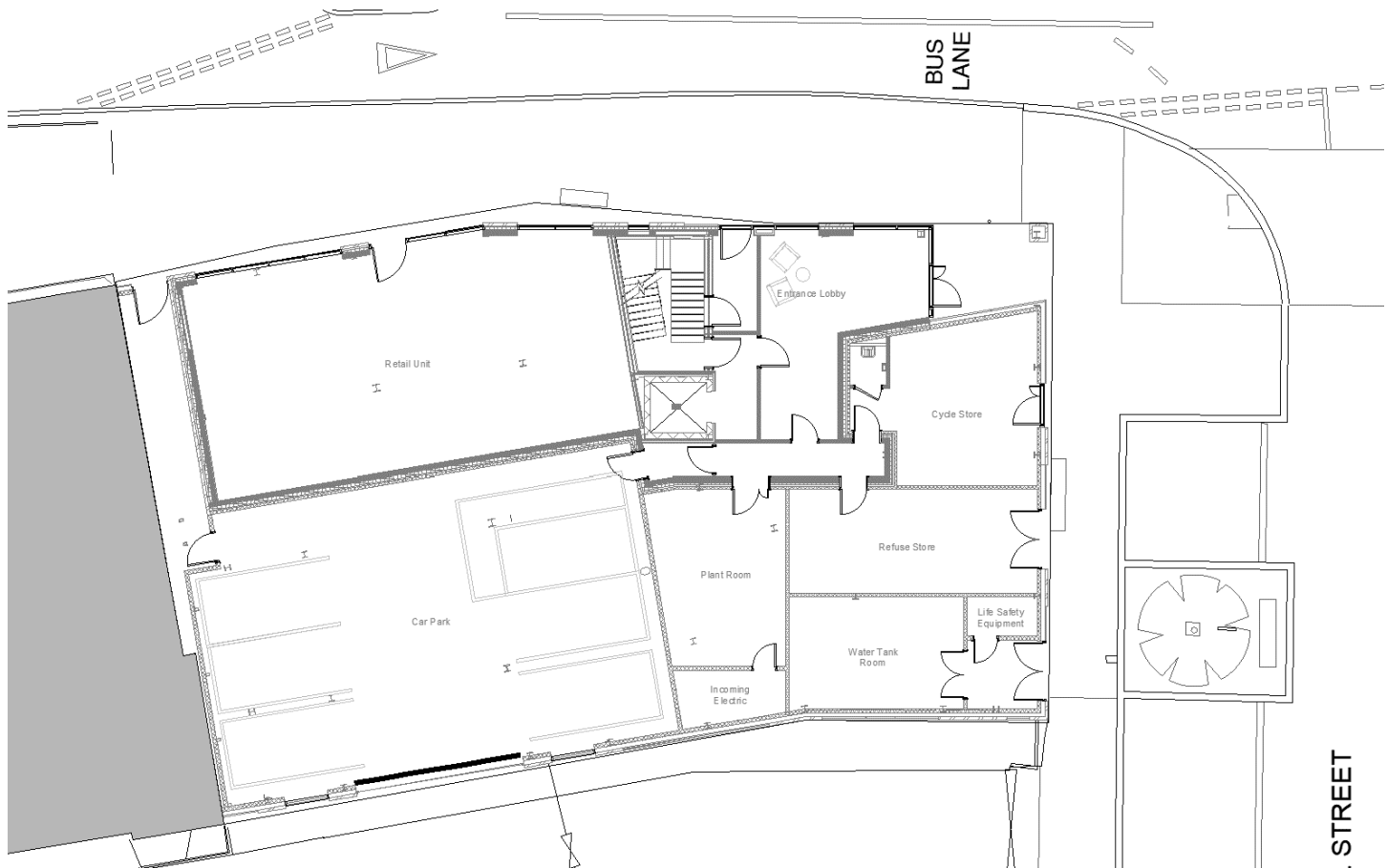


# Energy Statement

OLDHAM ROAD APARTMENTS, MANCHESTER

OUR REF: 201029c

DATE: 06 JAN 2021



PREPARED BY:

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## CONTENTS

### EXECUTIVE SUMMARY

|     |                            |         |
|-----|----------------------------|---------|
| 1.0 | INTRODUCTION               | PAGE 1  |
| 2.0 | POLICY CONTEXT             | PAGE 6  |
| 3.0 | POLICY RESPONSES           | PAGE 11 |
| A.1 | BLOCK COMPLIANCE WORKSHEET | PAGE 16 |



## 1.0 INTRODUCTION

It is the intent of this Energy Statement to communicate the measures considered by the applicant to improve the energy efficiency and sustainability of the proposed Mixed-Use Development comprising ground floor retail and 6No. floors of apartments at the junction of Cornell Street and Oldham Road, Manchester.

This report has been structured to demonstrate how the proposed development meets the policies of the National Planning Policy Framework (NPPF) and the relevant sustainability and climate change policies of Manchester City Council.



