

Plot 9a, First Street, Manchester

Energy & Sustainability Statement

First Street (Developments) Limited

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Executive Summary

The Plot 9a, First Street, Manchester development aims to be at the forefront of sustainability. Its strong carbon and sustainability goals will help create a development which supports Manchester's ambitious climate transition.

In accordance with the Manchester City Council (MCC) planning requirements, the following Energy Statement has been developed for the proposed Plot 9a First Street, Manchester development. It aims to meet the energy and climate change requirements of the Manchester City Council's Core Strategy (July 2012) and the Greater Manchester Spatial Framework (GMSF) (Revised Draft January 2020). Whilst the GMSF is no longer being progressed, the replacement joint development plan, Places for Everyone, is currently being reviewed, we have taken note of the direction of travel of Greater Manchester policy to ensure the development meets the standard set out in the GMSF. Manchester's emerging Zero Carbon framework has also been referred to, to inform the strategy and align with Manchester's future aspirations.

An energy strategy has been developed by following the energy hierarchy; Be Lean, Be Clean and Be Green. The energy assessment is based on the current SAP 2012 emission factors.

The proposed Plot 9a, First Street, Manchester development will deliver 18,977m² of commercial office space (Use Class E(c)) over 9 floors with winter gardens, gym space, 130 cycle paces, 26 car parking spaces and associated facilities, hard and soft landscaping, and associated works.

The core strategies applied in the project are outlined below:

- The envelope of the new build will be designed to perform significantly better than the Building Regulation standards with low U-values, g-values and low air leakage rates.
- Analysis has been carried out to optimise the facades so that heat losses are minimised whilst the size and position of openings has been optimised to maximise the use of natural light within each space.
- The development will be mechanically ventilated throughout the year, making use of heat recovery to reduce the heating demands.
- Energy efficient services employed in the development include high efficiency LED lighting coupled with occupancy and daylight controls to significantly reduce the lighting energy use.
- Electrical and mechanical systems within the development will be tightly metered and controlled with a full Building Management System (BMS). This will enable energy use to be tracked and opportunities for efficiency improvements to be made.

An 15.2% carbon emissions reduction is achieved through energy efficiency measures.

An investigation into the feasibility of connecting to an existing or proposed district network as per the Manchester City Council's Policy EN 6 indicates that there are no available district heating networks within the vicinity of the site. Also, the low heating demand of the development does not justify its use as an anchor load, to build out a new heat network, therefore, connecting to a district network has been discounted.

The inclusion of a Combined Heat and Power (CHP) unit to deliver a portion of the development's heat demand and electricity plant has been also assessed. The heat load of the development is insufficient to permit effective operation of an on-site combined heat and power unit. It is also widely recognised that CHP is now more CO₂ intensive than electricity because of the rapid decarbonisation of the electricity grid. Therefore, it is considered to be unviable for this scheme.

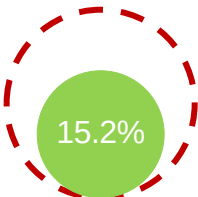
A study into low and zero carbon (LZC) technologies was undertaken as per the Manchester City Council's Policy EN 6. Variable refrigerant flow air source heat pumps are proposed to provide the local cooling and heating to the office space and reception. A standalone Air Source Heat Pump will provide DHW to the basement showers.

The proposed roof area is allocated as plant area and a roof terrace. The proposed location of PV arrays is at roof level. A total of 30m² usable PV array is required over a few sections of roof, with a modular efficiency of at least 17%, orientated south at an inclination of 30° to the horizontal. This could enable a 5kWp photovoltaic solar array to be installed.

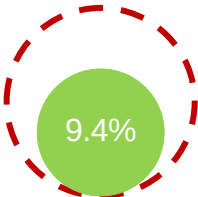
The use of on-site renewables and low carbon technologies could reduce the site-wide CO₂ emissions of the development by 9.4% across the site.

The proposed development is achieving a 24.6% improvement over the Building Regulations Part L 2010 Target Emission Rate. Thus, the development complies with Policy EN6 of Manchester City Council's Core Strategy, which stipulates that non-domestic development should achieve a minimum 15% improvement over Building Regulations Part L 2010.

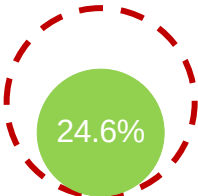
Carbon emissions reduction through energy efficiency measures:



Carbon emissions reduction through low & zero carbon technologies:



Total carbon emissions reduction over the Building Regulations Part L 2010 TER:



Health & Wellbeing



With people spending up to 90% of their lives indoors, the impact that buildings have on the health & wellbeing of occupants is of growing importance. The development aims to provide an environment that has a positive impact on its occupants.

- **Good daylight** will be achieved in occupied spaces through the balanced and considered use of glazing. High performance glazing will reduce energy loss and prevent excessive heat gain.
- As part of the façade adjacent to glazed areas, there are to be perforated panels with openable internal sections, that will provide free cooling during the day. The development will be mechanically cooled to maintain **thermal comfort** under normal operational hours.
- Central Air Handling Units (AHU) will maintain a consistent supply of filtered fresh air to maintain good **indoor air quality**. Low VOC materials and finishes will minimise internal sources of pollutants.

Transport

As the second largest emitter of CO₂ in the UK, the transport of people is a priority area in achieving the UK's net zero carbon ambition. Supporting alternatives to fossil fuel and private modes of transport is key.



- The promotion of **walking and cycling** with strong connection links from the site to the surrounding area. This is further supported with the provision of cycle storage facilities for occupant use.
- Good **public transport** links in the immediate vicinity with further national links in the nearby city centre.

Water



Climate change continues to place increasing pressure on the UK's water supply, with an increase in the frequency and severity of droughts. Furthermore, the energy and carbon emissions associated with the treatment of fresh water places water conservation at the forefront.

- **Water efficient** fixtures and fittings will be specified to reduce water consumption below the levels required for national building regulations.
- **Metering and sub-metering** of consumption will enable ongoing, targeted reductions in water use.
- **Leak detection and shut-off** will prevent both major and minor leaks within the buildings as well as in external areas.
- The need for **irrigation** will be minimised through appropriate landscaping which are adapted to the UK's conditions.
- The incorporation of a **blue roof**.

Materials



As well as carbon emissions, materials can have much wider social and environmental impacts which need to be considered.

- All **timber** used in the project will be from a responsible or sustainable source, using certified FSC or PEFC sources.
- To ensure **responsible and sustainable procurement**, materials will be specified in line with a documented sustainable procurement plan.
- Materials that are **durable and resilient** will be specified to maximise their lifespan and avoid the need for disposal and replacement.

Waste



Buildings and building sites produce a significant amount of waste per year.

- The use of a **Resource Management Plan** will set targets for resource efficiency and procedures for waste management.
- Appropriate and accessible **waste facilities** will be provided to encourage occupants to recycle waste effectively.

Land Use & Ecology



As well as a climate crisis, the UK faces a biodiversity crisis with a rapid decline in biodiversity in recent years. The built environment can respond to this through sustainable land use, habitat protection and creation as well as improvement of long-term biodiversity for the site and surrounding land.

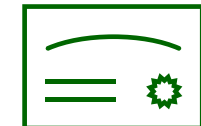
- Using the external landscape to integrate **biodiversity** and create a microclimate for planting..
- Diversity of planting to create valuable habitat throughout the seasons.

Pollution



- The site will feature no **on-site combustion** for heating and hot water which would be detrimental to local air quality.
- **External lighting** will be designed to minimise the impact of light pollution. Light fittings will be specified with a reduced light spill and controlled using photocells and timeclocks to limit unnecessary operation.
- Limits to noise emitting plant to prevent impacts on its surroundings.
- Responsible construction practices to minimise resource use and the impact of noise, dust and pollution.

Environmental Compliance



Manchester's Policy DM 1 – Development Management requires that new commercial developments should demonstrate best practice which will include the application of the BREEAM standards.

The preliminary BREEAM assessment indicates that the development is currently likely to achieve 'Excellent' under BREEAM New Construction 2018 scheme.

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1.0

Introduction



1.0 Introduction

1.1 Purpose of Statement

This Energy Statement has been prepared in support of the planning application for the Plot 9a, First Street, Manchester development, located in central Manchester. It responds to the energy and climate change policy requirements of Manchester City Council and the Greater Manchester's Combined Authority.

The format of the statement is intended to reflect and respond to the issues raised in the Manchester City Council's Core Strategy (July 2012).

