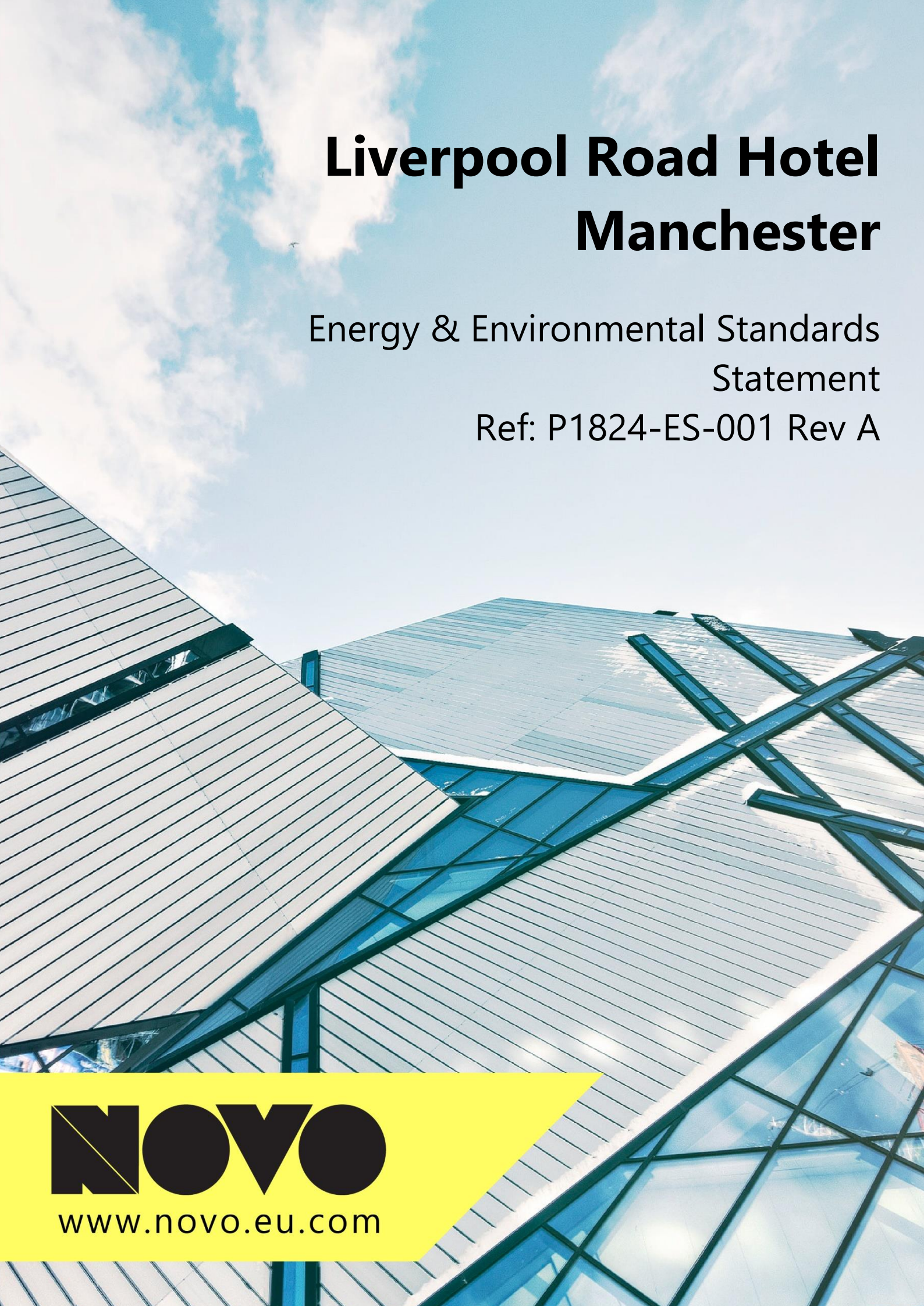


Liverpool Road Hotel Manchester

Energy & Environmental Standards
Statement

Ref: P1824-ES-001 Rev A



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REVISION	DESCRIPTION	DATE	AUTHOR	CHECKED
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1	EXECUTIVE SUMMARY	4
2	INTRODUCTION.....	7
2.1	PURPOSE.....	7
2.2	BACKGROUND POLICY DOCUMENTS	8
2.3	SITE DESCRIPTION	9
2.4	PLANNING POLICY	10
2.5	BUILDING REGULATIONS.....	13
3	DESIGN PARAMETERS	16
3.1	METHODOLOGY.....	16
3.2	ARCHITECTURAL DRAWINGS BY TIM GRROM ARCHITECTS LTD.....	17
3.3	FUEL	18
3.4	BASELINE CO ₂ EMISSIONS.....	18
4	ENERGY STRATEGY	20
4.1	ENERGY EFFICIENT DESIGN.....	20
4.2	CO ₂ REDUCTIONS AFTER FABRIC FIRST APPROACH	21
4.3	CLEANER ENERGY - CHP & DECENTRALISED ENERGY NETWORKS.....	22
4.4	LOW & ZERO CARBON TECHNOLOGIES	23
4.5	WATER	26
4.6	CHOSEN RENEWABLE SOLUTION	27
4.7	ENERGY DEMAND & LOW CARBON SOLUTIONS	Error! Bookmark not defined.
5	ENVIRONMENTAL STANDARDS STATEMENT	28
5.1	ENERGY EFFICIENCY	28
5.2	RENEWABLE ENERGY.....	29
5.3	ENVIRONMENTAL DESIGN.....	29
5.4	WATER MANAGEMENT AND WEATHER RESILIENCE	29
5.5	WASTE MANAGEMENT	29
5.6	CONSTRUCTION MANAGEMENT	30
6	CONCLUSIONS.....	31
7	APPENDICES	32

Appendix A – BRUKL Report

Appendix B – Predicted EPC

1 EXECUTIVE SUMMARY

The proposed development Liverpool Road is located within the curtilage of Manchester City Centre. As such the policies detailed in the Manchester Core Strategy must be adhered to. This report will directly address Building Regulations Part L 2021 and Manchester policies EN4, EN6 and EN8.

Policy EN6 of the Manchester core strategy states that:

"Where the CO2 emissions reduction required under any future revision to Part L of the building regulations becomes greater than the '% Minimum requirement', the reduction required under building regulations would apply"

Policy EN6 stipulates a 15% improvement in CO2 emissions beyond Part L 2010 Building Regulations, however Building Regulations Part L 2021 is known to be a 37% improvement over 2010 Building Regulations by default. Priority is therefore given to Part L 2021 compliance in this instance.

As the development incorporates a new build extension element that is both greater than 100m² and greater than 25% of the total useful floor area of the existing building, the extension is to be regarded as a new building and subjected Part L requirements within sections 1-9 of Approved Document Volume 2 2021.

This will be adhered to as far as limiting fabric u-values are concerned on the new build element however, as the existing building element is grade 2 listed and the site overall is within a conservation area; compliance with the conventional CO2 emission and Primary Energy metrics cannot be achieved. This is because it would require alteration of the existing building fabric and the incorporation of visually impactful renewable photovoltaic technology, both of which would compromise the integrity of the listed building status and principles of a conservation area.

In summary the methodology for this report will follow the Energy Hierarchy as set out in the Manchester Core Strategy. However, due to the listed nature of the building and location within a conservation area, the development is exempt from conventional CO2 and Primary Energy targets. The focus of this report will therefore be on achieving limiting fabric u-values for Part L 2021 compliance and future proofing the development against the 2025 Minimum Energy Efficiency Standards (MEES) which will demand minimum EPC ratings of C and above.

For additional context CO2 emission results will be presented throughout this report and compared against 2010 Building Regulation standards as referenced in the Manchester Core Strategy. Whilst the development cannot comply with current Part L 2021 CO2 and Primary Energy targets, a reduction greater than 15% above 2010 Building Regulation standards is still achieved due to the default 37% betterment of the current 2021 revision over the previous 2010 revision.

The proposed fabric specification is described in Tables 1-2 below.

Table 1 Building Fabric Specification (New Build Extension)

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	0.18
External Walls	0.26	0.18	0.19
Roof (Flat)	0.18	0.15	0.18
Windows	1.60	1.40	1.60
Doors	1.60	1.90	1.60
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	5.0

Table 2 Building Fabric Specification (Existing Listed Building)

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	0.18
External Walls	0.26	0.18	1.50
Roof (Flat)	0.16	0.15	0.16
Windows	1.60	1.40	1.60
Doors	1.60	1.90	1.60
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	5.0

Regarding the systems used, the development will utilise low carbon Air Source Heat Pump technology to provide both heating and cooling, hot water demand will be serviced by high efficiency hydrogen ready gas boilers and mechanical ventilation with heat recovery (MVHR) will be used for ventilation.

In addition to efficient systems, consideration has been given to the reduction of mains potable water usage through efficient water fixtures. This is further detailed in section 4.5 however potable water demand is to be reduced to <16 litres/person/day as per the requirement within Building Regulations.

Table 3 below displays the CO₂ results within Part L 2021 Building Regulations which the development has no compliance obligation to achieve owing to the listed status of the building and conservation area. Table 3 also displays the CO₂ performance against 2010 Building Regulations for comparison.