Figure 2. Google Maps (2020) Image of the Proposed Site Location

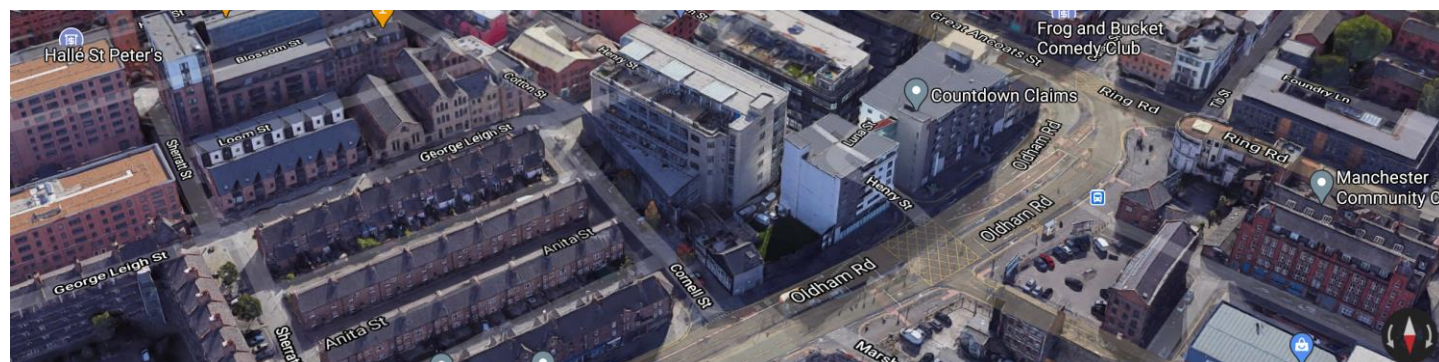


Figure 3. Google Maps (2020) 3D Image of the Proposed Site Location from the North