The principal objectives are to:

- Outline the development's approach to reducing the site's contribution to the causes of climate change by minimising the site's needs for energy and the emissions of CO₂, by providing some of the requirement by renewable/sustainable means, minimising waste generation and limiting consumption of finite resources.
- Demonstrate that the proposed development will meet the highest standards of sustainable design and construction throughout all of the stages of the project, including demolition, construction, and long-term management in line with the principles of BREEAM to achieve 'Excellent'.

1.2 Methodology – The Energy Hierarchy

The design of the proposed scheme has been developed to reduce its annual energy consumption, provide energy in an environmentally friendly way, and to minimise its annual CO₂ footprint. To achieve this, the Statement follows the 'Steps to low carbon methodology' as illustrated below.

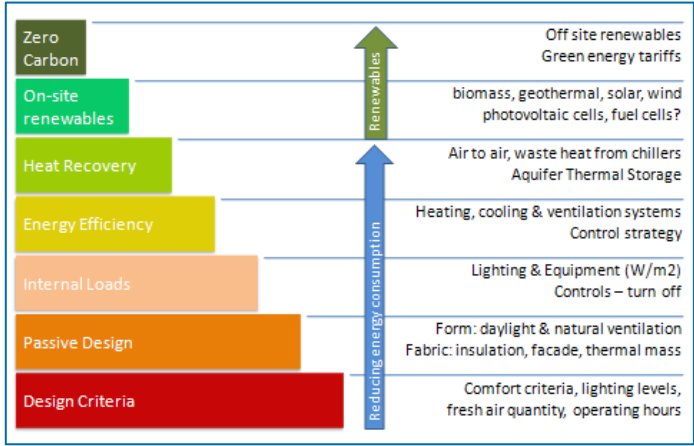


Figure 1-1. Steps to low carbon methodology

As part of the Energy Strategy an energy assessment has been carried out to benchmark the proposed energy strategy and evaluate its performance against the relevant policies. The calculations referenced within this planning statement have been based upon the National Calculation Methodology and Building Regulations Part L. These results highlight the development's potential energy efficiency. These are not a reflection on the likely energy consumption / CO₂ emissions of the building.

1.3 The Site, Surrounding Context and Proposed Development

The site is located at the south eastern edge of Manchester City Centre and is located within the First Street Strategic Development Framework (SDF) 2018 area. It is part of a wider vision to create a mixed use neighbourhood in the area, supported by a mixture of leisure, office and residential blocks. The site is known as Plot 9a and is bound by River Street to the north, a future development site known as Plot 10 to the east, future development Plot 9b to the south, and Medlock Street to the west. The Site is currently mostly hardstanding, reflecting its recent use as a temporary car parking area ahead of the plot's permanent redevelopment. There is limited vegetation on site, limited to small shrubbery to the edge of Medlock Street.

The Proposed Development will deliver 18,977m² of commercial office space over 9 floors with winter gardens, and associated gym space. The building is also host to 130 cycle spaces, and below ground, 26 car parking spaces. The façade is a grid of glazing and solid panels, to allow for 40% glazing in line with sustainability requirements.

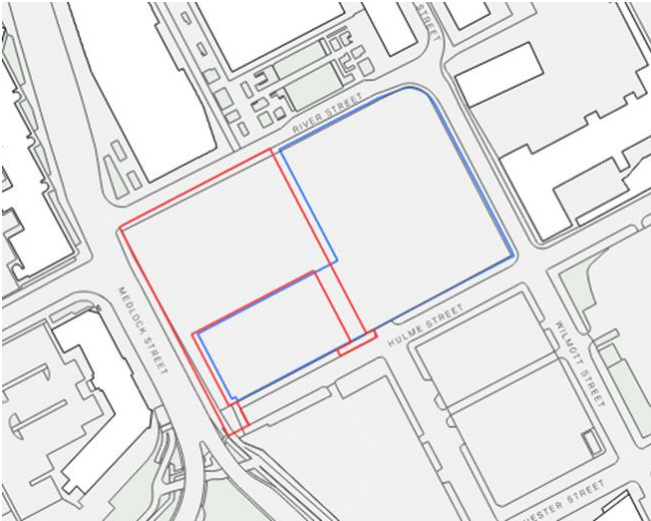
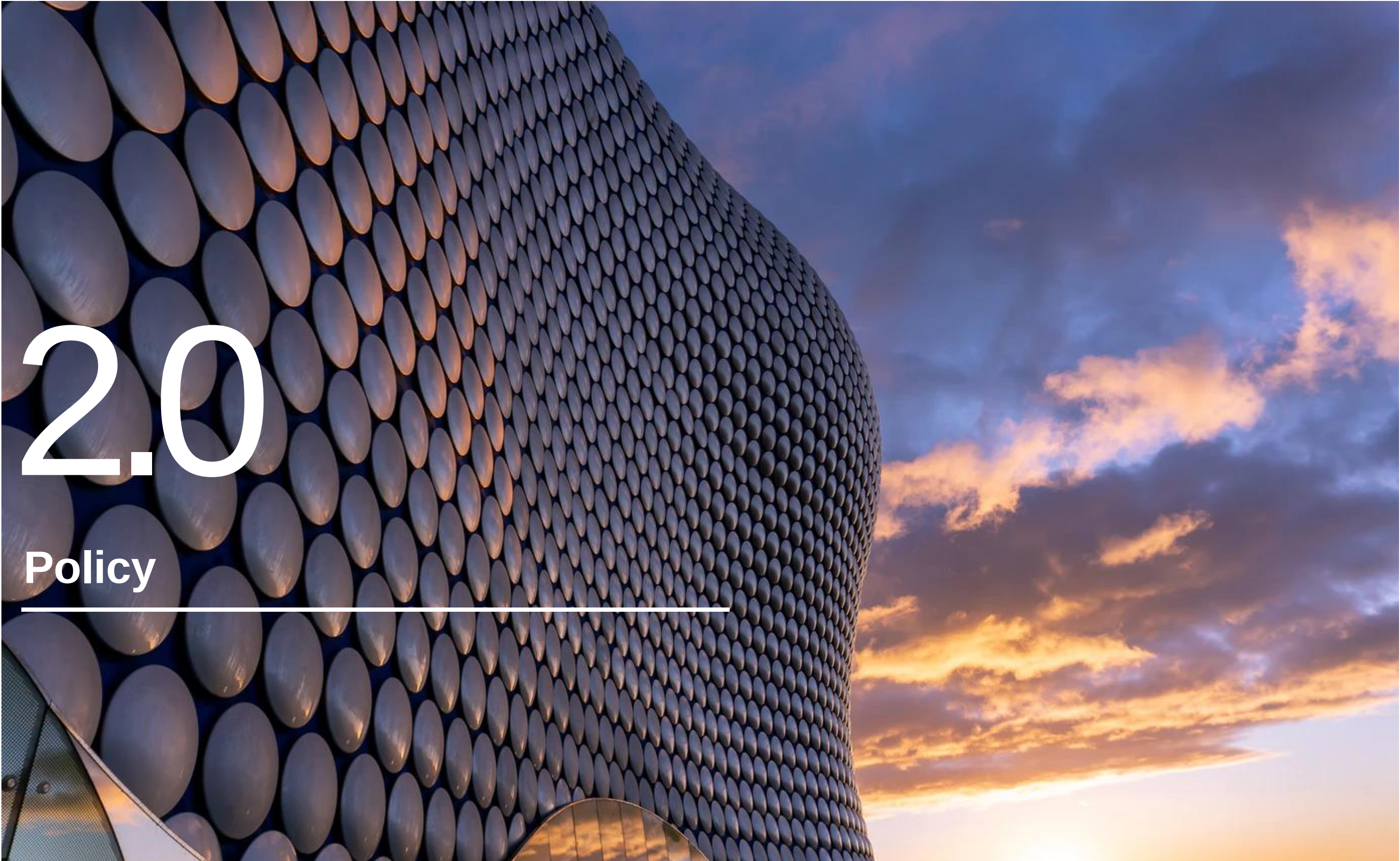