Table 3 Building Regulations Part L 2021 Results

Target Emission Rate vs Dwelling Emission Rate	
Combined Target Carbon Dioxide Emission Rate (TER)	59.79 kgCO ₂ /m ² .yr
Combined Dwelling Carbon Dioxide Emission Rate (BER)	71.36 kgCO ₂ /m ² .yr
% Reduction vs Part L 2021	-19.35%
Predicted EPC Rating	B
% Reduction vs Part L 2010	17.65%

2 INTRODUCTION

2.1 PURPOSE

NOVO Integration Ltd has been appointed as Energy Consultants to produce an Energy and Environmental Standards Statement for the Liverpool Road development, Manchester.

This is to support the scheme design process, demonstrate Building Regulations Part L compliance and to achieve the applicable planning policies set out in the Manchester Core Strategy.

Figure 1: Liverpool Road Manchester



This report will outline the following:

1. Assess the proposed development site's estimated CO₂ emissions, it will look into the feasibility of Low Zero Carbon technologies, examining the following aspects relative to LZC/renewable technologies:
 - Energy generated by Renewable/Low Zero Carbon Technologies (LZC)
 - Feasibility assessment for each Renewable/Low Zero Carbon Technologies (LZC)
 - Local Planning Requirements
2. The proposed building fabric and Low Zero Carbon (LZC) design strategy and analysis calculations, with respect to the Simplified Building Energy Model (SBEM). Demonstration of how the design is compliant against Part L 2021 Building Regulations.

2.2 BACKGROUND POLICY DOCUMENTS

The following statements and regulatory guidelines form the policy background to this energy strategy:

- The Kyoto Protocol at the United Nations.
- Framework Convention on Climate Change as negotiated in December 1997 has come into effect on 16 February 2005 following the ratification of the agreement by Russia on 18 November 2004. The Burden Sharing Agreement of the EU mandates a 12.5% reduction in greenhouse gas emissions for the UK by 2008 - 12.
- The Department of Transport and Industry White Paper, titled "Our Energy Future - Creating a Low Carbon Economy", spells out a target for 10% of electricity to be from renewable sources nationally by 2010 and twice this by 2020.
- National Policy Objectives in regard to renewable energy Planning Policy Statement 22: Renewable energy guidance for local governing bodies concerning implementation of renewable energy technologies through appropriate planning.
- The United Kingdom has made commitments that extend beyond this requirement. National Targets are for a reduction to 20% below 1990 CO₂ levels by 2010 and a 60% reduction by 2050.
- Integrating renewable energy into new developments: Toolkit for planners, developers and consultants, September 2004.
- National Planning Policy Framework (July 2021)
The National Planning Policy Framework is a key part of our reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. In particular point A of paragraph 16 which states the following:

Plans should:

- a) be prepared with the objective of contributing to the achievement of sustainable development.*
- b) be prepared positively, in a way that is aspirational but deliverable*
- c) be shaped by early, proportionate, and effective engagement between plan makers and communities, local organisations, businesses, infrastructure providers and operators and statutory consultees*
- d) contain policies that are clearly written and unambiguous, so it is evident how a decision maker should react to development proposals*
- e) be accessible through the use of digital tools to assist public involvement and policy presentation; and*
- f) serve a clear purpose, avoiding unnecessary duplication of policies that apply to a particular area (including policies in this Framework, where relevant).*

Another key point of the NPPF is paragraph 8, point C which states the following:

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth,*

innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;

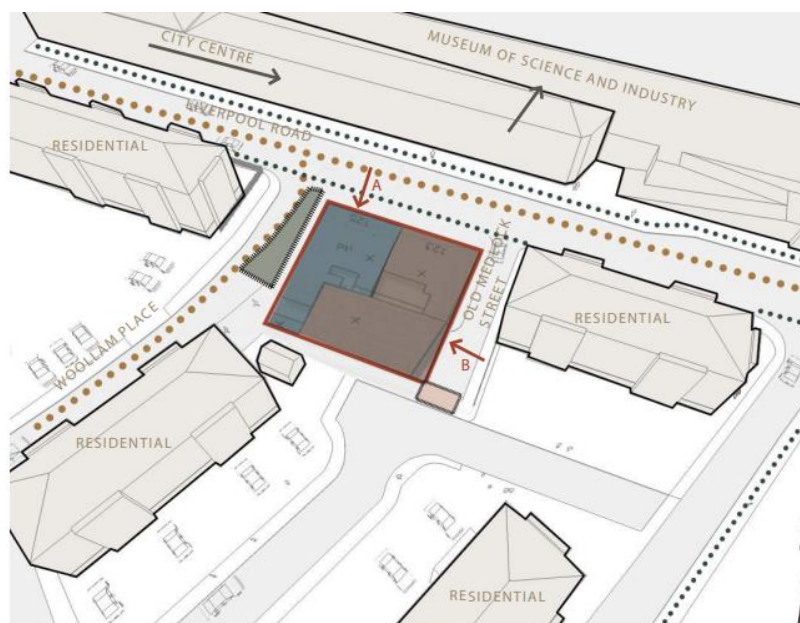
- b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*
- c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

- Manchester Core Strategy 2012-2027
- Guide to Development in Manchester SPD (2007)
- Manchester City Council Climate Change Framework (2020-2025)
- SAP 10 Technical Paper S10TP-15 CO2 and Primary Energy for SAP
- Approved Document Part L Volume 2: Buildings other than dwellings 2021

2.3 SITE DESCRIPTION

The site is located in the centre of Manchester, the surrounding area is a mix of non-domestic and domestic spaces. It is located within the Castlefield Conservation area which encompasses several grade 2 listed buildings.

Figure 2: Ariel View



2.4 PLANNING POLICY

2.4.1 Local Policy

The locality of the development site means it falls under the jurisdiction of Manchester City Council. As such the policies adopted by Manchester City Council must be adhered to.

The document that details Manchester's strategy for development is 'Manchester's Local Development Framework – Core Strategy Development Plan Document', throughout the remainder of this report it shall be referred to as Manchester Core Strategy. The Core Strategy was adopted 11th July 2012.

Policy EN 4:

Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development

The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO₂ emissions, and rising fossil fuel prices, through the following actions:

- All developments must follow the principle of the Energy Hierarchy, being designed to reduce the need for energy through design features that provide passive heating, natural lighting and cooling*
- To reduce the need for energy through energy efficient features such as improved insulation and glazing*
- To meet residual energy requirements through the use of low or zero carbon energy generating technologies*
- Wherever possible new development and retrofit projects, including energy generation plant, must be located and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies*
- Where possible new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings*
- Where appropriate new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing / potential decentralised energy schemes*

Policy EN 6

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

Applications for residential development of 10 or more units and all other development over 1,000 sq m will be expected as a minimum to meet the target shown in Tables 12.1 or 12.2, unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development.

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

The target framework relates to three broad development locations and their potential for low and zero carbon, decentralised energy. The areas are defined as follows:

- Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling)*

- *Target 2 Electricity intense areas: Locations where the predominant building type has an all-electric fit-out such as retail units and leisure complexes*
- *Target 3 MICRO-GENERATION AREAS: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical*

Policy EN 8:

Adaptation to Climate Change

The council outlines an indicative list of remedial actions for new developments in order to be adaptable to climate change in terms of design, layout, siting and function:

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

Domestic CO₂ emission targets

Table 12.1

Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2: Electricity intense buildings	+15% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Non-domestic CO₂ emissions reduction targets

Table 12.2

Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2: Electricity intense buildings (applies to commercial uses with a high proportion of emissions from electricity use (>45kgCO ₂ /m ²))	+15% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Where the CO₂ emissions reduction required under any future revision to Part L of the building regulations become greater than the '% minimum requirement', the reduction required under building regulations would apply.

Where the Council identifies an 'allowable solution', for example within an energy proposals plan, that would produce higher carbon reductions at no extra cost than that of achieving the '% Minimum requirement' (or required under building regulations if greater) the higher percentage reduction will be required. The cost comparison is based on the cost of incorporating the 'allowable solution' at design stage.

The energy statement will be required to be submitted at the outset of any proposed development (outline application or before). Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO₂ mitigation, subject to the energy statement incorporating evidence such as modelling to demonstrate compliance.

Guidance on what the energy statement should contain and how to decide which target applies to a development proposal is given in appendix A.

The above policy states that this specific development requires a 15% betterment with CO₂ emission reduction over 2010 Building Regulations. However, the development is subjected to 2021 Building Regulations as it is 37% improved over 2010 by default.

Section 0.12 parts A and B of Approved Document Volume 2 2021 confirms that listed buildings and buildings within conservation areas are exempt from energy efficiency requirements where to do so would alter the buildings character/appearance. For this reason, the priority of this Energy Strategy is to demonstrate compliance with limiting fabric efficiency standards applicable to the new build aspect and the MEES standards for EPC ratings applicable to the building overall.

Furthermore Section 4 Environmental Standards of the Manchester Supplementary Planning Document details the requirement for an Environmental Standards Statement highlighting a number of Environmental issues be addressed. These issues are addressed in Section 5 of this report.