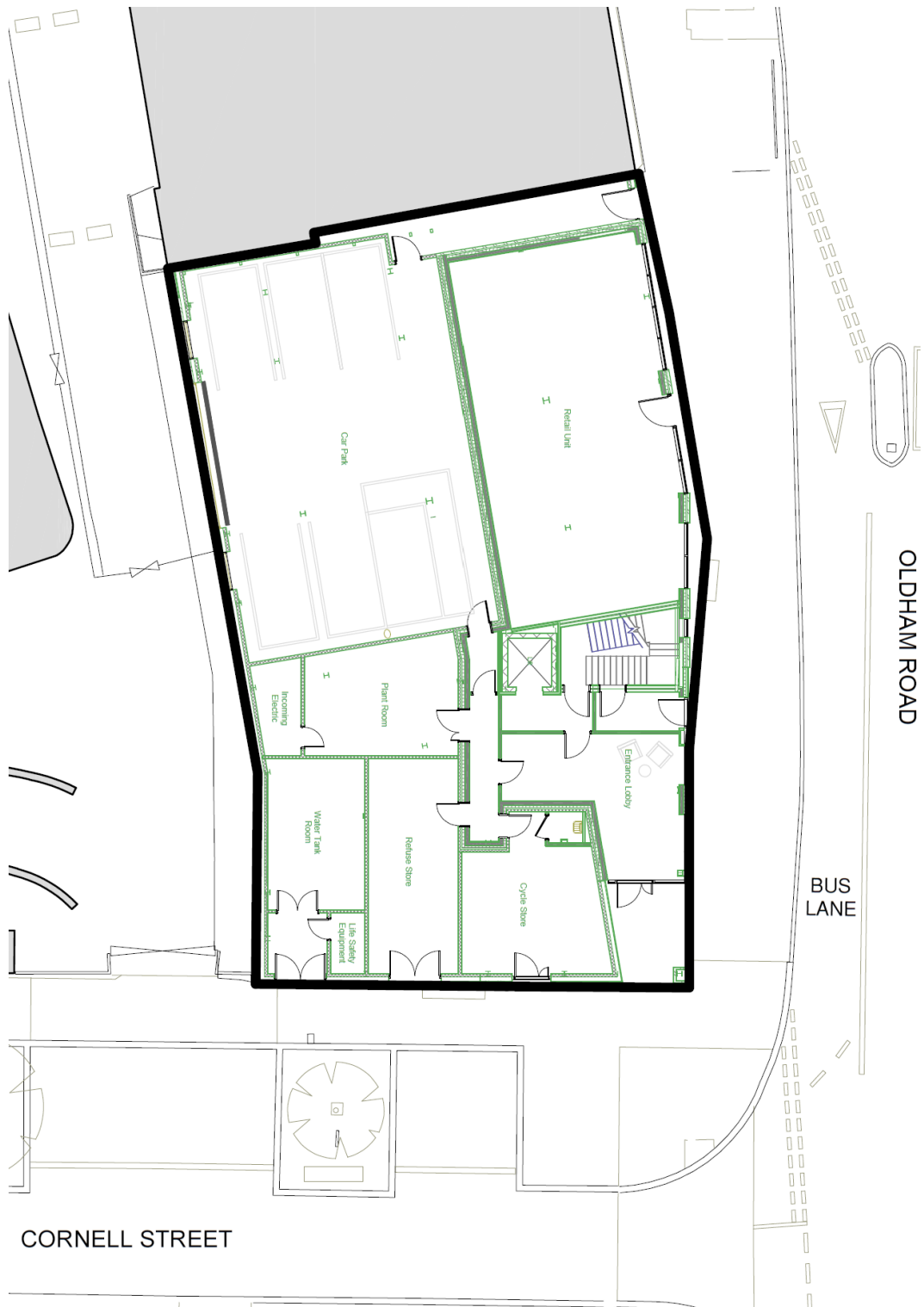


Figure 4. Proposed Site Layout. Taken from AEW Architects Drawing No. B10103-AEW-XX-SI-DR-A-1001



Figure 5. Proposed Ground Floor Layout. Taken from AEW Architects Drawing No. B10103-AEW-XX-00-DR-A-2001



Figure 6. Proposed First Floor Layout. Taken from AEW Architects Drawing No. B10103-AEW-XX-01-DR-A-2002



Figure 8. Proposed Second Floor Layout. Taken from AEW Architects Drawing No. B10103-AEW-XX-02-DR-A-2003



Figure 8. Proposed Third to Fifth Floor Layout. Taken from AEW Architects Drawing No. B10103-AEW-XX-ZZ-DR-A-2004



Figure 9. Proposed Sixth Floor Layout. Taken from AEW Drawing No. B10103-AEW-XX-06-DR-A-2005

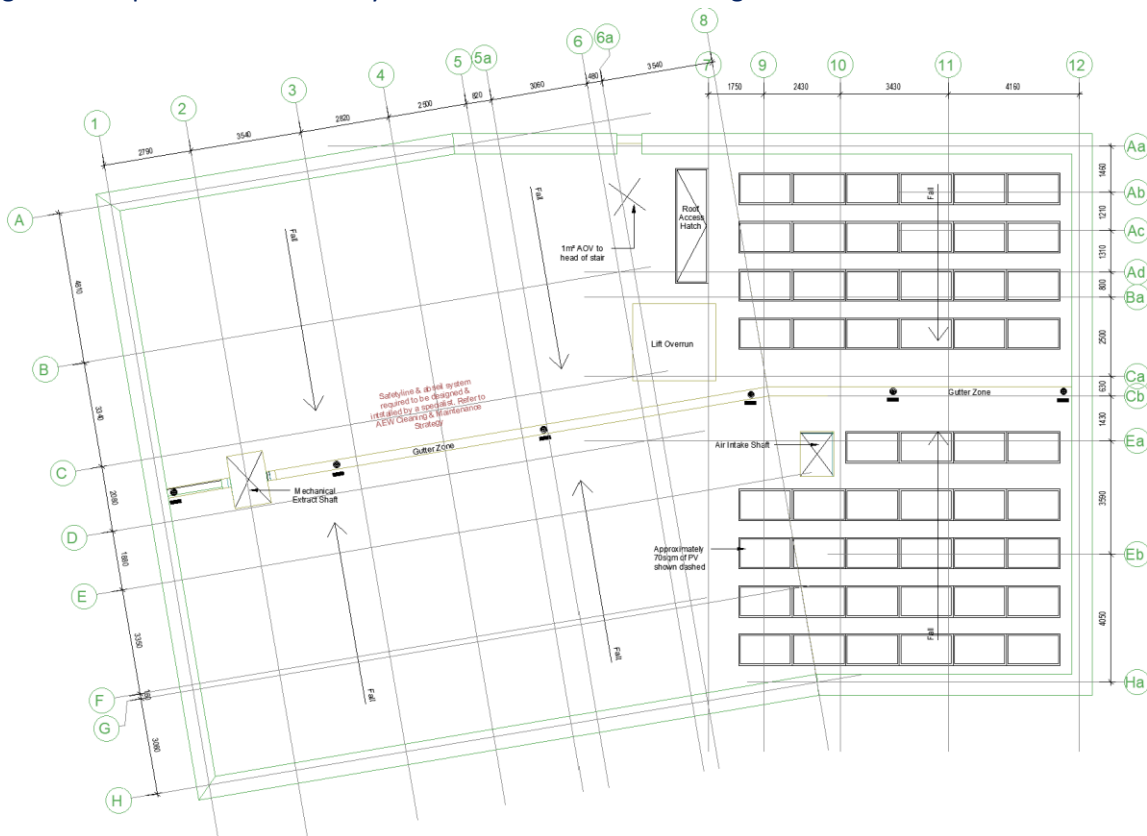


Figure 10. Proposed Roof Layout. Taken from AEW Drawing No. B10103-AEW-XX-RF-DR-A-2006

## 2.0 POLICY CONTEXT

This section of the report provides an overview of the relevant planning policy and guidance regarding sustainability and climate change policies applicable to new mixed-use developments from a national and local perspective.