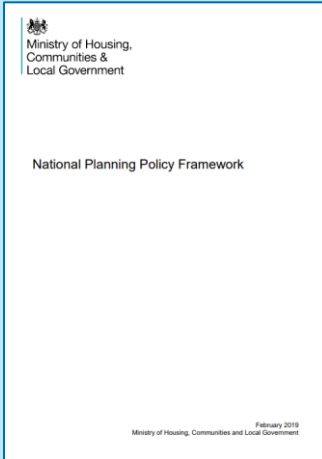
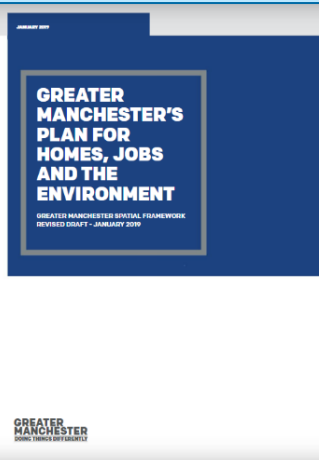
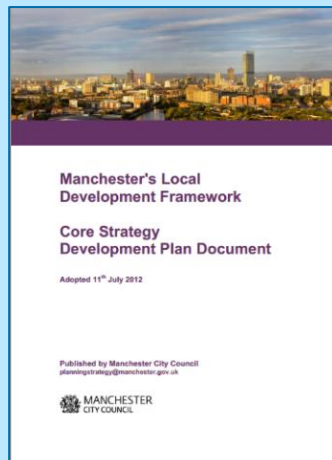
Figure 1-2. Red Line Application Boundary Plan



2.0 Policy

In support of the planning submission this energy and sustainability statement has been produced to demonstrate how the Plot 9a, First Street, Manchester development proposal addresses the policies and standards presented in the following table.

For more details about the planning policies see **Appendix A**.

	Guidance	Policy Reference	Minimum Requirements									
Energy Strategy	<u>National</u> - National Planning Policy Framework – February 2019 - Building Regulations Part L2A 2010 <u>Regional</u> - Greater Manchester Plan for Homes, Jobs and the Environment: The Greater Manchester Spatial Framework (GMSF) Revised Draft 2020 (Whilst the GMSF is no longer being progressed, the replacement joint development plan, Places for Everyone, is currently being reviewed, we have taken note of the direction of travel of Greater Manchester policy to ensure the development meets the standard set out in the GMSF.) <u>Local</u> - Manchester City Council Core Strategy	<u>Greater Manchester Spatial Framework</u> - Objective 7 : Ensure that Greater Manchester is a more resilient and carbon neutral city region - Policy GM-S 2: Carbon and Energy - Policy GM-S-3: Heat and Energy Networks + Supporting guidance documentation <u>Manchester City Council Core Strategy</u> - EN 4: Reducing CO2 Emissions by Enabling Low and Zero Carbon Development - EN 6: Target Framework for CO2 reductions from low or zero carbon energy supplies	Objective 7: Ensure that Greater Manchester is a more resilient and carbon neutral city region. - Promote carbon neutrality of new development by 2028; - Promote sustainable patterns of development that minimise the need to travel and contribute to cleaner air; - Locate and design development to reduce car dependency; - Facilitate provision of infrastructure for cleaner vehicles; - Improve energy efficiency and the generation of renewable and low carbon energy. <u>Non-domestic development</u> <table><thead><tr><th>Target</th><th>% minimum req.</th></tr></thead><tbody><tr><td>Target 1: Network development area</td><td>CHP/district heating anchor Or connection or where not feasible, a 15% increase on Part L 2010</td></tr><tr><td>Target 2: Electricity intense buildings</td><td>+10% increase on Part L 2010</td></tr><tr><td>Target 3: Micro generation area</td><td>+15% increase on Part L 2010</td></tr></tbody></table>	Target	% minimum req.	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	+10% increase on Part L 2010	Target 3: Micro generation area	+15% increase on Part L 2010	   
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Target 3: Micro generation area	+15% increase on Part L 2010											
Overheating Assessment	Manchester City Council Core Strategy	<u>Manchester City Council Core Strategy</u> Policy EN 8 – Adaptation to Climate Change	The need to control overheating of buildings through passive design.									
Sustainability Strategy	- Manchester City Council Core Strategy - Climate Change - Air quality - Sustainable drainage - Sustainable water - Noise - Ecology/ landscaping (Urban Greening) - Sustainable transport	<u>Manchester City Council Core Strategy</u> - Policy EN 8 – Adaptation to Climate Change - Policy EN 14 – Flood Risk - Policy EN 15 – Biodiversity and Geological Conservation - Policy EN 16 – Air Quality - Policy EN 17 – Water Quality - Policy T 1 – Sustainable Transport										
Compliance Tools	Manchester City Council Core Strategy	<u>Manchester City Council Core Strategy</u> Policy DM 1 – Development Management	For new commercial developments to demonstrate best practice which will include the application of the BREEAM standards. By 2019 provisions similar to the Code for Sustainable Homes will also apply to all new non-domestic buildings.									

3.0

Energy Strategy



3.0 Energy Strategy

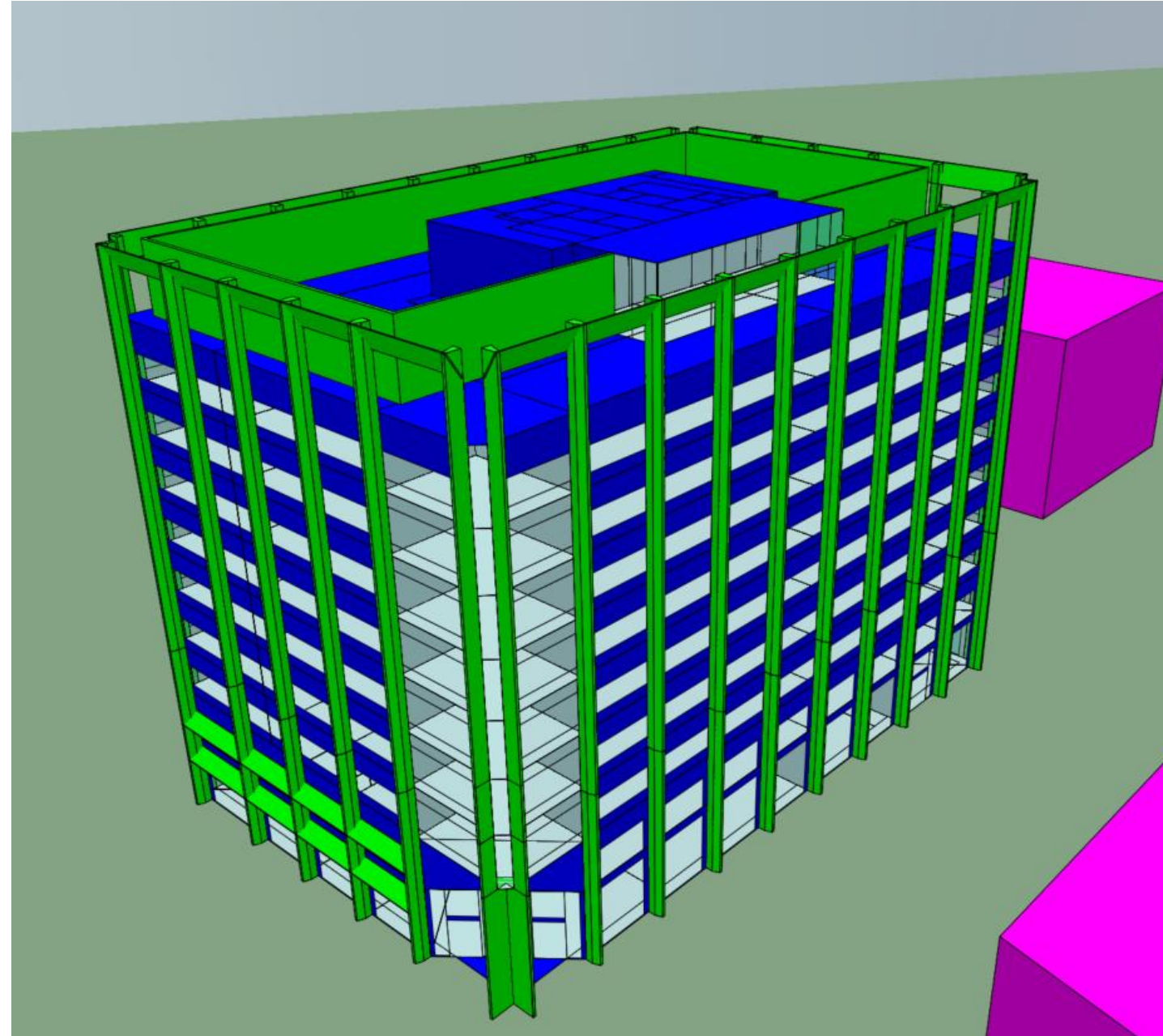
This section outlines the development's approach to achieve the Manchester City Council's planning requirements.

