in the construction is reached.

For insulation layers the following criteria applies:

- C .. An insulating layer is reached (defined as  $\lambda \leq 0.08 \text{ W/(mK)}$ ).

|   | Name                                    | Thickness<br>[m] | lambda<br>[W/(mK)] | Q        | Thermal<br>capacity<br>[kJ/(kgK)] | Q        | Density<br>[kg/m³] | Q        | Thermal<br>mass<br>kJ/(m²K) | Criteria<br>Exclusion |
|---|-----------------------------------------|------------------|--------------------|----------|-----------------------------------|----------|--------------------|----------|-----------------------------|-----------------------|
|   | <b>Start of calculation - Warm</b>      |                  |                    |          |                                   |          |                    |          |                             |                       |
| 1 | Concrete, Reinforced (with 2% of steel) | 0.0875           | 2.500              | <b>D</b> | 1.00                              | <b>D</b> | 2400.0             | <b>D</b> | 210.0                       | -, -, -               |
| 1 | Concrete, Reinforced (with 2% of steel) | 0.0875           | 2.500              | <b>D</b> | 1.00                              | <b>D</b> | 2400.0             | <b>D</b> | <del>210.0</del>            | -, B, -               |
|   | <b>End of calculation - Earth</b>       |                  |                    |          |                                   |          |                    |          |                             |                       |
|   |                                         | <b>0.1750</b>    |                    |          |                                   |          |                    |          | <b>210.0</b>                |                       |

**Heat capacity = 210.0 kJ/(m²K)**

The following exclusion criteria apply:

- B .. The mid point in the construction is reached.

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following

**A** .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.

**B** .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party

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