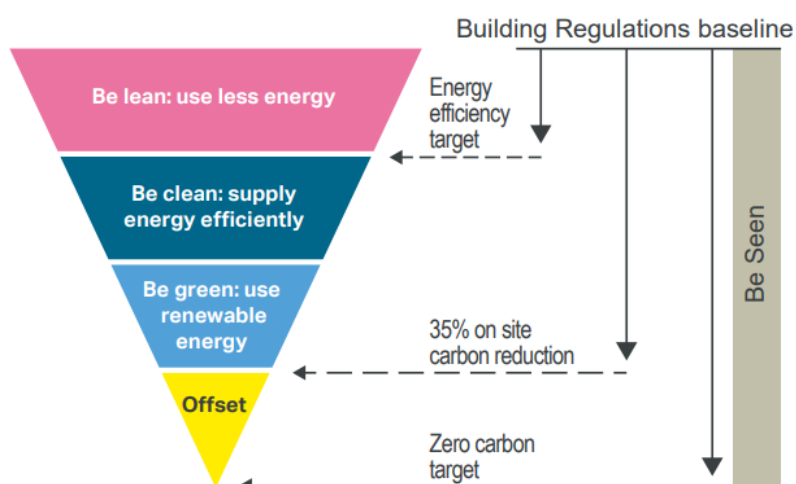
2.4.2 Energy Hierarchy

As part of the Sustainability and Energy analysis of the development Energy Hierarchy has been used as a means of structuring the sustainable design process.

We have taken this approach in order to properly address the Manchester Core Strategy Policies which promote low carbon design, assessment of connection to CHP and consideration of other low – zero carbon technologies.

An overview of the Energy Hierarchy is provided below:

Figure 3: Energy Hierarchy Diagram

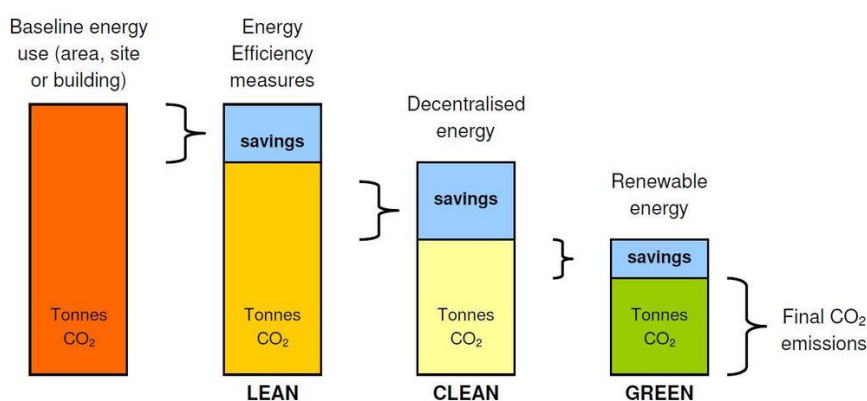


- Using less energy, in particular by adopting sustainable design and construction measures.
- Supplying energy efficiently, in particular by prioritising decentralised energy generation; and
- Using renewable energy.

The development Energy strategy has adopted the following design ethos:

- **BE LEAN** – By using less energy and taking into account the further energy efficiency measure in comparison to the baseline building.
- **BE CLEAN** – By supplying energy efficiently. The clean building looks at further carbon dioxide emission savings over the lean building by taking into consideration the use of decentralise energy via CHP.
- **BE GREEN** – By integrating renewable energy into the scheme which can further reduce the carbon dioxide emission rate.

Figure 4: Energy Hierarchy Example Graph



2.5 BUILDING REGULATIONS

For this development, Part L 2021 Vol 2: Buildings other than dwellings is applicable.

To comply with this document 2nr compliance metrics must be met, these are:

- 1) The Dwelling Emission Rate must be lower than the Target Emission Rate
- 2) The Dwelling Primary Energy Rate must be lower than the Target Primary Energy Rate

The non-domestic regulations do not have a fabric efficiency target in the same vein as the domestic regulations however, a set of limiting fabric u-values must be achieved as a minimum.

The following are some key extracts from ADL2 detailing the requirements of the regulations, for full details please refer to Part L Volume 2 2021: Buildings other than dwellings.

Regulations

Methodology of calculation of the energy performance

- 24.** (1) The Secretary of State shall approve—
- (a) a methodology of calculation of the energy performance of buildings, including methods for calculating asset ratings and operational ratings of buildings; and
 - (b) ways in which the energy performance of buildings, as calculated in accordance with the methodology, shall be expressed.
- (2) In this regulation—
- “asset rating” means an energy performance indicator determined from the amount of energy estimated to meet the different needs associated with a standardised use of the building; and
- “operational rating” means an energy performance indicator determined from the amount of energy consumed during the occupation of a building over a period of time and the energy demand associated with a typical use of the building over that period.

Minimum energy performance requirements for new buildings

- 25.** Minimum energy performance requirements shall be approved by the Secretary of State, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, for—
- (a) new buildings (which shall include new dwellings), in the form of target CO₂ emission rates;
 - (b) new dwellings, in the form of target fabric efficiency rates, and
 - (c) new buildings in the form of target primary energy rates.

Nearly zero-energy requirements for new buildings

- 25B.** Where a building is erected, it must be a nearly zero-energy building.

CO₂ emission rates for new buildings

- 26.** Where a building is erected, it shall not exceed the target CO₂ emission rate for the building that has been approved pursuant to regulation 25, applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.

Target primary energy rates for new buildings

- 26C.** Where a building is erected it must not exceed the target primary energy rate for the building which has been approved pursuant to regulation 25(c), applying the methodology of calculation and expression of the energy performance of buildings approved pursuant to regulation 24.

Regulation continued

CO₂ emission rate calculations

- 27.** (1) This regulation applies where a building is erected and regulation 26 applies.
- (2) Not later than the day before the work starts, the person carrying out the work shall give the local authority a notice which specifies—
- (a) the target CO₂ emission rate for the building, calculated and expressed in accordance with the methodology approved pursuant to regulation 24,
 - (b) the CO₂ emission rate for the building as designed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, and
 - (c) a list of specifications to which the building is to be constructed.
- (3) Not later than five days after the work has been completed, the person carrying out the work shall give the local authority—
- (a) a notice which specifies—
 - (i) the target CO₂ emission rate for the building, calculated and expressed in accordance with the methodology approved pursuant to regulation 24,
 - (ii) the CO₂ emission rate for the building as constructed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24, and
 - (iii) whether the building has been constructed in accordance with the list of specifications referred to in paragraph (2)(c), and if not a list of any changes to those specifications; or
 - (b) a certificate of the sort referred to in paragraph (4) accompanied by the information referred to in subparagraph (a).
- (4) A local authority are authorised to accept, as evidence that the requirements of regulation 26 have been satisfied, a certificate to that effect by an energy assessor who is accredited to produce energy performance certificates for that category of building.
- (5) In this regulation, “specifications” means specifications used for the calculation of the CO₂ emission rate.

Target primary energy rate calculations for new buildings

- 27C.** (1) This regulation applies where a building is erected.
- (2) Not later than the day before the work starts, the person carrying out the work must give the local authority a notice which specifies—
- (a) the target primary energy rate for the building calculated and expressed in accordance with the methodology approved pursuant to regulation 24;
 - (b) the calculated target primary energy rate for the building as designed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24; and
 - (c) the list of specifications to which the building is to be constructed.
- (3) Not later than five days after the work has been completed, the person carrying out the work must give the local authority—
- (a) a notice which specifies—
 - (i) the target primary energy rate for the building calculated and expressed in accordance with the methodology approved pursuant to regulation 24;
 - (ii) the calculated target primary energy rate for the building as constructed, calculated and expressed in accordance with the methodology approved pursuant to regulation 24; and
 - (iii) whether the building has been constructed in accordance with the list of specifications referred to in paragraph (2)(c), and if not a list of any changes to those specifications; or
 - (b) a certificate of the sort referred to in paragraph (4) accompanied by the information referred to in subparagraph (a).
- (4) A local authority is authorised to accept, as evidence that the requirements of regulation 26C have been satisfied, a certificate to that effect by an energy assessor who is accredited to produce energy performance certificates for that category of building.
- (5) In this regulation, “specifications” means specifications used for the calculation of the target primary energy rate.

3 DESIGN PARAMETERS

3.1 METHODOLOGY

For non-domestic areas Approved Document Part L Volume 2 is applicable which sets the standard for carbon emissions for new buildings other than dwellings.

As the development incorporates a listed building and is located within a conservation area, it is exempt from conventional energy efficiency requirements. The below details what would be required in the event the current strategy changes and is for information only.

(i) *The CO₂ emission and Primary Energy Rates must not exceed the targets*

To demonstrate compliance the actual buildings emission rate is compared to the national buildings emission rate and must be at least equal to or less than the target emission rate. The same applies with primary energy demand.

The actual buildings emission rate is calculated when the building is modelled using approved software and the proposed construction values are detailed, for example, u-values, efficiency of M&E plant, etc. following this exercise the software will generate a notional building, the notional building has the same layout as the actual building, but the construction values and energy performance of the M&E equipment is pre-set, this allows the software to generate a target emission rate (TER) for the actual building, the TER is the anticipated emission rate from the notional building.

The same process is applied to how the Target Primary Energy Rate (TPER) is generated which the actual Building Primary Energy rate must achieve (BPER).

The BER/BPER is then compared to the TER/ TPER and if it is equal to or lower than then the building is deemed to comply with Part L 2021 Building Regulations.

This process needs to be completed and issued to Building Control at the "As-Designed" Stage to demonstrate to Building Control that the proposals for the building comply with the criteria.

(ii) *Limits on Design Flexibility*

Each element of the construction has pre-set performance limits within the document; these are generally split into 2 categories, an average value and an upper limit value which cannot be exceeded.

To demonstrate compliance with this element then the CO₂ and Primary Energy Rate must be achieved with no individual element exceeding the upper limit set for performance.

(iii) *Limiting the Effects of Solar Gains in Summer*

It is a requirement to demonstrate that solar gains have been limited during the summer period to either reduce the need for air conditioning; or to reduce the installed capacity of any air conditioning system that is installed.