To calculate carbon emissions and reductions, the design was assessed under 'Part L 2010: Conservation of Fuel and Power' of the UK Building Regulations, using the National Calculation Methodology (NCM). A detailed energy model was created using Government approved software Integrated Environmental Solutions: Virtual Environment (IES: VE) 2021, in line with CIBSE AM11. The model was revised for each of the steps of the Energy Hierarchy to establish expected performance and satisfaction of the policy requirements. The energy assessment is based on the current SAP 2012 emission factors.

The energy strategy has been developed by following the energy hierarchy:

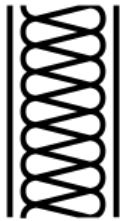
- **Energy Demand Reduction – Be Lean:** The energy demand of the development is minimised through prioritisation of passive design.
- **Heat Networks/ Combined Heat Power (CHP) – Be Clean:** The use of a decentralised heating network utilising a combined heat and power to reduce emissions.
- **Low & Zero Carbon Technologies – Be Green:** On site renewable energy generation should be prioritised and where this is not possible, off-site renewable energy should be procured.

As part of the Energy Strategy an energy assessment has been carried out to benchmark the proposed energy strategy and evaluate its performance against the relevant Policies. The energy strategy will cover passive design elements, energy efficiency measures and low and zero carbon energy delivery systems and how they have been incorporated into the project.



3.1 Demand Reduction – Be Lean

Envelope



The development will first and foremost seek to reduce its energy demand in line with five basic principles:

- 1. Continuous thermal insulation
- 2. Airtightness
- 3. Thermal bridge free
- 4. High-performance windows
- 5. Mechanical ventilation with heat recovery

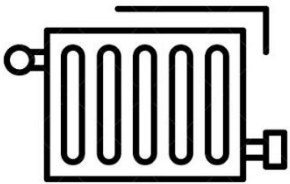
These principles focus on achieving a continuous, well insulated envelope which is both airtight and thermal-bridge free. High performance glazing provides a positive energy balance whilst improving thermal comfort. Mechanical ventilation with heat recovery ensures a continual supply of fresh air with minimal heat loss.

The thermal envelope will go significantly beyond the building regulation standards, with preliminary target values as shown in the table below:

Element	U-Values (W/m²K)	Part L2A Minimum	Design Values
Floor		0.25	0.15
Roof		0.25	0.10
External Wall		0.35	0.22
Windows & Doors		2.20	1.40
Vehicle Doors		1.50	1.40
Louvered Wall		0.35	0.35

An improved air leakage rate of 3.0m³/(hr.m²) is being targeted for the proposed development, in comparison with the Building Regulation minimum standards of 10m³/(hr.m²) at 50Pa. Good air tightness could be achieved by prefabrication of several key building components under factory conditions, robust detailing of junctions and good building practices on site.

Systems



All equipment and plant will exceed the minimum requirements of the Building Services Compliance Guides. This document provides guidance on the means of complying with the requirements of Approved Document Part L2A of the Building Regulations for conventional space heating/ cooling systems, hot water systems and ventilation systems.

Central Air Handling Units (AHU) are to be employed to provide fresh air with a heat recovery efficiency of at least 75%.

All fans and pumps will be specified with variable-speed drives, which will reduce their energy consumption by more than two-thirds compared with equivalent constant speed alternatives, by only supplying the required flow rate to meet the demand.

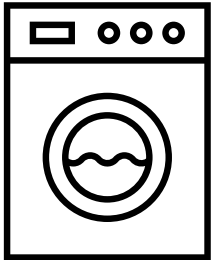
The heating and cooling systems are to be appropriately zoned, with local fast responding controls.

Natural light is maximised throughout, where practicable, with appropriate glazing design. This allows electric lighting energy consumption to be reduced during daylight hours, reducing running costs and CO₂ emissions.

Installing efficient low energy light fittings internally and externally can significantly reduce a building's overall lighting load hence lowering its annual CO₂ emissions. The development will reduce the energy consumption by the specification of low energy, high efficacy LEDs to all areas.

Appropriate lighting controls and occupancy controls will reduce the lighting energy use where appropriate.

Unregulated Energy



Unregulated energy is those uses that fall outside the typical scope of building regulations. This includes energy used through cooking, computers, external lighting and other 'plug loads' which are typically under the control of the occupant.

Addressing these loads, which often form a significant portion of a building's overall energy consumption, is key to reducing energy consumption to levels required for Net Zero Carbon.

This will be achieved through the specification of energy efficient white goods, lifts, and other appliances.

Be Lean Results

In accordance with the industry recognised Energy Hierarchy, an energy assessment has been carried out for the entire development with the aforementioned passive design and energy efficiency measures.

The table below presents the improvement over the notional building Part L2A 2010 carbon emissions after the energy demand reduction.

An 15.2% carbon emissions reduction is achieved through energy efficiency measures.

Part L2A 2010 End-uses Breakdown (kgCO ₂ /m²)		
End-use	TER	BER
Heating	2.67	1.66
DHW	2.27	2.56
Cooling	1.52	2.45
Auxiliary	8.64	8.45
Lighting	8.65	5.03
Renewables	0	0
Total	23.75	20.15
Improvement over TER		15.2%
Part L Status (BER<TER)		Pass

The BRUKL document's front page and technical data sheet can be found in **Appendix C**.

3.2 Cooling and Overheating

The proposed development has been designed to minimise its use of energy intensive cooling systems through passive and energy efficient measures.

Minimising internal heat generation

Plug-loads and occupant densities associated with the building’s activities cannot be altered beyond the client’s brief. Therefore, the only area that can be targeted is the lighting. Low energy, high efficacy, LED lighting will be used through-out the development to minimize internal heat gains.

Reducing the amount of heat entering the building

The development facades have undergone design review to control the amount of solar gain entering internal spaces. The façade elements have been specified with a low solar transmission (g-value) of 35% in all facades and 30% in the top floor Pavilion. Internal solar control blinds with a shading coefficient of 0.40 will operate when needed based on the solar gains to winter garden areas.

Glazing Specifications (%)	Design Values
Solar transmittance typical (G-value)	0.35
Solar transmittance for shaded Winter Garden glazing area (G-Value)	0.175
Glazing visible light transmission (VLT)	0.46
Solar control blinds shading coefficient – Winter Gardens	0.40
Glazing frame factor (%) - typical value	5%

Passive ventilation

As part of the façade adjacent to glazed areas, there are to be automatically openable vents, that will provide free cooling during the day, until demand requires mechanical cooling.

Mechanical ventilation and active cooling systems

To deliver the high-performance internal environment required by the client, a mechanical ventilation and cooling strategy has been recommended. All fresh air will be delivered by AHUs to all areas of the building. Cooling will be provided by air source heat pumps/VRF for the office areas and ground floor reception. Efficiency values of these

systems will exceed the requirements of the ‘Non-Domestic Building Services Compliance Guide’.

Active Cooling

The Part L assessment also provides a quantification of the energy demand likely to be expected of the cooling system. This is compared to the notional building benchmark demand to demonstrate compliance.

3.3 Heating Infrastructure – Be Clean

Combined Heat & Power

Combined Heat and Power (CHP), also known as cogeneration, is an energy system capable of producing both useful heat and electricity simultaneously in a single process. It allows for optimum use of the energy available from the fuel used.

In accordance with the Policy EN 6 of the Manchester City Council the feasibility of a site-wide CHP network has been investigated. The efficient use of CHP typically depends on finding a use for the heat generated by the process. Issues to consider include:

- If heat is not used, then the system is effectively just an electricity generator and electricity will be greener and cheaper if sourced from the national grid.
- If excess electricity is generated on site this can be exported (sold) back to the grid whereas excess heat needs to be rejected (wasted). Exported electricity can count towards reducing the site's CO₂ emissions.
- Exported electricity will typically not be financially attractive as exports tend to coincide with low demand periods on the national grid so the cost of producing the electricity on site can be less than the prices received for the exported electricity.

The heat load of the development is insufficient to permit effective operation of an on-site combined heat and power unit. Furthermore, CHP emits local air pollution in the form of NO_x and SO_x. CHP is not viable without expensive catalytic converters which would not be feasible for a unit of this size.

It is also widely recognised that CHP is now more CO₂ intensive than electricity because of the rapid decarbonisation of the electricity grid.

As such it is not proposed to include CHP within the development.