### 2.1 UK Sustainable Development Strategy

In 2005, the Government published an updated strategy for implementing sustainable development across the UK.

This strategy acts as an overarching document from which a range of specific policies and legislation was derived. Although published in 2005, the strategy has taken a recently renewed focus considering the Government's definition of Sustainable Development in the NPPF.

One of the key 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 document established five key principles that will underpin the national sustainable development strategy:

1. Living within Environmental Limits;
2. Ensuring a Strong, Healthy and Just Society;
3. Achieving a Sustainable Economy;
4. Promoting Good Governance; and
5. Using sound science responsibly.

The strategy will be implemented at a national level through the development of more specific strategies at a Government department or sector level. With regards to planning and the built environment, this document set the basis for the development of plans and policies that promote development that mitigates and adapts to climate change.

### 2.2 Climate Change Act

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, which is responsible for setting binding interim Carbon budgets for the Government over successive five year periods. The first three Carbon budgets were announced in the Budget 2009, resulting in an interim target of a 34% reduction in CO<sub>2</sub> equivalent emissions on 1990 levels by 2020.

### 2.3 UK Carbon Plan

In 2011, the Government published an updated Carbon Plan setting out how the UK will achieve deCarbonisation and make the transition to a low Carbon economy. It sets this objective within a framework of mitigating and adapting to climate change and maintaining energy security in a way that minimises costs and maximises benefits to the economy.

With regards to development, the Carbon Plan presents the Government's approach to promoting the delivery of low Carbon, resilient and adaptive buildings and enabling sustainable transportation as positively contributing to these national Carbon reduction targets.

## 2.4 Building Regulations

Whilst not planning policy, the Building Regulations, and specifically Approved Documents Part L; Conservation of Fuel and Power, are relevant as they determine the minimum energy efficiency and Carbon emission standards required by new buildings.

The primary mechanism for reducing Carbon emissions in new development is progressive changes to Part L aiming to deliver zero Carbon buildings by 2019.

The latest Part L 2013 Building Regulations now require new non-residential buildings to deliver an aggregate 9% reduction in Carbon emissions compared to equivalent 2010 Part L standards. This change aims to strike a balance between the commitment to reducing Carbon emissions and improving energy efficiency and ensuring that the overall effect of regulation upon consumers and businesses does not stifle growth.

Approved Documents Part L allows for flexibility in how the construction industry meets the Carbon reduction targets, however, the emphasis of these changes is on using a fabric first approach and this is reinforced through the improvements in minimum values for fabric energy efficiency.

## 2.5 National Planning Policy Framework (NPPF)

Following its publication on 27 March 2012, national planning policy is now provided by the NPPF which sets out the government's planning policies for England and how these are expected to be applied. It also sets out the requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

The Government has made clear its expectation that the planning system should positively embrace well-conceived development to deliver the economic growth necessary and the housing we need to create inclusive and mixed communities.

The presumption in favour of sustainable development is a key thread running through national policy for both planning making and decision taking.

The NPPF states that: *'The purpose of the planning system is to contribute to the achievement of sustainable development'*.

To satisfy this purpose the Planning System must perform three distinct roles, aligned to the three pillars of sustainability, which must not be taken in isolation and should be pursued jointly:

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

**A social role** supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with

accessible local services that reflect the community's needs and support its health, social and cultural well-being; and

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

### 2.5.1 Demonstrating Sustainable Development

Paragraph 6 of the NPPF states that: *"The purpose of the planning system is to contribute to the achievement of sustainable development. The policies in paragraphs 18 to 219, taken as a whole, constitute the Government's view of what sustainable*

*development in England means in practice for the planning system"*.

The policies referred to in Paragraph 6 of the NPPF have been divided into 13 themes;

1. Building a Strong Competitive Economy
2. Ensuring the Vitality of Town Centres
3. Supporting a prosperous rural economy
4. Promoting sustainable transport
5. Supporting high quality communications infrastructure
6. Delivering a wide choice of high quality homes
7. Requiring good design
8. Promoting healthy communities
9. Protecting Green Belt Land
10. Meeting the challenge of climate change, flooding and coastal change
11. Conserving and enhancing the natural environment
12. Conserving and enhancing the historic environment
13. Facilitating the sustainable use of minerals

Should a proposed development demonstrate that it is supporting the relevant policies of the NPPF then it is deemed to be 'Sustainable Development'.

### 2.6 National Planning Policy Guidance

In March 2014, the Government released the updated National Planning Policy Guidance (the Guidance). The Guidance provides information to local authorities on how to implement the policies of the NPPF and approach specific policy aims.