To demonstrate compliance an assessment of the solar gains must be undertaken, the actual building results are then compared to a pre-defined standard and if the performance of the actual building is no worse than that of the pre-defined building then it is deemed to comply.

(iv) Provisions for Energy-Efficient Operation of the Building

The owner of the building should be provided with sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

This is generally achieved by production of a building logbook.

3.2 ARCHITECTURAL DRAWINGS BY TIM GROOM ARCHITECTS LTD

The following drawings have been used to produce the Energy Model.

Table 4 Architects Drawing Schedule

Drawing Number	Drawing Contents
1073-TGA-XX-00-DR-A-03000-P03	Level 00 Plan
1073-TGA-XX-01-DR-A-03001-P03	Level 01 Plan
1073-TGA-XX-02-DR-A-03002-P03	Level 02 Plan
1073-TGA-XX-03-DR-A-03003-P03	Level 03 Plan
1073-TGA-XX-04-DR-A-03004-P03	Level 04 Plan
1073-TGA-XX-B1-DR-A-03010-P03	Basement Plan

3.3 FUEL

Table 5 Fuel Factors SAP 2012 and SAP 10

kgCO ₂ /kWh	SAP 2012	SAP 10.1
Gas:		
mains gas	0.216	0.210
bulk LPG	0.241	0.241
bottled LPG	0.241	0.241
bottled LPG (no contract)	0.241	0.241
LPG subject to Special Condition 18	0.241	0.241
biogas (including anaerobic digestion)	0.098	0.024
Liquid fuel:		
heating oil	0.298	0.298
biodiesel from any biomass source	0.123	0.038
biodiesel from vegetable oil only	0.083	0.018
appliances able to use mineral oil or biodiesel	0.298	0.298
B30K	0.245	0.220
bioethanol from any biomass source	0.140	0.105
Solid fuel:		
house coal	0.394	0.395
anthracite	0.394	0.395
manufactured smokeless fuel	0.433	0.366
wood logs	0.019	0.028
wood pellets (in bags for secondary heating)	0.039	0.053
wood pellets (bulk supply for main heating)	0.039	0.053
wood chips	0.016	0.023
dual fuel appliance (mineral and wood)	0.226	0.087
Electricity:		
standard tariff	0.519	0.136
7-hour tariff (high rate)	0.519	0.136
7-hour tariff (low rate)	0.519	0.136
10-hour (high rate)	0.519	0.136
10-hour (low rate)	0.519	0.136
18-hour (high rate)	0.519	0.136
18-hour (low rate)	0.519	0.136
24-hour heating tariff	0.519	0.136
electricity exported to grid	0.519	0.136
electricity, any tariff	0.519	0.136
Community heating schemes:		
heat from boilers - mains gas	0.216	0.210
heat from boilers - LPG	0.241	0.241
heat from boilers - oil	0.331	0.335
heat from boilers that can use mineral oil or biodiesel	0.331	0.335
heat from boilers using biodiesel from any biomass source	0.123	0.038
heat from boilers using biodiesel from vegetable oil only	0.083	0.018
heat from boilers - B30D	0.269	0.269
heat from boilers - coal	0.380	0.375
heat from electric heat pump	0.519	0.136
heat from boilers - waste combustion	0.047	0.074
heat from boilers - biomass	0.031	0.029
heat from boilers - biogas (landfill or sewage gas)	0.098	0.024
waste heat from power station	0.058	0.015
geothermal heat source	0.041	0.011
heat from CHP	as above	0.011
electricity generated by CHP	0.519	0.136
electricity for pumping in distribution network	0.519	0.136

3.4 BASELINE CO₂ EMISSIONS

For the purpose of this report the baseline energy use and CO₂ emissions are calculated based on the 'Notional Dwelling' requirements specified in the National Calculation Methodology 2021. Please note that the notional/baseline building under 2021 Building Regulation always includes PV, this is produced by the calculation software and cannot be removed for a fair fabric only comparison between the baseline calculation and the Be Lean stage calculation of the Energy Hierarchy.

Table 6 Non-Domestic Baseline Building Fabric

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	-
External Walls	0.26	0.18	-
Roof (Flat)	0.18	0.15	-
Roof (Pitched)	0.18	0.15	-
Windows	1.60	1.40	-
Doors	1.60	1.90	-
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	-

The following table details the notional baseline area weighted CO₂ regulated emissions for the development. The target emission rates (TER's) in the above figures combined with the total floor area was used to produce the baseline CO₂ emissions below.

Table 7 Estimated Baseline Carbon Emissions Part L 2021 Building Regulations

Building Services	Baseline CO ₂ Emissions (kg CO ₂ /m ² /yr)	Baseline CO ₂ Emissions for overall development (kg CO ₂ / yr)
Total regulated emissions (heating, hot water, lighting, fans & pumps)	59.76	137,854.36

By using low u-values and high-performance materials to reduce greenhouse emissions and improve energy efficiency; the Be Lean stage of this report addresses policy EN4 and EN6 of the Manchester Core Strategy and is in accordance with Paragraph 8 of the National Planning Policy Framework (NPPF) by reducing CO₂ emissions and supporting a low carbon economy.

4 ENERGY STRATEGY

4.1 ENERGY EFFICIENT DESIGN

This section outlines the design energy efficient measures taken to minimise the building's energy demand and therefore reduce energy use and CO₂ emissions further than the baseline notional building, often referred to as the 'Fabric First' approach.

The energy efficient measures include:

- a) Inclusion of better U-values than the minimum U-values set in the ADL1/2A
- b) Designing for a buildings air permeability exceeding ADL1/2A target values
- c) Utilising the highly efficient heating and hot water systems
- d) Utilising low energy efficient lighting such as LED lighting

The table below outlines the improvements made to the building fabric elements compared against both the Building Regulations limiting U-values and the 'Notional Dwelling' U-values which the baseline is derived from. Owing to the grade 2 listed status of the building and location within a conservation area, only the limiting fabric elements are the primary focus for compliance however the existing listed aspect of the development is exempt.

Table 8 Building Fabric Specification (New Build Extension)

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	0.18
External Walls	0.26	0.18	0.19
Roof (Flat)	0.18	0.15	0.18
Windows	1.60	1.40	1.60
Doors	1.60	1.90	1.60
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	5.0

Table 9 Building Fabric Specification (Existing Listed Building)

Building Fabric			
Element	L2A: 2021 Limiting U-values (W/m ² .k)	L2A: 2021 Notional U-values (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors	0.18	0.15	0.18
External Walls	0.26	0.18	1.50
Roof (Flat)	0.16	0.15	0.16
Windows	1.60	1.40	1.60
Doors	1.60	1.90	1.60
Air permeability (m ² /h.m ² @ 50 pa)			
Whole Building	8.0	3.0	5.0

4.1.1 Heating, Cooling, Ventilation and Hot Water Demand

The heating energy demand will be reduced by providing high performance insulation of the building envelope as well as a low Air Permeability Target to minimise heat losses. Low carbon technology in the form of air source heat pumps will provide heating and cooling throughout. Mechanical ventilation with heat recovery (MVHR) will provide a ventilation solution which will further reduce the heating load by recovering heat that would otherwise be expelled to atmosphere. The heat recovery efficiency of the MVHR unit will be around 80% (final efficiencies may change as the design develops). Hot water will be provided by high efficiency hydrogen ready gas boilers with a delivery efficiency of around 96%.

4.1.2 Lighting

The proposed light fittings will be low energy efficient fittings, in this instance LED fittings only throughout.

4.1.3 Embodied Carbon

All materials used within the construction of the development will have embodied carbon within them, taking into consideration manufacturing processes and supply chains. It is assumed that the developer will seek to procure materials and construction elements with appropriate sustainable accreditations, for example FSC for timber, ISO:140001 accreditations where applicable etc, to minimise the use of high embodied carbon within the building.

4.2 CO₂ REDUCTIONS AFTER FABRIC FIRST APPROACH

The following table demonstrates the reduction in CO₂ emissions based on an area weighted average calculation utilising a fabric first approach please note, as stated earlier, the SAP 10 baseline calculation now always includes PV, a fair comparison cannot be made against the fabric first result which does not include any PV.

Table 10: Fabric First Results CO₂ Whole Building 2021 Building Regulations

Regulated Emissions	Baseline CO ₂ Emissions	Fabric Building Emissions	First CO ₂	CO ₂ Emission Savings	Part L 2021 % reduction in CO ₂ Emissions	Part L 2010 Equivalent % reduction in CO ₂ Emissions
Kg of CO ₂ /m ² /yr	59.76	71.36		-11.6	-19.35%	17.65%
kg of CO ₂ /yr	137,854.36	164,613.24		-29,758.88		

The above table shows that, in terms of CO₂ emissions the fabric first result is worse than the baseline, this is because the baseline calculation now incorporates PV, this is included by the calculation software itself and cannot be amended by the Assessor. The fabric first result does not include any PV hence the discrepancy. Irrespective of this software issue, the development is exempt from energy efficiency requirements given the listed nature of the building and conservation area location.

It can however be proven that the fabric efficient design has a positive impact under the 2010 building regulation equivalent result which shows a 17.65% improvement, this is afforded by the 37% default improvement 2021 Building Regulations has over 2010 Building Regulations.

4.3 CLEANER ENERGY - CHP & DECENTRALISED ENERGY NETWORKS

The Energy Hierarchy encourages the use of a CHP system and/or the connection to District Heating system to reduce CO₂ emissions further.