District Heating

A district heating or cooling scheme comprises of a network of insulated pipes used to deliver heat or cooling, normally in the form of hot or chilled water from the point of production to an end user.

The feasibility of connecting to an existing district network has been investigated for the site in accordance with Policy EN 6 of the Manchester City Council. There are no existing or proposed district heating networks within 500m of the site, therefore connection to an existing network is not feasible.

To facilitate future connection, space will be earmarked at the basement level to host a plate heat exchanger, pump and calorifier should a district energy network be commissioned at a later date.

3.4 Low & Zero Carbon Technologies – Be Green

Air Source Heat Pumps

Air source heat pumps (ASHP) exchange heat between the outside air and a building to provide space heating in winter and cooling in the summer months. The efficiency of these systems is inherently linked to the ambient air temperatures.

Heat pumps supply more energy than they consume, by extracting heat from their surroundings. Heat pump systems can supply as much as 4kW of heat output for just 1kW of electrical energy input.

ASHPs are therefore being incorporated into the design proposals and will be implemented as follows:

VRF systems transfer heat from one location to another using refrigerant and are likely to be utilised for the office areas and ground floor receptions heating and cooling strategy.

Domestic hot water will be provided to the basement showers via ASHP and will utilise high temperature refrigerant, such as CO₂, which operate efficiently at the high temperatures that DHW generation demands.

These heat pump systems will enable significant emissions savings over a conventional gas boiler heating system, particularly when factoring in the decarbonisation of the electrical grid.

A summary of the fixed building services inputs used for the 'Be Green' scenario can be found in **Appendix B**.

Photovoltaics (PV)

Photovoltaic solar cells convert solar energy directly into electricity. The advantage of photovoltaic cells is once they are installed, they require minimal maintenance over their operational life and have no primary fuel requirements.

The proposed roof area is allocated as plant area and a roof terrace. The proposed location of PV arrays is at roof level. A total of 30m² usable PV array is required over a few sections of roof with a modular efficiency of at least 17%, orientated south at an inclination of 30° to the horizontal. This could enable a 5kWp photovoltaic solar array to be installed.

Other Technologies

Other technologies were considered, however are not considered appropriate for the development. These include:

- **Wind Turbines:** The output from wind turbines is highly sensitive to wind speed. Hence it is essential that turbines should be sited away from obstructions, with a clear exposure, or fetch, for the prevailing wind. The urban nature of the site means these are not considered appropriate for this development.
- **Biomass:** Biomass in the form of logs, wood chips and wood pellets are classified as a renewable source of energy since the carbon dioxide emitted when the biomass is burned has been taken out of the atmosphere by the growing plants. Even allowing for emissions of carbon dioxide in planting, harvesting, processing, and transporting the fuel they will typically reduce net CO₂ emissions by over 90%. However, biomass boilers and their associated NO_x emissions would impact local air quality and therefore are not considered feasible for this development.
- **Solar Thermal:** Solar thermal collectors utilise solar radiation to heat water for use in buildings. Solar collectors are typically designed to meet a development's base heat load, associated with its domestic hot water requirements. However, the complexities involving the integration of pipework as well as the limited available roof space means that solar thermal collectors are not considered feasible for the development.

Be Green Results

The analysis indicates that the proposed development is performing significantly better than the minimum requirements of Part L of the Building Regulations and achieves an improvement of 24.6% over the Building Regulations Part L 2010 Target Emission Rate as highlighted below.

Part L2A 2010 End-uses Breakdown (kgCO ₂ /m ²)		
End-use	TER	BER
Heating	2.67	1.38
DHW	2.27	1.92
Cooling	1.52	1.28
Auxiliary	8.64	8.43
Lighting	8.65	5.03
Renewables	0	-0.13
Total	23.75	17.91
Improvement over TER		24.6%
Part L Status (BER<TER)		Pass

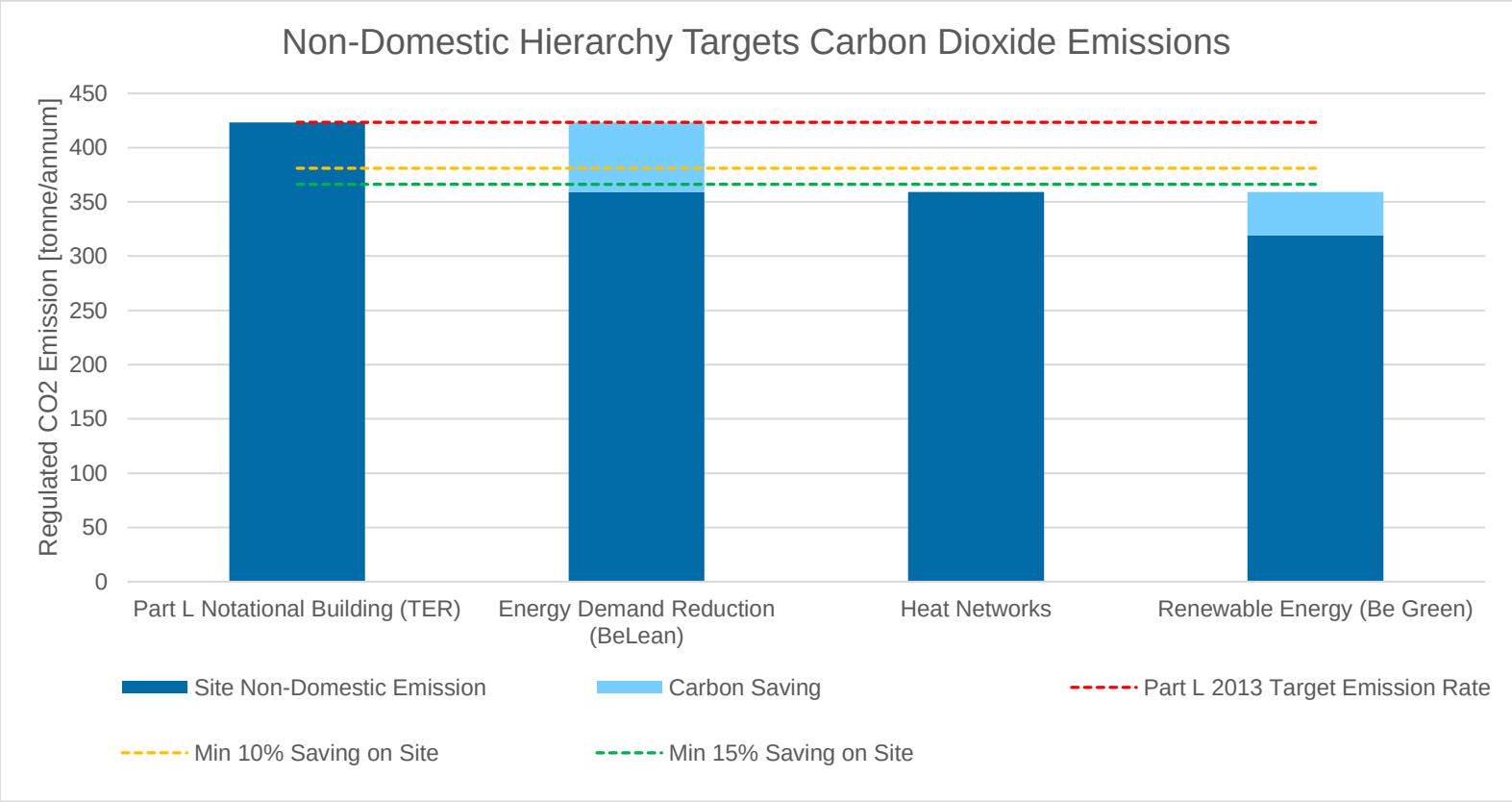
The BRUKL document's front page and technical data sheet can be found in **Appendix C**.

3.5 Proposed Energy Strategy

The analysis indicates that the proposed development is performing significantly better than the minimum requirements of Part L of the Building Regulations and achieves an improvement of 24.6% over the Building Regulations Part L 2010 Target Emission Rate as highlighted below.

A summary of the energy and sustainability policies and the developments performance against the targets is shown in the next page.

A summary of the fixed building services inputs used for the scenarios can be found in **Appendix B**.