The guidance sets out how local authorities should include policies that protect the local environment and strategies to mitigate and adapt to climate change. It reiterates that local authorities should set sustainability policies for new development that are line with the Government's Zero Carbon Buildings Policy and nationally described standards. It supports developments of good design that are functional and adaptable for the future.

## 2.7 Manchester City Council Core Strategy 2012 to 2027



Section 4.1 of the Core Strategy outlines the vision of a 2027 Manchester:

- *a successful sustainable and accessible City in the front rank of cities in Europe and the world*
- *a City with a growing economy driven by the strength of the Regional Centre and Manchester Airport which supports a successful City Region. The knowledge based economy flourishes within an entrepreneurial community, characterised by a fully skilled, inclusive working population*
- *meeting the challenge of climate change at the forefront of environmental initiatives and improvements and continuing to deliver sustainable development and a more effective Green Infrastructure*
- *a City with an increased and sustainable healthy population and a community which both benefits from and drives the City's productivity upwards*
- *a City with neighbourhoods where people choose to live all their lives because they offer a wide range of quality housing and an attractive environment where locally distinctive character is conserved and enhanced. Neighbourhoods in the North and East of the City will have benefited from a significant increase in the quantity and quality of housing*
- *a City with thriving district centres, which have a distinct local character and provide a good range of accessible public services, retail and local facilities a City which is supported by transport infrastructure which provides sustainable and efficient links locally, within the City, and more widely, between the Regional Centre and workers across the City Region. It will also have strong national and international connections made possible by its world class airport*
- *a City defined by excellence in urban design and environmental quality, where its distinctive historic environment is understood, valued, cared for and its potential fully realised*
- *a City where residents and visitors regularly enjoy a network of quality open spaces, parks and river valleys, enriched with biodiversity, which provide recreational routes and opportunities for sport across the City*

- *an international destination for tourism and culture with the Eastlands area of the Regional Centre a national attraction for sport, leisure and recreation*

To facilitate the realisation of Manchester City Council's Vision for the area, 73 individual policies with detailed guidance notes have been published covering all major issues of sustainable design.

This report will focus on a selection of these policies which are relevant to this particular development as outlined below.

**SP1 – Spatial Principles** *Minimise emissions, ensure efficient use of natural resources and reuse previously developed land wherever possible.*

**T1 – Sustainable Transport** *Facilitate modes of transport that reduce carbon emissions e.g by incorporating charging points for electric vehicles, subject to their appropriate design and location.*

**T2 – Accessible areas of opportunity and need** *Within the City Centre, provides a level of car parking which reflects the highly accessible nature of the location, as well as the realistic requirements of the users of the development.*

**T3 – Strategic Integration** *contribute to an economically and environmentally sustainable transport network*

**EN4 – Reducing CO2 Emissions by Enabling Low and Zero Carbon Development** *follow the principle of the Energy Hierarchy, being designed:*

- to reduce the need for energy through design features that provide passive heating, natural lighting and cooling*
  - to reduce the need for energy through energy efficient features such as improved insulation and glazing*
  - to meet residual energy requirements through the use of low or zero carbon energy generating technologies*
- be located and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies*
- be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings*
- be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing / potential decentralised energy schemes.*
- use of building materials with low embodied carbon in new development and refurbishment schemes.*

**EN5 – Strategic Areas for low and zero carbon decentralised energy infrastructure** *achieving an increase in the level of decentralised, low and zero carbon energy supplies*

**EN6 – Target Framework for CO2 reductions from low or zero carbon energy supplies** *Framework for CO2 reductions from low or zero carbon energy supplies*

**EN7 – Energy Infrastructure opportunities** *low and zero carbon decentralised energy schemes*

**DM1 – Development Management** *incorporates sustainable construction techniques as follows (In terms of energy targets this policy should be read alongside policy EN6)*

## 3.0 POLICY RESPONSES

This chapter summarises the approach and specific measures proposed by the design team to deliver a sustainable, energy efficient and a low Carbon development.

The purpose of the planning system is to contribute to the achievement of sustainable development and the scheme presents proposals that balance economic, social and environmental benefits, giving due consideration to each of these sustainability pillars.

This section aims to provide sufficient information to advise the Council of the strategy and approach to sustainability and climate change under the following headings:

- 3.1 Design and Construction
- 3.2 Materials and Construction Waste
- 3.3 Climate Change and Renewable Energy
  - 3.3.1 Demand Reduction (Be Lean)
  - 3.3.2 Heating Infrastructure (Be Clean)
  - 3.3.3 Renewable Energy (Be Green)
- 3.4 Sustainable Drainage
- 3.5 Biodiversity and Geodiversity

### 3.1 Design and Construction

The 13 themes referred to in Paragraph 6 of the NPPF have been considered from the earliest stages in the design of this site. These considerations have shaped the dwelling sizes, special arrangements and style of construction proposed. Sustainable construction techniques will be adopted throughout the development and correctly managed at each stage.