4.3.1 CHP

The Energy Hierarchy identifies combined heat and power (CHP) as a method of producing heat and electricity with much lower emissions than separate heat and power. Also, it encourages the creation of district heating systems supplied by CHP.

The implementation of a CHP strategy should be decided according to good practice design. Key factors for the efficient implementation of the CHP system are:

- Development with high heating load for the majority of the year
- CHP operation based on maximum heat load for minimum 10 hours per day
- CHP operation at maximum capacity of 90% of its operating period

A CHP system will not be considered for this development due to the following reasons:

- Due to restrictions on site space would be limited for the level of plant required for a CHP system, which would require accumulators, additional boiler power, pumps, pressurisation units etc.
- Pollution discharged from the CHP unit may not be appropriate given the site locality and the number of people passing the site given its proximity to residential buildings.
- Noise pollution is a consideration given the function of the development and its proximity to other surrounding buildings.
- Economic viability is heavily dependent on the constant demand for heat and power, as well as the price of electricity and gas.
- A predominantly electric systems strategy has been used to take advantage of the updated fuel factors for grid electricity and provide some level of future proofing as grid electricity closes in on carbon neutrality over time.

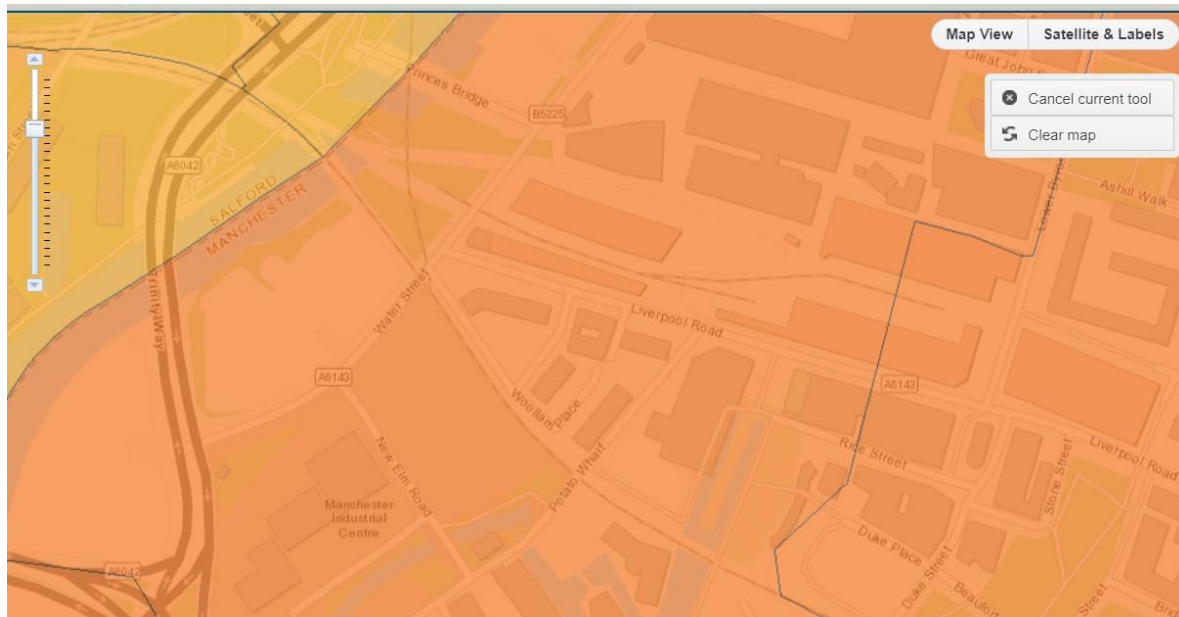
Hence, the implementation of a CHP strategy is not recommended for this development.

As a result, no CO₂ reduction can be achieved as part of the Be Clean section of the Energy Hierarchy.

4.3.2 Decentralised Energy Network

The feasibility of connecting into an existing heating network or providing the building with its own combined heat and power plant has been assessed through the use of UK CHP Development Map, for Salford as for a District Heating network.

Figure 5: CHP Development Map – Local Heat Loads



Presently heat loads for area in general are medium to high however is no heat network in close proximity to the site to connect to. Should a District Heating Network evolve into an all-electric system and the infrastructure for such be provided then connection could be considered in the future.

Heat networks are best suited to large developments with appropriate plant space for buffer vessel, plate heat exchangers and manifold positions, meters, furthermore the pipework required for connection to the development makes this option financially unviable.

As such no additional CO₂ reduction can be observed at the Be Clean stage of the Energy Hierarchy.

4.4 LOW & ZERO CARBON TECHNOLOGIES

4.4.1 General

Low and zero carbon (LZC) technologies are systems that generate energy with either zero or reduced CO₂ emissions when compared against traditional energy generation methods.

The alternative LZC technologies have been assessed in relation to the development and their viability assessed. Some of the LZCs are intrinsically unsuitable due to the development type and location whereas others are potentially viable.

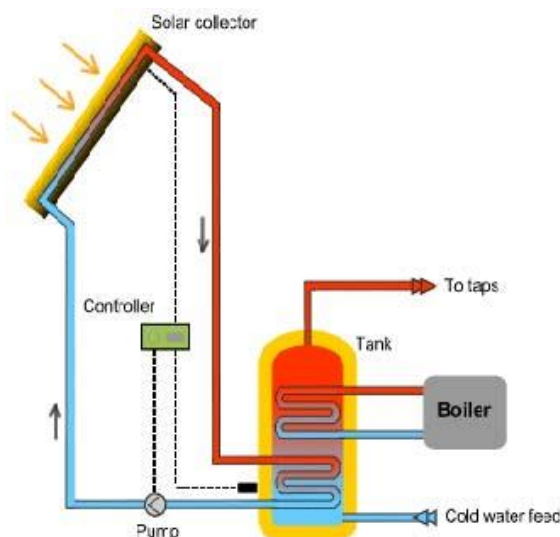
4.4.2 Solar Water Heating

Solar thermal panels utilise the sun energy to generate hot water for use within the building. The panels are commonly provided in either flat plate or evacuated tube arrangements. The panels are ideally located facing south at an approximate 30° inclination angle in areas where they are not subjected to shade.

This system alone would not generate a large enough CO₂ reduction in proportion to other comparable technologies. This technology has also been discounted due to the inflated cost of installation with

regards additional pipe runs, maintenance requirements and the significant roof area that would be required.

Figure 6: Solar Thermal Diagram



4.4.3 Wind Turbines

Wind turbines generate electrical energy derived from kinetic energy provided by the local wind resource. The performance of wind turbines depends greatly on the wind speed and turbulence that in turn is influenced by the terrain and installation height.

Figure 7: Typical Small Scale 6kW Wind Turbine



The use of wind turbines on the development will also have a significant visual impact on the city centre location and neighbouring buildings, as well as low frequency noise source and hence it is likely to meet opposition within the local area.

In very simplistic terms, space for such a large technology on this development site cannot be considered.

For the reasons detailed above wind turbines are not considered viable for the development.

4.4.4 Photovoltaic Cells (PV)

Photovoltaic (PV) panels utilise the sun's energy to generate electricity. The optimum location for PV panels is south facing at an approximate 30-45° inclination angle in areas where they are not subjected to shade.

Figure 8: PV Examples



PV technology has been discounted from this strategy due to visual impact on the building character and surrounding area. This to protect the grade 2 listed status of the building and uphold the principles of the surrounding conservation area in which the building is situated. Should there be any relaxation in stance on PV technology being used on such a building then the technology could be considered for implementation in the future.

4.4.5 Source Heating and Cooling

The Air Source Heat Pumps can be linked with indoor units to heat and cool the space. These could be either ceiling mounted cassette units, wall mounted units or floor mounted units. This option therefore has good flexibility in terms of installation. The outdoor units can be located anywhere and are not dependant on orientation. They need to be externally mounted and in a local compound to be safe.

ASHP technology has been included within the design to provide heating and cooling throughout. ASHP's benefit from a simple installation process and low maintenance, furthermore they are very efficient with respect to energy produced vs energy used, for every 3-4 units of energy produced only 1 unit of energy is used. This technology has been chosen for its excellent carbon performance which best addresses the requirements of Part L and the Manchester Core Strategy.

4.4.6 Biomass Boiler

Biomass is considered to be a renewable fuel source as the CO₂ absorbed during the growth period is assessed as being approximately equal to the CO₂ emitted during combustion and hence deemed "carbon neutral". Biomass for boilers is typically wood either in chip or pellet form.

Biomass boilers require fuel storage together with associated transportation and delivery to the store location.

Figure 9: Biomass Example



With the minimal plant areas available for a biomass generator combined with the logistics and increase in pollution from wood pellet deliveries/transportation, biomass generators have not been included in this Energy Strategy.

For the above reasons, the use of a biomass boiler plant is not considered viable for the development.

4.4.7 Fuel Cell

The fuel cell technology essentially converts chemical energy into both electrical and heat energy. The cell needs to be continually supplied with hydrogen (derived from either a piped or storage source) and oxygen (derived from air) that are combined and the chemical reaction produce electrical energy, heat energy and water vapour.

The fuel cell requires a hydrogen fuel source that can either be from a piped source (not currently available) or from stored gas. However, the more usual approach currently in the UK is to use natural gas in order to generate the hydrogen required to operate the fuel cell.

Fuel cells have various commercial and technical limitations. There is a high initial capital cost together with there being few established suppliers and a very limited specialist design, installation, and maintenance capabilities.

Certain fuel cell elements require regular replacement imposing a significant on-going cost implication. The fuel cells themselves are generally large, heavy and require fresh air ventilation.