	Guidance	Minimum Requirements	Summary of Performance								
Energy Strategy	<u>National</u> - National Planning Policy Framework – February 2019 - Building Regulations Part L2A 2013 <u>Regional</u> - Greater Manchester Plan for Homes, Jobs and the Environment: The Greater Manchester Spatial Framework (GMSF) Revised Draft 2020 (Whilst the GMSF is no longer being progressed, the replacement joint development plan, Places for Everyone, is currently being reviewed, we have taken note of the direction of travel of Greater Manchester policy to ensure the development meets the standard set out in the GMSF.) <u>Local</u> Manchester City Council Core Strategy	Objective 7: Ensure that Greater Manchester is a more resilient and carbon neutral city region. - Promote carbon neutrality of new development by 2028; - Promote sustainable patterns of development that minimise the need to travel and contribute to cleaner air; - Locate and design development to reduce car dependency; - Facilitate provision of infrastructure for cleaner vehicles; - Improve energy efficiency and the generation of renewable and low carbon energy. <u>Non-domestic development</u> <table><tr><th>Target</th><th>% minimum req.</th></tr><tr><td>Target 1: Network development area</td><td>CHP/district heating anchor Or connection or where not feasible, a 15% increase on Part L 2010</td></tr><tr><td>Target 2: Electricity intense buildings</td><td>+10% increase on Part L 2010</td></tr><tr><td>Target 3: Micro generation area</td><td>+15% increase on Part L 2010</td></tr></table>	Target	% minimum req.	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	+10% increase on Part L 2010	Target 3: Micro generation area	+15% increase on Part L 2010	The results indicate that the proposed development is achieving a 24.6% improvement over the Building Regulations Part L 2010 Target Emission Rate, using the SAP 2012 emissions factors. This exceeds the Manchester City Council Core Strategy target. A 15.2% carbon emissions reduction is achieved through energy efficiency measures ('Be Lean'), using the SAP 2012 emissions factors. The 'Be Lean' scenario utilises a centralised gas-fired boiler system to deliver the space heating and domestic hot water requirements. Based on NMC modelling guide, the notional building uses the same system type and fuel for hot water generation as the actual building. The analysis found that the use of renewables (air source heat pumps for heating and cooling and photovoltaic panels) could reduce CO₂ emissions by 9.4% for the development over a conventional HVAC configuration, using the SAP 2012 emissions factors. The BRUKL output is provided in Appendix C.
Target	% minimum req.										
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	+10% increase on Part L 2010										
Target 3: Micro generation area	+15% increase on Part L 2010										
Overheating Assessment	Manchester City Council Core Strategy	The need to control overheating of buildings through passive design.	The development will use a mixed mode strategy, using natural ventilation where possible, and switching to mechanical during periods of higher demand. As part of the façade adjacent to glazed areas, there are to be perforated panels with openable internal sections, that will provide free cooling during the day. There is a reduction in load due to lower energy lighting, solar control and improved fabric performance. There is no requirement for an overheating assessment.								
Sustainability Strategy	- Manchester City Council Core Strategy - Climate Change - Air quality - Sustainable drainage - Sustainable water - Noise - Ecology/ landscaping (Urban Greening) - Sustainable transport										
Compliance Tools	Manchester City Council Core Strategy	For new commercial developments to demonstrate best practice which will include the application of the BREEAM standards. By 2019 provisions similar to the Code for Sustainable Homes will also apply to all new non-domestic buildings.	BREEAM 'Excellent' rating is being targeted. The preliminary BREEAM assessment indicates that the development is currently likely to achieve 'Excellent'.								

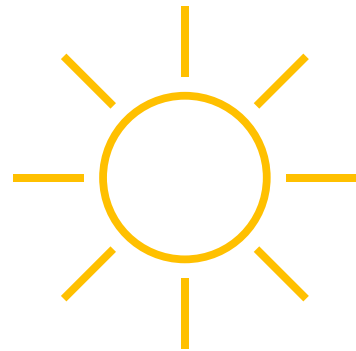
4.0

Health & Wellbeing



4.0 Health & Wellbeing

4.1 Daylight



Good daylight is an important factor in moderating people's circadian rhythm, which enhances productivity and regulates the sleep cycle. It is also a key factor in reducing energy consumption from artificial lighting.

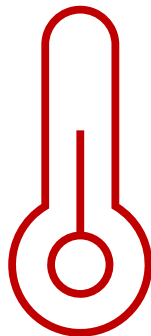
Achieving a perfect balance between thermal comfort, internal daylight and energy consumption is a main driver when establishing the location and size of windows and the glazing properties.

The elevations have been established using a balanced approach to glazing to ensure that all windows within elevations are providing maximum daylighting resulting in bright and airy space, but at the same time, no excessive heat enters the building during hot summer days.

Room depths enable occupants to have access to a view out, which is important in allowing the eyes to refocus after periods of deep focus.

Glare control measures such as blinds will allow occupants to regulate their own internal daylight conditions in line with their preferences.

4.2 Thermal Comfort



As climate change leads to rising summer temperatures, maintaining acceptable temperatures in occupied spaces is fundamental to creating productive, healthy & safe places for people to live and work. Maintaining good thermal comfort has been central to the project's shading, ventilation & cooling strategy.

Heat has been limited from entering the building through careful consideration of glazing. This must be balanced with a need for good daylight and solar heat in winter, so the use of shading and solar control glass has been considered.

The specification of LED lighting and energy efficient equipment has been considered for reducing the internal heat generation.

The development will be mechanically cooled and ventilated throughout, with manually openable sections behind perforated panels on the façade adjacent to glazed areas that will enable free cooling during the day.

4.3 Air Quality



Poor external air quality originates from the high number of vehicles, as well as plant and machinery such as boilers used to heat buildings, and the density of roads and building, which prevents effective dispersal of pollutants.

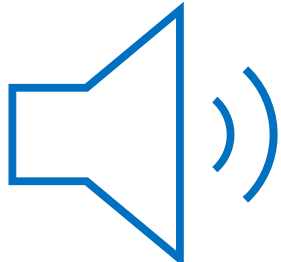
To protect occupants from the high levels of air pollution experienced at certain areas of the site, a background ventilation strategy that does not rely on openable windows will be adopted. Centralised Air Handling Units (AHU) with heat recovery will maintain a reliable and consistent supply of fresh air to occupants whilst avoiding excessive heat loss in winter. Where necessary, appropriate filtration will be installed to clean the incoming air into the building and ensure good standards of air quality.

The development proposal will not include the installation of any combustion plant for the purposes of generating heat or hot water. This will be entirely electric, therefore will not create any adverse effect on the local air quality for residents and neighbouring properties.

To maintain good internal air quality, internal finishes will be specified which have low or no emissions of VOCs and other harmful pollutants complying with European best practice levels as a minimum.

An air quality assessment has been carried out to support the development's planning application. Further details of the development's response to air quality can be found in the Air Quality Assessment report issued by Cundall in December 2021.

4.4 Acoustics



Acoustic comfort is important for occupant productivity, relaxation and rest. High noise levels which hinder this can have a range of adverse effects on people's mental and physical health.

For more details refer to the Noise Impact Assessment report issued by Cundall December 2021.



5.0 Transport

5.1 Walking & Cycling



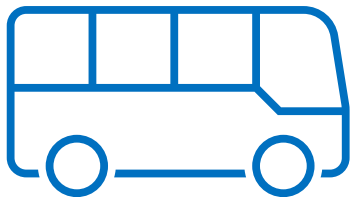
The transport of people between buildings is the second largest source of CO₂ emissions in the UK after energy use in buildings and remains the main source of many local pollutants. Energy use and emissions from transport are growing at 4% per year, while the effects of climate change are becoming more severe.

As part of the development, secure cycle spaces will be provided for occupants use to reduce reliance on car-based travel.

The site benefits from good walking and cycling links from the site to the surrounding areas, including:

- The area provides multiple options for safe cycling such as trails, dedicated lanes and bicycle-friendly roads.

5.2 Public Transport



The proposed development on First Street, Manchester, benefits from access to a comprehensive range of public transport services.

The Transport for Greater Manchester (TfGM) Oxford Road and Deansgate rail stations are located within a ten-minute walk of the site (500m away), providing services to other destinations in Manchester, as shown in the next figure.