To reduce transport related Carbon emissions fast telecommunications are proposed for the entire site. It is expected that fast data access and sharing (including video conferencing) will maximise the potential for working from home. The in-building and site access for telecommunications will be designed with the network providers to ensure the fastest possible broadband speeds are achieved to each dwelling.

### 3.2 Materials and Construction Waste

The development will source all minerals in line with the minerals hierarchy and select the more sustainable transport modes where possible.

The BES 6001 standard for Responsible Sourcing of Construction Products will be used as the benchmark when specifying materials.

All sourcing of materials will consider direct and indirect Carbon emissions (extraction/cultivation, manufacturing, handling and in-life emissions resulting from the use of the materials). Data will be collected to allow for audit and supply validation of all sustainably sourced materials.

The development aims to maximise the use of Secondary Recycled Aggregates, especially when it comes to development-related waste materials generated on site. A detailed Site Waste Management Plan (SWMP) will be adopted to encourage and facilitate the waste hierarchy: Reduce > Reuse > Recycle > Recover.

As part of the SWMP, on-site facilities such as waste sorting areas will be provided to maximise the potential for the Reuse and Recycle stages of the waste hierarchy. The site induction for all staff and contractors will include an appropriate brief of the SWMP specific to their involvement with it.

### 3.3 Climate Change and Renewable Energy

One of the main challenges we face when designing high performance buildings is predicting and managing the impact of climate change. Climate change will cause the UK to become warmer, winters will become wetter, and summers will become drier. Adapting to the changing climate has a significant impact on the design, construction, location, cost and operation of buildings in the next few decades.

The latest UK climate projections suggests that by the 2020's the UK could see an increase in summer mean temperature of 1.5 Degrees Celsius, a decrease in mean summer rainfall of six per cent and an increase in mean winter rainfall of six per cent, all from a 1961– 1990 baseline.

The Climate Change policies and supporting guidance expect developments to achieve a target a CO<sub>2</sub> rating in line with current Building Regulations minimum Part L requirements.

This is to be achieved in accordance with the energy hierarchy:

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

The energy hierarchy promotes a 'fabric first' approach to reducing Carbon emissions which is considered best practice and is the critical first step in the delivery of low Carbon and sustainable buildings.

#### 3.3.1 Demand Reduction (Be Lean)

Reducing the demand for heat and power through a well-constructed and insulated building fabric and energy efficient services is recognised as the most effective way of minimising Carbon emissions and is central to the passive design approach adopted by the applicant.

This 'fabric first' approach has many distinct benefits including but not limited to:

- Carbon savings delivered are 'locked-in' for the lifetime of the building (60 years or more) rather than the much shorter lifespan (around 25 years) of a renewable energy technology.
- Virtually no maintenance and/or replacement costs to maintain Carbon reductions through improved fabric;

The proposed design is based on the following design decisions:

1. Retain a simple building envelope/plan shape to minimise the surface area to volume ratio (minimise fabric heat loss).

2. Building orientation along with internal spatial configuration or connectivity to minimise excess solar gains and adapt to a changing climate.

Targeting uncontrolled ventilation loss and improving the fabric U-values and delivers a meaningful reduction in the DERs, it will also protect the development from the changing climate.

Table 1 provides a comparison of the Part L1A 2013 (2016) limiting fabric standards against the proposed fabric performance for this development.

| Table 1. Design Fabric Efficiencies |              |                |                                           |
|-------------------------------------|--------------|----------------|-------------------------------------------|
| Building Element                    | Part L Limit | Proposed Value |                                           |
| Walls                               | 0.30         | 0.18           | W/m <sup>2</sup> .K                       |
| Roof                                | 0.20         | 0.12           | W/m <sup>2</sup> .K                       |
| Floor                               | 0.25         | -              | W/m <sup>2</sup> .K                       |
| Glazing                             | 2.00         | 1.20           | W/m <sup>2</sup> .K                       |
| Air Permeability                    | ≤ 10.0       | 3.50           | m <sup>3</sup> /(h.m <sup>2</sup> ) @50Pa |

Additional 'active' measures are proposed to further enhance the energy efficiency of the development and reduce Carbon emissions including:

- Enhanced daylight and lighting controls which dim down and/or switch off when not required;
- Energy efficient luminaires will be specified throughout, specifically LED lighting.
- Mechanical ventilation with heat recovery;
- Reduced heat gains and glare control through installation of fixed internal blinds and suitable solar control glazing specification to reduce the need for mechanical cooling.
- Comprehensive metering strategy.

### 3.3.2 Heating Infrastructure (Be Clean)

The next step in the energy hierarchy, once conservation of energy and energy efficiency have been addressed, is the provision of low Carbon heat/cool and power.

The development has considered opportunities for the use of Combined Heat and Power (CHP) and the connectivity to any local decentralised heating networks.