Due to the initial capital cost, space requirements and on-going maintenance costs fuel cells are not considered viable for this development.

4.5 WATER

The development will be designed to reduce mains/potable water and include water efficient devices and equipment. This will comprise of efficient water fixtures (low flow taps and showers, dual flush WCs and low volume baths) to reduce potable water demand to <16 litres/person/day as per the requirement within Building Regulations.

This will be done using low flow rate sanitaryware and the use of flow restrictors throughout the development.

An example of the flow rates and capacities that could potentially be used are as follows. Please note these are a guide at this stage and actual figures may differ at the time of construction. However, they will fall within the required level:

- WC – Dual Flush – 6/3 Litre Flush capacity
- Wash hand basin taps – 5 L/min
- Kitchen sink taps – 7L/min
- Shower – 7L/min

4.6 CHOSEN RENEWABLE SOLUTION

Following the above review of various LZC technology the chosen solution for this strategy is to utilise low carbon technology in the form of Air Source Heat Pumps to supplement the fabric efficiency measures detailed earlier in this report.

Incorporating this technology into the design allows the development to meet its heating and cooling demand through a low carbon solution that also minimises the visual impact on the building and surrounding area thereby respecting the listed status of the development and the conservation area. Photovoltaic panels could be considered in the future should the stance on visually impactful improvements on listed buildings change, at this stage however, it has been determined that ASHP is the only viable low carbon technology that can be used whilst also supporting the building character and that of the surrounding area.

As ASHP technology is included in the base design no additional reduction is observed at the Be Green Stage, rather it contributes to the existing CO2 performance alongside achieving limiting fabric u-value performances as required for Part L 2021 Compliance.

5 ENVIRONMENTAL STANDARDS STATEMENT

It is best practice to incorporate Environmental Standards within the design of such a development. Being mindful of the design standard issues often compliment the Energy Strategy and the Sustainability aspects of the design and this planning report.

Some elements described within the environmental standards section fall outside the remit of NOVO Integration Ltd and as such will be incorporated within other parties' appointments. This report will however summarise and reference other third-party reports where applicable to aid with addressing all applicable elements of the Environmental Standards.

The various topics covered within the environmental standards sections are as follows:

- Energy Efficiency
- Renewable Energy
- Environmental Design
- Water Management and Weather Resilience
- Waste Management
- Construction Management
- Waterways

Each element will be summarised how the development will achieve this, and any relevant third-party reports referenced accordingly.

Please note that where assumptions have been made of specific reports being carried out, confirmation of these reports from the developer will be required. Reference only is made within this report.

Any reports referenced within this section does not confirm that these reports are either required or have been or will be carried out and are assumptions of such only.

5.1 ENERGY EFFICIENCY

The Manchester Core Strategy states that in summary, all new developments should endeavour to reduce their CO₂ emission by particular targets as discussed previously in this report.

However, the principals highlighted within the section are carried through into the design.

Section 4 Energy Strategy of this report details specifically how the proposed design of the development including the fabric, mechanical and electrical services will use passive, energy efficient and low carbon technologies throughout with emphasis on a fabric first approach to minimise the CO₂ emissions as far as practical given that the listed status of the building and surrounding conservation area exempts the development from conventional energy efficiency requirements. The focus in this case is to achieve limiting fabric u-value performance levels and ensure the predicted EPC is at C or above to future proof against MEES 2025 standards.

The Energy Strategy describes how the development follows the Energy Hierarchy approach which many local authorities advocate the use of.

5.2 RENEWABLE ENERGY

The Manchester Core Strategy encourages the use of Low Zero Carbon technologies, this again follows the Hierarchical approach.

This is to encourage opportunities to reduce the energy demand via the use of onsite renewable technologies to improve energy security for occupants of the site and export of surplus energy back to the grid.

Various opportunities and different technologies should be investigated to determine the most viable and appropriate technology for the site in question.

Again section 4 of this report deals with the Energy Hierarchical approach to Energy and the use of renewable technology. Many different technology opportunities have been investigated and discounted where applicable and included where appropriate.

Following these in-depth reviews of varying renewable technologies, Air Source Heat Pump technology have been deemed viable and appropriate for the development.

5.3 ENVIRONMENTAL DESIGN

This element encourages developers to use the Building Research Establishment Assessment Method (BREEAM) to assess environmental performance. The project shall have a BREEAM assessment undertaken to attain the highest possible rating to suit the existing and listed nature of the property.

5.4 WATER MANAGEMENT AND WEATHER RESILIENCE

Thoughtful design to reduce the levels of pollution within the city's watercourses, as well as mitigating the effects of flooding should significant storms present themselves in the future should be considered.

As such a Flood Risk Assessment and Drainage Strategy Report will be produced to demonstrate the methodology as to how the development will manage excessive water in times of storms etc to minimise the risk of flooding to the development and surrounding areas.

It is anticipated that any excessive rainwater will be dealt with through the use of attenuation other methodologies falling line with SUDs techniques to improve flows and quality of the surface water run-off.

Water Usage has been covered earlier within this report under section 4.6 and describes how the development will utilise low flow / volume sanitaryware to reduce the amount of water consumed and comply with the Building Regulations Part G.

5.5 WASTE MANAGEMENT

It is understood that the Construction Waste Management Plan will be prepared to ensure that all aspects of waste production, deliveries, noise, dust pollution etc are all accounted for and reasonably mitigated.

There is potential for the Waste Management Strategy to be reviewed by Building Management during the lifetime of the building for opportunities to improve the procedures and will also review areas where

reductions in waste, or an increase in recycling waste can be made. This will form part of a Construction Management Plan which will likely be required by a condition attached to any planning permission.

The design of designated areas for waste and recyclable waste once construction has been completed for the use of the occupants has and will be carefully considered, not only in terms of capacity but allowances made for access for collections.

These areas will have designated areas for recyclable waste which will encourage further responsibility to be taken by the occupiers to separate their own waste accordingly.

5.6 CONSTRUCTION MANAGEMENT

Best practices encourage environmentally friendly construction methods and materials which in effect reduces energy consumption.

This standard also encourages best practices during construction to prevent or limit damage to the environment and to make sure these measures are not being abused during the full construction phase.

It is assumed that the contractor will be responsible for providing a comprehensive construction management plan containing all procedures on site and methodologies for a safe, environmentally conscious, and efficient construction period.

6 CONCLUSIONS

The Energy Strategy for the proposed development Liverpool Road has adopted a hierarchical approach of using passive and low energy design technologies to reduce the baseline energy demand and hence CO₂ emissions followed by the feasibility of the application of low and zero carbon technologies as appropriate.

This is supported by the SBEM Calculations to provide compliance in England with the Building Regulations Part L Volume 2 2021, the resulting as-designed BRUKL report and predicted EPC can be found in Appendix A and B respectively.

This is achieved by incorporation of the following elements:

- Improved thermal transmittance U-valued as depicted.
- Mechanical Ventilation with Heat Recovery (circa 80% efficiency)
- Highly efficient low carbon Air Source Heat Pumps
- Low building air leakage rate (5.0 m³/h/m² at a pressure differential of 50 Pa)
- 100% Low energy lighting through the buildings
- Low flow aerated showerheads and basin tap inserts to reduce water consumption.
- Reducing mains/potable water via water efficient devices and equipment

The design ethos has followed the principles of the Energy Hierarchy required by the Manchester Core Strategy as demonstrated by the table below which also displays what the equivalent 2010 Building regulation CO₂ performance would be.

Table 11: Overall CO₂ Emissions Reduction

Regulated Emissions	Baseline CO ₂ Emissions	BE LEAN – BE GREEN Stage CO ₂ Emissions	CO ₂ Emission Savings	Part L 2021 % reduction in CO ₂ Emissions	Part L 2010 Equivalent % reduction in CO ₂ Emissions
Kg of CO ₂ /m ² /yr	59.76	71.36	-11.6	-19.35%	17.65%
kg of CO ₂ /yr	137,854.36	164,613.24	-29,758.88		

The analysis has shown that by incorporating passive and low energy design measures the development can achieve limiting fabric u-values and a predicted EPC rating of B. As stated throughout the report, the grade 2 listed status of the building and location within a conservation area exempts the development from traditional CO₂ and Primary Energy requirements within Part L. The development would require fabric alterations and visually impactful technology such as Photovoltaic panels to meet traditional Part L 2021 standards which would counter the principles of the listed status and protected area in which the building is situated. For this reason, no observable CO₂ reduction is present under 2021 Building Regulations.

With that considered, the development would achieve a 17.65% reduction by 2010 Building Regulation standards as referenced in the Manchester Core Strategy. There is no compliance necessity to achieve this given the grade 2 listed status however, it highlights the impact of the default 37% improvement Part L 2021 Building Regulations has over the previous 2010 revision. As limiting fabric u-values have been included and a predicted EPC rating of B is achieved, the development complies with Part L 2021, supports the Manchester Core Strategy ethos and is future proofed against MEEs 2025 standards.