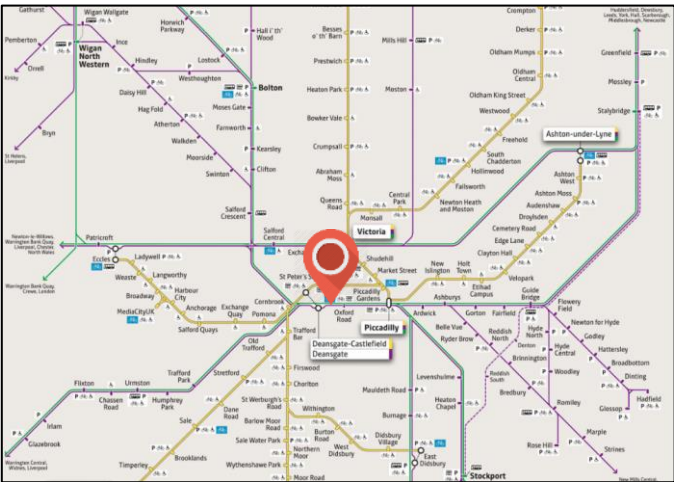


Figure 5-1. Greater Manchester Train and Tram Lines, Transport for Greater Manchester

There are bus stops on Medlock Street and Cambridge Street within a 100m walk, offering a high frequency service across the city centre.

Further details on the development's approach to sustainable transport can be found in the Transport Statement and Framework Travel Plan issued by Vectos December 2021.



6.0

Water

6.0 Water

6.1 Water Efficiency



Water consumption in the UK has risen by 70% over the last 30 years. Trying to meet the increasing demand by locating new sources of water supply is both expensive and damaging to the environment. Therefore, the design team have focused on reducing the demand for water and managing the existing resources.

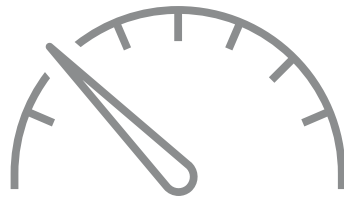
The aim is to minimise internal and external potable water use within the development. Good water management can contribute to reducing the overall level of water consumption maintaining a vital resource and having environmental as well as cost benefits in the lifecycle of the building.

Water consumption in the development will be limited to no more than 45 litres per person per day.

The following water saving measures are being considered throughout:

- **Dual Flush Cisterns on WC's** - It is proposed that these are used throughout the development in order to minimise water consumption.
- **Flow Restrictors to Taps** - Flow restrictors reduce the volume of water discharging from the tap. Spray taps have a similar effect and are recommended to reduce both hot and cold-water consumption.
- **Low Flow Showers** - The average shower uses 15 litres of water a minute, however by restricting the output of any showers in the development to lower rate, a significant water saving can be achieved. Flow rates can be reduced to 6 litres/minute without compromising on water pressure and hence will be considered as the design develops.

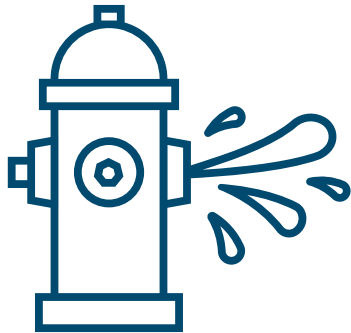
6.2 Water Monitoring



In 2017, approximately 5.3 billion cubic meters of water were abstracted for public water supply, making up over half of all water abstracted in the UK. To reduce this figure, accurate information on usage is required for management of a building's consumption.

Water meters will be specified on the main supply and sub-metering in line with the BREEAM requirements.

6.3 Leak Prevention and Detection



To minimise the risks of major water leaks occurring, a water leak detection will be installed. The flowrate of the incoming water meter will be monitored by a leak detection system, which will highlight when there is a significant rise in water consumption, indicating a major leak within the building.

The leak detection system can be standalone or can be integrated within the Building Management System (BMS). It will feature programmable thresholds to suit the specific consumption of the building and an audible alarm if those thresholds are exceeded. It will also be designed to avoid false alarms by normal operation of large water consuming plant.

As well as a major leak detection system, minor leaks will be prevented through automatic flow control devices within each WV/facility. These will feature solenoid valves within the cold-water supply to each area, linked to the occupancy sensors within the space. This will minimise water leaks and wastage from sanitary fittings.

6.4 Irrigation



External irrigation can also contribute towards significant water consumption if not appropriately managed. External planting on the roof area, will utilise plants which are adapted to the local climate and can rely on precipitation alone for the majority of the year.

The incorporation of a **blue roof** can offer temporary storage of rainfall to mitigate runoff impacts and storage for reuse such as irrigation.

6.5 Sustainable Urban Drainage

A surface water drainage assessment has been carried out for the development to examine opportunities to reduce the overall level of flood risk through the appropriate application of sustainable drainage systems. The assessment demonstrates that there is scope for various SuDS features that can restrain runoff to mitigate the risk of future surface water flooding, taking into account potential climate changes.

Further details on the development's approach can be found in the Proposed Drainage Strategy and Flood Risk Assessment issued by Ramboll.



7.0

Materials

7.0 Materials

7.1 Responsible Sourcing & Procurement

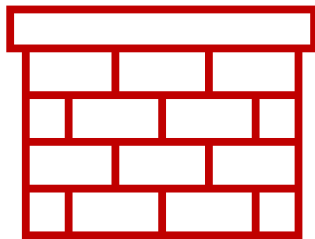


All timber used for basic or finishing building elements in the scheme will be sourced from responsibly managed and sustainable forests or plantations. Such timber products are the only truly renewable construction material in common use and the responsible management of forests for timber helps to lock in CO₂. By maximising the use of timber for structural or finishing purposes the embodied carbon impact of the development can be reduced.

The development recognises the importance of using locally sourced materials, which it will aim to consider throughout the design. Preference will be given to locally sourced materials wherever practical. Materials will be sourced from reasonable sources where possible, including ISO 14001 and BES 6001.

Much of the responsibility for materials procurement falls to the contractor, therefore they will aim to procure all materials in accordance with a documented sustainable procurement plan. This sets out a clear framework for the responsible sourcing of materials to guide those involved in the specification and procurement of materials throughout a project. It is intended to identify risks & opportunities against a broad range of social, economic & environmental issues, and provide a strategic assessment of sustainably sourced materials available locally or nationally. This will also contain a policy to procure materials locally where possible. This is to reduce the environment impacts and CO₂ emissions associated with transportation to the site.

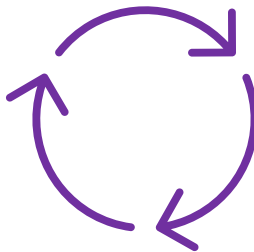
7.2 Durability and Resilience



In order to ensure the longevity of the materials used in the building construction and avoid the need for replacement, durability & protection measures will be specified where appropriate. This will prevent damage to vulnerable parts of the building, such as high pedestrian traffic areas, external vehicular collision and areas with internal vehicle/storey movement.

The building elements will also be designed to incorporate appropriate measures to limit material degradation due to environmental factors. This includes degradation due to factors such as temperature variation, water/moisture damage, pollutants etc.

7.3 Material Efficiency



Material use will be reduced or optimised through design, specification and construction techniques. Targets will be set and monitored throughout the construction process to achieve the objective. This is to reduce the environmental impact through optimising the use of materials during all stages of the project.

7.4 Healthy Materials



Volatile organic compounds (VOCs) are emitted as gases (commonly referred to as off-gassing) from certain solids or liquids. VOCs include a variety of chemicals, some of which are known to have short-term and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors.

VOCs are emitted by a wide array of products numbering in the thousands. Examples include paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials, furnishings, adhesives, Urea-formaldehyde foam insulation (UFFI), pressed wood products (hardwood plywood wall panelling, particleboard, fibreboard) and furniture made with these pressed wood products.

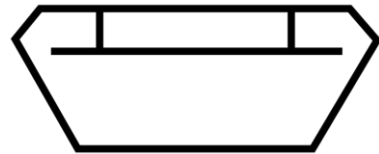
'No' or 'low' VOC paints are available from most standard mainstream paint manufacturers. The 'eco-friendly' paints are made from organic plant sources and powdered milk-based products.

The design team will select internal finishes and fittings with low or no emissions of VOCs and comply with European best practice levels as a minimum.



8.0 Waste

8.1 Construction Waste Management



During the construction phase, a large amount of waste material will be generated through construction, demolition, and land clearing procedures. In building construction, the primary waste products in descending percentages are wood, asphalt/concrete/masonry, drywall, roofing, metals, and paper products.