#### **Decentralised Energy Opportunities**

Heating networks require a critical mass of heat demand to be both feasible and viable in operation. The improved thermal efficiency of the new building fabric acts to substantially reduce energy demand for space heating.

There are no existing district heating networks near the development site and the site is not identified within a specific area of opportunity within any local heat network development.

The proposed heating system is a wet radiator system which can be easily attached to a district heating network at a future date by bypassing the boilers on site.

### 3.3.3 Renewable Energy (Be Green)

The next step in reducing the development's Carbon emissions is the consideration of suitable renewable energy technologies. In accordance with the energy hierarchy and local planning policies the development aims to provide a reduction in Carbon emissions through installation of on-site renewable energy generation.

The inclusion of renewable energy technologies should be determined based on site specific constraints and opportunities and in response to identified energy demands of the new building and supporting Carbon reduction targets.

An initial review of available technologies has been carried out to identify those which are most likely to be feasible and viable for the development and make a positive contribution to the scheme's energy demand and minimising Carbon emissions.

Table 2. Renewable Energy Technology Suitability Assessment

| Renewable Energy Technology | Potential Suitability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solar PV                    | Solar PV systems are feasible on unobstructed pitched roofs orientated or flat roofs of suitable structural capacity and accessibility. Solar PV systems generate electricity throughout the year and systems have seen a recent rapid decline in cost although remain costly and have visual and maintenance considerations.<br>The proposed building has suitable available roof space to install Solar PV although the rooflight layout significantly reduces the installable area.                                                                                                                          |
| Wind Turbine                | The site is too small for a large-scale turbine and effectiveness of small-scale wind in semi-rural locations has yet to be proven.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Biomass Heating             | Biomass boilers is not considered appropriate in this instance given the site's location, spatial, operational and maintenance demands of a biomass system. As with CHP the absence of stable yearly base thermal load restricts the effective sizing and runtime of a biomass boiler and is combined with potential fuel sourcing, storage and local air quality impacts.                                                                                                                                                                                                                                      |
| Micro Hydro                 | As the site has no established water bodies near the building this technology is not considered feasible and has been discounted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Solar Thermal Hot Water     | Carbon savings are low relative to the costs of installation.<br>The electrical (including cooling) demand of the building is estimated to outweigh demand for hot water, a solar PV array would compete for space on the roof.                                                                                                                                                                                                                                                                                                                                                                                 |
| Heat Pump Systems           | Heat pumps can provide low grade heat well suited to energy efficient buildings.<br>However, Ground Source Heat Pumps (GSHP) require substantial external space for horizontal loops or vertical boreholes which is restricted by the site constraints.<br>Air Source Heat Pump (ASHP) systems require less space and have lower capital costs. Typical efficiencies are in the region of 400%. As the ASHP is powered electrically any on site electricity generation can be used to power the system allowing significant savings on conventional gas fired systems. Noise from systems can also be an issue. |

### **Proposed Renewable Installation**

The most suitable renewable energy solution for the initial design of the scheme is a roof mounted Solar PV system for each dwelling. To satisfy the Local Authority Planning Core Strategy target of a 15% reduction on the Part L DER 0.45kWp of PV should be supplied to each dwelling. This is equivalent to circa **140sqm of PV panels**.

The applicant is committed to providing a 140sqm flat mounted solar PV array of the top storey roof as shown in Figure 10 on page 5 of 15 of this report.

### **3.3.4 Energy Strategy Summary**

Lean measures in combination with Green renewable Solar PV provides a 15.49% improvement over the Building Regulations (England and Wales) Part L Dwelling Emissions Rate (TER) mandatory target using the approved Block Compliance approach.

The complete SAP Block Compliance Worksheet

### **3.4 Biodiversity and Geodiversity**

Figure the site is not located in a Site of Special Scientific Interest, Site of Biological Importance, Local Nature Reserve (including proposed LNRs), or any other location restricted or protected from development.

A green infrastructure plan will be produced for the development. The main function of the plan is to protect and improve the existing biodiversity and geodiversity of the development site, and to ensure all regulatory requirements are adhered to such as any Protection Orders applicable to the site.

As the development is the conversion of an existing building with little to no existing biodiversity or geodiversity and with limited outdoor space for the development of such, the plan will be very limited in scope.

### **3.5 Sustainable Travel**

The development is within walking distance of all major public transport networks reducing the reliance on private vehicles. For example, the site is just 750m from Shudehill, Market St & Piccadilly Metro stops.

A secure cycle storage room is situated on the Ground Floor (see Figure 4) to encourage the use of bicycles.

Provision will also be made for the future addition of electric vehicle charging points in the carpark area.