7 APPENDICES

Appendix A – BRUKL Report

Appendix B – Predicted EPC

Appendix A

BRUKL Report

Project name

P1824 Liverpool Road**As designed****Date:** Wed May 10 09:44:28 2023**Administrative information****Building Details****Address:** Liverpool Road, Manchester, M3 4JN**Certifier details****Name:** Ben Duckworth**Telephone number:** 01132577300**Address:** 7 Feast Field, Horsforth, Leeds, LS18 4TJ**Certification tool****Calculation engine:** Apache**Calculation engine version:** 7.0.20**Interface to calculation engine:** IES Virtual Environment**Interface to calculation engine version:** 7.0.20**BRUKL compliance module version:** v6.1.e.1**Foundation area [m²]:** 219.45**The CO₂ emission and primary energy rates of the building must not exceed the targets****The building does not comply with England Building Regulations Part L 2021**

Target CO ₂ emission rate (TER), kgCO ₂ /m ² annum	59.76
Building CO ₂ emission rate (BER), kgCO ₂ /m ² annum	71.36
Target primary energy rate (TPER), kWh _{PE} /m ² annum	338.05
Building primary energy rate (BPER), kWh _{PE} /m ² annum	415.98
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 _{a-Limit}	U _{a-Calc}	U _{i-Calc}	First surface with maximum value
Walls*	0.26	0.88	1.51	B1000006:Surf[0]
Floors	0.18	0.19	0.46	00000015:Surf[13]
Pitched roofs	0.16	0.25	0.75	B1000006:Surf[5]
Flat roofs	0.18	0.15	0.15	B100000D:Surf[0]
Windows** and roof windows	1.6	1.6	1.6	00000013:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.6	1.6	00000010:Surf[0]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building
U _{a-Limit} = Limiting area-weighted average U-values [W/(m ² K)] U _{a-Calc} = Calculated area-weighted average U-values [W/(m ² K)] U _{i-Calc} = Calculated maximum individual element U-values [W/(m ² 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. ^ For fire doors, limiting U-value is 1.8 W/m ² 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 ³ /(h.m ²) at 50 Pa	8	5

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	>0.95

1- System 3 - VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.18	6.96	0	-	0.8
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

2- System 5 - Electric Panel Heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

3- System 2 - VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.29	6.97	0	-	0.8
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

4- System 1 - VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.11	7.17	0	-	0.8
Standard value	2.5*	5	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.					

1- System 4 - DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.96	0.24
Standard value	0.91	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
B1 - Spa Treatment 03	-	-	-	1.5	-	-	-	-	-	-	-	N/A
B1 - Spa Treatment 01	-	-	-	1.5	-	-	-	-	-	-	-	N/A
B1 - Spa Treatment 02	-	-	-	1.5	-	-	-	-	-	-	-	N/A
B1 - Staff Room	-	-	-	1.5	-	-	-	-	-	-	-	N/A
00 - Kitchen	-	-	-	1.5	-	-	-	-	-	-	-	N/A
00 - Bar/Library	-	-	-	1.5	-	-	-	-	-	-	-	N/A
00 - Bar	-	-	-	1.5	-	-	-	-	-	-	-	N/A
00 - Bar/Restaurant	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - General Manager/Finance	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - H.Keeping Office	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 05	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 4	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 3	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 9	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 8	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 07	-	-	-	1.5	-	-	-	-	-	-	-	N/A
01 - Type 06	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 9	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 3	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 4	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 5	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 6	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 7	-	-	-	1.5	-	-	-	-	-	-	-	N/A
02 - Type 8	-	-	-	1.5	-	-	-	-	-	-	-	N/A
03 - Type 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
03 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
03 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
03 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
03 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
03 - Type 3	-	-	-	1.5	-	-	-	-	-	-	-	N/A
04 - Type 1	-	-	-	1.5	-	-	-	-	-	-	-	N/A
04 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
04 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A

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
04 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
04 - Type 2	-	-	-	1.5	-	-	-	-	-	-	-	N/A
04 - Type 3	-	-	-	1.5	-	-	-	-	-	-	-	N/A

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
B1 - Spa Treatment 03		137	-	-
B1 - Comms		113	-	-
B1 - Bar Storage Spirits		91	-	-
B1 - WC		97	-	-
B1 - Circ		96	-	-
B1 - Spa Treatment 01		105	-	-
B1 - Spa Treatment 02		104	-	-
B1 - Staff Room		105	165	0.909
B1 - Staff WC		105	-	-
B1 - Circ		148	-	-
B1 - Female Change		155	-	-
B1 - Male Change		157	-	-
B1 - Stairs 2		103	-	-
B1 - Store		97	-	-
B1 - Spa Lobby		100	165	0.818
B1 - DDA WC		100	-	-
B1 - Steam Room		129	-	-
B1 - Sauna		145	-	-
B1 - Swimming Pool		127	-	-
B1 - Circ		123	-	-
B1 - Stairs		106	-	-
B1 - Changing		101	-	-
B1 - DDA Changing		117	-	-
B1 - Bar Storage Barrels		77	-	-
B1 - Circ		103	-	-
B1 - Spa Storage		99	-	-
B1 - WC		122	-	-
00 - Circ		228	-	-
00 - Circ		270	-	-
00 - Lobby		198	165	0.818
00 - Kitchen Refuse		186	-	-
00 - Linen Room		142	-	-
00 - Dry Store		118	-	-
00 - Kitchen		138	-	-
00 - Freezer		133	-	-
00 - DDA WC		147	-	-

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 - Fridge		124	-	-
00 - Unisex WC		88	-	-
00 - Cleaners Store		111	-	-
00 - Straits		115	-	-
00 - Circ		161	-	-
00 - Bar/Library		142	165	0.909
00 - Hotel Lobby		89	165	0.818
00 - Stairs		127	-	-
00 - Circ		152	-	-
00 - Circ		127	-	-
00 - Restaurant Lobby		92	165	0.818
00 - Lobby		236	165	0.818
00 - Stairs		138	-	-
00 - Bar		154	165	0.909
00 - Bar/Restaurant		130	165	0.909
00 - Stair		259	-	-
00 - Circ		231	-	-
01 - General Manager/Finance		113	-	-
01 - H.Keeping Office		118	-	-
01 - Circ		187	-	-
01 - Stairs		132	-	-
01 - Circ		136	-	-
01 - Type 06 - Bathroom		125	-	-
01 - Linen Store		181	-	-
01 - Stair 2		111	-	-
01 - Circ		166	-	-
01 - Circ		116	-	-
01 - Circ		144	-	-
01 - Type 05		146	-	-
01 - Type 4 - Bathroom		119	-	-
01 - Type 4		140	-	-
01 - Type 1 - Bathroom		163	-	-
01 - Type 1		169	-	-
01 - Type 2		169	-	-
01 - Type 2 - Bathroom		163	-	-
01 - Type 2 - Bathroom		162	-	-
01 - Type 2		169	-	-
01 - Type 2		169	-	-
01 - Type 2 - Bathroom		164	-	-
01 - Type 2 - Bathroom		162	-	-
01 - Type 2		169	-	-
01 - Type 3		179	-	-
01 - Type 3 - Bathroom		163	-	-

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
01 - Type 9		147	-	-
01 - Type 8		150	-	-
01 - Type 8 - Bathroom		126	-	-
01 - Type 07		143	-	-
01 - Type 07 - Bathroom		112	-	-
01 - Type 06		156	-	-
01 - Type 06 - Bathroom		117	-	-
02 - Linen Store		162	-	-
02 - Stairs 2		110	-	-
02 - Circ		116	-	-
02 - Circ		142	-	-
02 - Sales and Reservations		103	-	-
02 - Circ		183	-	-
02 - Stairs		136	-	-
02 - Circ		138	-	-
02 - Type 9		148	-	-
02 - Type 3		178	-	-
02 - Type 3 - Bathroom		162	-	-
02 - Type 2 - Bathroom		163	-	-
02 - Type 2		170	-	-
02 - Type 2		169	-	-
02 - Type 2 - Bathroom		163	-	-
02 - Type 2 - Bathroom		163	-	-
02 - Type 2		169	-	-
02 - Type 2		169	-	-
02 - Type 2 - Bathroom		163	-	-
02 - Type 1 - Bathroom		164	-	-
02 - Type 1		127	-	-
02 - Type 4 - Bathroom		118	-	-
02 - Type 4		140	-	-
02 - Type 5 - Bathroom		126	-	-
02 - Type 5		146	-	-
02 - Type 6		154	-	-
02 - Type 6 - Bathroom		117	-	-
02 - Type 7		143	-	-
02 - Type 7 Bathroom		115	-	-
02 - Type 8		149	-	-
02 - Type 8 - Bathroom		126	-	-
03 - Store		112	-	-
03 - Stairs 2		110	-	-
03 - Type 1		169	-	-
03 - Type 1 - Bathroom		161	-	-
03 - Type 2		169	-	-

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
03 - Type 2 - Bathroom		163	-	-
03 - Type 2 - Bathroom		164	-	-
03 - Type 2		169	-	-
03 - Type 2		169	-	-
03 - Type 2 Bathroom		162	-	-
03 - Type 2 - Bathroom		163	-	-
03 - Type 2		170	-	-
03 - Type 3		178	-	-
03 - Type 3 - Bathroom		161	-	-
04 - Linen Store		112	-	-
04 - Stairs 2		110	-	-
04 - Type 1 - Bathroom		164	-	-
04 - Type 1		169	-	-
04 - Type 2		168	-	-
04 - Type 2 - Bathroom		161	-	-
04 - Type 2 - Bathroom		162	-	-
04 - Type 2		169	-	-
04 - Type 2		169	-	-
04 - Type 2 - Bathroom		162	-	-
04 - Type 2 - Bathroom		162	-	-
04 - Type 2		169	-	-
04 - Type 3		179	-	-
04 - Type 3 - Bathroom		162	-	-
04 - Circ		125	-	-
04 - Circ		173	-	-
03 - Circ		171	-	-
03 - Circ		124	-	-
01 - Type 9 - Bathroom		121	-	-
02 - Type 9 - Bathroom		122	-	-
B1 - Storage		63	-	-
B1 - Hatch Lobby		64	-	-