-END-

## A.1 PART L1A (SAP) BLOCK COMPLAINE WORKSHEET

### Block Compliance WorkSheet: Block

| User Details          |                |                          |                   |
|-----------------------|----------------|--------------------------|-------------------|
| <b>Assessor Name:</b> | Simon Atkinson | <b>Stroma Number:</b>    | STRO029551        |
| <b>Software Name:</b> | Stroma FSAP    | <b>Software Version:</b> | Version: 1.0.5.12 |
| Calculation Details   |                |                          |                   |

| Dwelling  | DER   | TER   | DFEE | TFEE | TFA   |
|-----------|-------|-------|------|------|-------|
| 1F Flat 1 | 24.64 | 25.71 | 42.1 | 48.4 | 72.85 |
| 1F Flat 2 | 21.26 | 24.14 | 35.1 | 42.1 | 70.5  |
| 1F Flat 3 | 17.67 | 23.19 | 24.3 | 29.6 | 50.35 |
| 1F Flat 4 | 17.4  | 22.91 | 23.7 | 28.8 | 50.7  |
| 1F Flat 5 | 20.35 | 25.16 | 30.2 | 37.1 | 51.77 |
| 1F Flat 6 | 23.34 | 25.29 | 39   | 46.2 | 72.18 |
| 1F Flat 7 | 20.76 | 25.54 | 32.1 | 37.7 | 50.12 |
| 2F Flat 1 | 21.47 | 23.55 | 36.2 | 41.3 | 72.85 |
| 2F Flat 2 | 18.43 | 22.06 | 29.4 | 35.3 | 70.5  |
| 2F Flat 3 | 18.99 | 24.56 | 27.6 | 34.2 | 50.35 |
| 2F Flat 4 | 15.65 | 21.22 | 18.9 | 22.9 | 50.7  |
| 2F Flat 5 | 18.67 | 23.87 | 26.6 | 32.7 | 51.77 |
| 2F Flat 6 | 19.97 | 23.01 | 32.6 | 38.7 | 72.18 |
| 2F Flat 7 | 18.08 | 23.53 | 26.4 | 30.9 | 50.12 |
| 3F Flat 1 | 21.47 | 23.55 | 36.2 | 41.3 | 72.85 |
| 3F Flat 2 | 18.43 | 22.06 | 29.4 | 35.3 | 70.5  |
| 3F Flat 3 | 15.3  | 19.5  | 21.6 | 26.5 | 71.11 |
| 3F Flat 4 | 16.99 | 20.86 | 25.6 | 31.5 | 72.44 |
| 3F Flat 5 | 19.97 | 23.01 | 32.6 | 38.7 | 72.18 |
| 3F Flat 6 | 18.08 | 23.53 | 26.4 | 30.9 | 50.12 |
| 4F Flat 1 | 21.47 | 23.55 | 36.2 | 41.3 | 72.85 |
| 4F Flat 2 | 18.43 | 22.06 | 29.4 | 35.3 | 70.5  |
| 4F Flat 3 | 15.3  | 19.5  | 21.6 | 26.5 | 71.11 |
| 4F Flat 4 | 16.99 | 20.86 | 25.6 | 31.5 | 72.44 |
| 4F Flat 5 | 19.97 | 23.01 | 32.6 | 38.7 | 72.18 |
| 4F Flat 6 | 18.08 | 23.53 | 26.4 | 30.9 | 50.12 |

## Block Compliance WorkSheet: BlockCont...

| Dwelling  | DER   | TER   | DFEE | TFEE | TFA   |
|-----------|-------|-------|------|------|-------|
| 5F Flat 1 | 21.47 | 23.55 | 36.2 | 41.3 | 72.85 |
| 5F Flat 2 | 18.43 | 22.06 | 29.4 | 35.3 | 70.5  |
| 5F Flat 3 | 15.3  | 19.5  | 21.6 | 26.5 | 71.11 |
| 5F Flat 4 | 16.99 | 20.86 | 25.6 | 31.5 | 72.44 |
| 5F Flat 5 | 19.97 | 23.01 | 32.6 | 38.7 | 72.18 |
| 5F Flat 6 | 18.08 | 23.53 | 26.4 | 30.9 | 50.12 |
| 6F Flat 1 | 24.95 | 26.12 | 42.7 | 49.7 | 72.85 |
| 6F Flat 2 | 21.63 | 24.6  | 35.8 | 43.6 | 70.5  |
| 6F Flat 3 | 17.86 | 21.86 | 27.6 | 34.4 | 71.11 |
| 6F Flat 4 | 19.9  | 23.28 | 31.7 | 39.6 | 72.44 |
| 6F Flat 5 | 23.51 | 25.61 | 39.3 | 47.2 | 72.18 |
| 6F Flat 6 | 21.25 | 26.09 | 33.1 | 39.5 | 50.12 |

### Calculation Summary

|                         |         |
|-------------------------|---------|
| Total Floor Area        | 2473.74 |
| Average TER             | 23.05   |
| Average DER             | 19.48   |
| Average DFEE            | 30.64   |
| Average TFEE            | 36.55   |
| Compliance              | Pass    |
| % Improvement DER TER   | 15.49   |
| % Improvement DFEE TFEE | 16.17   |