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?
B1 - Spa Treatment 03	N/A	N/A
B1 - Comms	N/A	N/A
B1 - Spa Treatment 01	N/A	N/A
B1 - Spa Treatment 02	N/A	N/A
B1 - Staff Room	N/A	N/A
B1 - Spa Lobby	N/A	N/A
B1 - Swimming Pool	N/A	N/A
00 - Lobby	N/A	N/A
00 - Kitchen	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
00 - Bar/Library	NO (-40.9%)	NO
00 - Hotel Lobby	NO (-28.9%)	NO
00 - Restaurant Lobby	NO (-68.3%)	NO
00 - Lobby	NO (-77%)	NO
00 - Bar	N/A	N/A
00 - Bar/Restaurant	NO (-51.9%)	NO
01 - General Manager/Finance	N/A	N/A
01 - H.Keeping Office	N/A	N/A
01 - Type 06 - Bathroom	N/A	N/A
01 - Type 05	NO (-62.6%)	NO
01 - Type 4 - Bathroom	NO (-26.4%)	NO
01 - Type 4	NO (-56.7%)	NO
01 - Type 1 - Bathroom	N/A	N/A
01 - Type 1	NO (-60.3%)	NO
01 - Type 2	NO (-46.8%)	NO
01 - Type 2 - Bathroom	N/A	N/A
01 - Type 2 - Bathroom	N/A	N/A
01 - Type 2	NO (-47.2%)	NO
01 - Type 2	NO (-46.4%)	NO
01 - Type 2 - Bathroom	N/A	N/A
01 - Type 2 - Bathroom	N/A	N/A
01 - Type 2	NO (-47%)	NO
01 - Type 3	NO (-76.5%)	NO
01 - Type 3 - Bathroom	N/A	N/A
01 - Type 9	NO (-43.7%)	NO
01 - Type 8	NO (-70.2%)	NO
01 - Type 8 - Bathroom	NO (-20.9%)	NO
01 - Type 07	NO (-47.4%)	NO
01 - Type 07 - Bathroom	N/A	N/A
01 - Type 06	NO (-61.9%)	NO
01 - Type 06 - Bathroom	NO (-57.6%)	NO
02 - Sales and Reservations	N/A	N/A
02 - Type 9	NO (-44%)	NO
02 - Type 3	NO (-76.6%)	NO
02 - Type 3 - Bathroom	N/A	N/A
02 - Type 2 - Bathroom	N/A	N/A
02 - Type 2	NO (-46.3%)	NO
02 - Type 2	NO (-47.1%)	NO
02 - Type 2 - Bathroom	N/A	N/A
02 - Type 2 - Bathroom	N/A	N/A
02 - Type 2	NO (-46.6%)	NO
02 - Type 2	NO (-47%)	NO
02 - Type 2 - Bathroom	N/A	N/A
02 - Type 1 - Bathroom	N/A	N/A
02 - Type 1	NO (-61.7%)	NO
02 - Type 4 - Bathroom	NO (-29.7%)	NO
02 - Type 4	NO (-56.2%)	NO
02 - Type 5 - Bathroom	N/A	N/A
02 - Type 5	NO (-62.8%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02 - Type 6	NO (-61.7%)	NO
02 - Type 6 - Bathroom	NO (-57.4%)	NO
02 - Type 7	NO (-47.7%)	NO
02 - Type 7 Bathroom	N/A	N/A
02 - Type 8	NO (-70.1%)	NO
02 - Type 8 - Bathroom	NO (-21%)	NO
03 - Type 1	NO (-67.1%)	NO
03 - Type 1 - Bathroom	N/A	N/A
03 - Type 2	NO (-46.7%)	NO
03 - Type 2 - Bathroom	N/A	N/A
03 - Type 2 - Bathroom	N/A	N/A
03 - Type 2	NO (-46.5%)	NO
03 - Type 2	NO (-47.2%)	NO
03 - Type 2 Bathroom	N/A	N/A
03 - Type 2 - Bathroom	N/A	N/A
03 - Type 2	NO (-46.2%)	NO
03 - Type 3	NO (-76.5%)	NO
03 - Type 3 - Bathroom	N/A	N/A
04 - Type 1 - Bathroom	N/A	N/A
04 - Type 1	NO (-67%)	NO
04 - Type 2	NO (-47.4%)	NO
04 - Type 2 - Bathroom	N/A	N/A
04 - Type 2 - Bathroom	N/A	N/A
04 - Type 2	NO (-46.6%)	NO
04 - Type 2	NO (-46.8%)	NO
04 - Type 2 - Bathroom	N/A	N/A
04 - Type 2 - Bathroom	N/A	N/A
04 - Type 2	NO (-46.8%)	NO
04 - Type 3	NO (-76.4%)	NO
04 - Type 3 - Bathroom	N/A	N/A
01 - Type 9 - Bathroom	N/A	N/A
02 - Type 9 - Bathroom	N/A	N/A

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 ²]	2306.8	2306.8
External area [m ²]	2782	2794.7
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	5	3
Average conductance [W/K]	1760.05	1121.12
Average U-value [W/m ² K]	0.63	0.4
Alpha value* [%]	26.07	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
 Storage or Distribution

100

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/m²]

	Actual	Notional
Heating	29.11	10.2
Cooling	0.26	0.93
Auxiliary	5.85	1.95
Lighting	10.01	11.35
Hot water	309	268.69
Equipment*	24.14	24.14
TOTAL**	354.24	293.11

* 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/m²]

	Actual	Notional
Photovoltaic systems	0	0.78
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0</i>	<i>0.78</i>

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	209.16	93.21
Primary energy [kWh _{PE} /m ²]	415.99	338.05
Total emissions [kg/m ²]	71.36	59.76

HVAC Systems Performance									
System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	416.7	24.4	29.7	1.4	14.4	3.9	4.94	4.18	6.96
Notional	83.3	70.7	8.3	4.2	3.6	2.78	4.63	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	141.3	2.4	10.2	0.1	6.6	3.83	5.09	4.11	7.17
Notional	148	13.7	14.8	0.8	1.4	2.78	4.63	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity									
Actual	300.5	1.5	20.9	0.1	6.6	4	4.95	4.29	6.97
Notional	110.9	10.3	11.1	0.6	1.4	2.78	4.63	----	----
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity									
Actual	633.1	0	219.8	0	0	0.8	0	1	0
Notional	298.7	0	58.8	0	0	1.41	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 B

Predicted EPC

Energy Performance Certificate

Non-Domestic Building



Liverpool Road

Address 3

Address 4

Manchester

M3 4JN

Certificate Reference Number:

9039-7422-5712-9315-7658

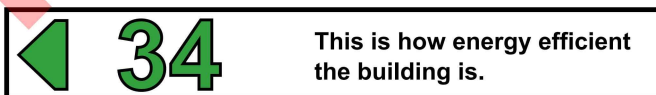
This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating

More energy efficient



Net zero CO₂ emissions



Less energy efficient

Technical information

Main heating fuel:	Natural Gas
Building environment:	Air Conditioning
Total useful floor area (m ²):	2306.800
Building complexity:	Level 5
Building emission rate (kgCO ₂ /m ² per year):	71.36
Primary energy use (kWh _{PE} /m ² per year):	415.99

Benchmarks

Buildings similar to this one could have ratings as follows:

28 If newly built

114 If typical of the existing stock

Administrative information

This is an Energy Performance Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software:	Virtual Environment v7.0.20 using calculation engine ApacheSim v7.0.20
Property Reference:	UPRN-000000000000
Assessor Name:	Ben Duckworth
Assessor Number:	LCEA025862
Accreditation Scheme:	CIBSE Certification Limited
Assessor Qualifications:	NOS5
Employer/Trading Name:	Trading Name
Employer/Trading Address:	Trading Address
Issue Date:	09 May 2023
Valid Until:	08 May 2033 (unless superseded by a later certificate)
Related Party Disclosure:	Not related to the owner

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report: 2311-3551-0698-4021-8360

About this document and the data in it

This document has been produced following an energy assessment undertaken by a qualified Energy Assessor, accredited by CIBSE Certification Limited. You can obtain contact details of the Accreditation Scheme at www.cibsecertification.com.

A copy of this certificate has been lodged on a national register as a requirement under the Energy Performance of Buildings Regulations 2012 as amended. It will be made available via the online search function at www.ndepcregister.com. The certificate (including the building address) and other data about the building collected during the energy assessment but not shown on the certificate, for instance heating system data, will be made publicly available at www.opendatacommunities.org.

This certificate and other data about the building may be shared with other bodies (including government departments and enforcement agencies) for research, statistical and enforcement purposes. For further information about how data about the property are used, please visit www.ndepcregister.com. To opt out of having information about your building made publicly available, please visit www.ndepcregister.com/optout.

There is more information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government website at: www.gov.uk/government/collections/energy-performance-certificates. It explains the content and use of this document and advises on how to identify the authenticity of a certificate and how to make a complaint.

Opportunity to benefit from a Green Deal on this property

The Green Deal can help you cut your energy bills by making energy efficiency improvements at no upfront costs. Use the Green Deal to find trusted advisors who will come to your property, recommend measures that are right for you and help you access a range of accredited installers. Responsibility for repayments stays with the property - whoever pays the energy bills benefits so they are responsible for the payments.

To find out how you could use Green Deal finance to improve your property please call 0300 123 1234.