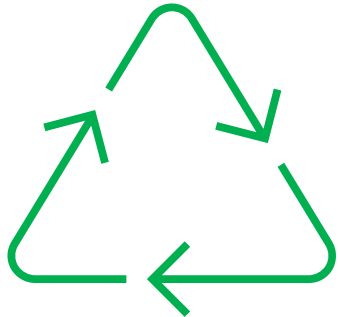
Prior to commencement on site a Resource Management Plan (RMP) that complies with the requirements of current legislation and BREEAM will be prepared. This plan will identify the local waste haulers and recyclers, determine the local salvage material market, identify and clearly label site spaces for various waste material storage and require a reporting system that will quantify the results and set targets. As a minimum, the RMP will contain:

1. The target benchmark for resource efficiency i.e. m^3 of waste per 100m^2 or tonnes of waste per 100m^2 .
2. Procedures and commitments to minimise non-hazardous waste in line with the target benchmark.
3. Procedures to minimise hazardous waste.
4. A waste-minimisation target and details of waste minimisation actions to be undertaken.
5. Procedures to estimate, monitor, measures and report on hazardous and non-hazardous site waste and demolition waste, where relevant, arising from work carried out by the principal contractor and all subcontractors. Waste data obtained from licensed external waste contractors needs to be reliable and verifiable, i.e. using data from EA/SEPA/EA Wales/NIEA waste return forms or from a PAS402 compliant company.
6. Monthly reporting of all construction waste data throughout the project checked against what would be expected based on the stage of the project, invoices, etc., to validate completeness of waste reporting data.

7. Procedures to sort, reuse and recycle construction waste into defined waste groups, either on site or through a licensed external contractor.
8. Procedures to review and update the plan.
9. The name or job title of the individual responsible for implementing the above.

The development's target is to achieve more than 90% of construction waste be diverted away from landfill.

8.2 Operational Waste



The detailed design phases will identify the potential waste streams that the development will produce. As a minimum, plans will be formulated to handle the separation, collection, and storage of common recyclable materials such as paper, glass, plastics, and metal. The collection points will be easily accessible to all users.

The main aim will be to recycle as much waste as possible, this will be achieved by making sure that waste recycling facilities are strategically placed in convenient locations.

Dedicated storage space for recyclable materials generated by the site during occupation, will include the following:

- Be clearly labelled to assist with segregation, storage and collection of the recyclable waste streams.
- Be placed within accessible reach to building occupants or facilities operators for the deposit of materials and collections by waste management contractors
- Of a capacity appropriate to the building type, size, number of units (if relevant) and predicted volumes of waste that will arise from daily or weekly operational activities and occupancy rates.

Cundall will be preparing a waste proforma as required by Manchester City Council.

9.0

Land Use & Ecology



9.0 Land Use & Ecology

Biodiversity of wildlife, plants and their habitats is a vital component of healthy, well-functioning ecosystems, which in turn sustain all life on the planet.

In response to the ecological emergency developments should aim to increase local ecology and diversity.

The development's roof terrace area will be used as amenity area offering the occupants vital outdoor space. The development will provide a high-quality public realm treatment including proposed tree planting along the highway edge that will create a microclimate and enhance biodiversity of the site.

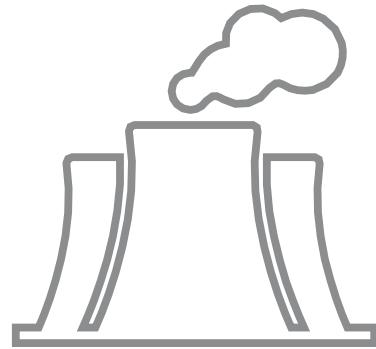
For more details refer to the Design & Access Statement issued by Jon Matthews Architects.

10.0

Pollution

10.0 Pollution

10.1 Local Air Pollution



Global concern for environmental pollution has risen in recent years, as concentrations of harmful pollutants in the atmosphere are increasing. Buildings have the potential to create major pollution both from their construction and operation, largely through pollution to the air (dust emissions, NOx emissions, ozone depletion and global warming) but also through pollution to watercourses and ground water. The proposed development will aim to minimise the above impacts, both at the design state and onsite.

The development will feature no on-site combustion for the provision of heating and hot water. All services will be electrically driven. As well as supporting the development's low emission aspirations, this has the added benefit of negating its impact on local air quality.

There will be an emergency backup diesel generator for the office floors, to be located at roof level, and a space has been allocated for a similar sized tenant standby generator at ground floor level with flue at high level ground floor on the centre of the eastern façade. Anticipated use is expected to be 26hours a year per unit, associated with 30-minute weekly testing.

Further details of the development's response to air quality can be found in the Air Quality Assessment report issued by Cundall.

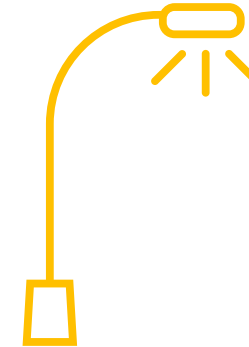
10.2 Sustainable Urban Drainage



A flood risk assessment (FRA) and Drainage Strategy has been prepared for this development in support of the planning application. The FRA is used to establish the risk of flooding to the development and from the proposed development to the vicinity.

Further details on the site's flood risk and sustainable drainage strategy can be found in the Proposed Drainage Assessment Strategy issued by Ramboll.

10.3 Light Pollution

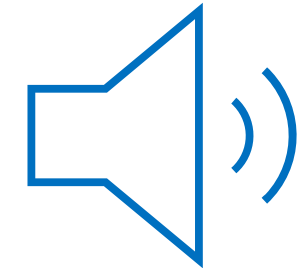


External lighting encompasses vehicle and pedestrian access lighting, security lighting, facility illumination and general feature lighting. The lighting will be designed on a site wide basis to meet the mandatory requirements and aesthetic considerations. The strategy is to provide a balance between adequate external lighting for safe and secure operation of the site without unnecessary illumination or power consumption.

The intention is to be a good neighbour and not to introduce nuisance glare or light pollution of the night sky from misdirected or unnecessary lighting. Feature lighting, where required, will be focussed to the task/subject. Where necessary, luminaires will be further screened in cases where there may be an issue of proximity and light spill to adjacent neighbouring residential areas, although the intention is to avoid this situation wherever possible from the outset. The external lighting design will take into consideration the relevant guidance from the British Standards and other recommended documents including the following Standards and Design Guides:

- CIBSE Lighting Design Guides
- BS5489 Code of Practice for the Design of Road Lighting
- BS EN 13201-1&2 Road Lighting
- Institute of Lighting Engineers Guidance for Reduction of Obtrusive Light

10.4 Noise Pollution



New developments can have an adverse impact on their local surroundings by creating nuisance noise that did not exist before. It is therefore important to understand and limit this noise to avoid disturbances.

Any new items of building services plant will need to be selected, installed, and attenuated such that the local authority noise criteria are achieved. It is proposed that noise from any new items of building services plant associated with the development be designed to meet the BS4142:2014 requirements.

For more details refer to the Noise Impact Assessment report issued by Cundall in December 2021.



11.0

Environmental Certification

11.0 Environmental Certification

A pre-assessment has been carried out using the BREEAM 2018 New Construction methodology, shell and core office building.

The results of the assessment indicate that the current design is likely to achieve a BREEAM ‘Excellent’ rating, with a score of 77.69%.

The threshold for an ‘Excellent’ rating is 70%, Cundall recommends a 4-5% additional buffer to mitigate against any unforeseen credit loss throughout the design stages.

BREEAM groups its sustainability rating under the following nine headings:

- Management - Commissioning and construction site management
- Health & Wellbeing - Indoor and external issues
- Energy Use - Operational energy and CO2 issues
- Transport - Transport related CO2 and location related factors
- Water - Consumption and water efficiency
- Materials - Environmental implication of building materials
- Waste – Operational and construction waste resource efficiency
- Land Use & Ecology - Ecological value of the site
- Pollution - Air & Water pollution

The overall rating of the building is constructed by achieving ‘credits’, which represent particular management, design or performance aspects of the building, as stipulated by BREEAM. The building must achieve the relevant mandatory credits, as well as other credits which contribute towards an overall target score. This score is used to determine what BREEAM rating the building achieves.

The following table summarise the initial strategy to achieve BREEAM ‘Excellent’ rating.

Environmental Section	Available	Weighting	Excellent	Section score
Management	18	11%	18	11.00%
Health & Wellbeing	11	8%	10	7.27%
Energy	22	14%	16	10.18%
Transport	12	11.5%	10	9.58%
Water	9	7%	8	6.22%
Materials	14	17.5	8	10.00%
Waste	10	7%	7	4.90%
Land Use & Ecology	13	15%	10	11.54%
Pollution	12	9%	8	6.00%
Exemplary/Innovation	10	10%	1	1.00%
Total	131	110	96	77.69%
Excellent				

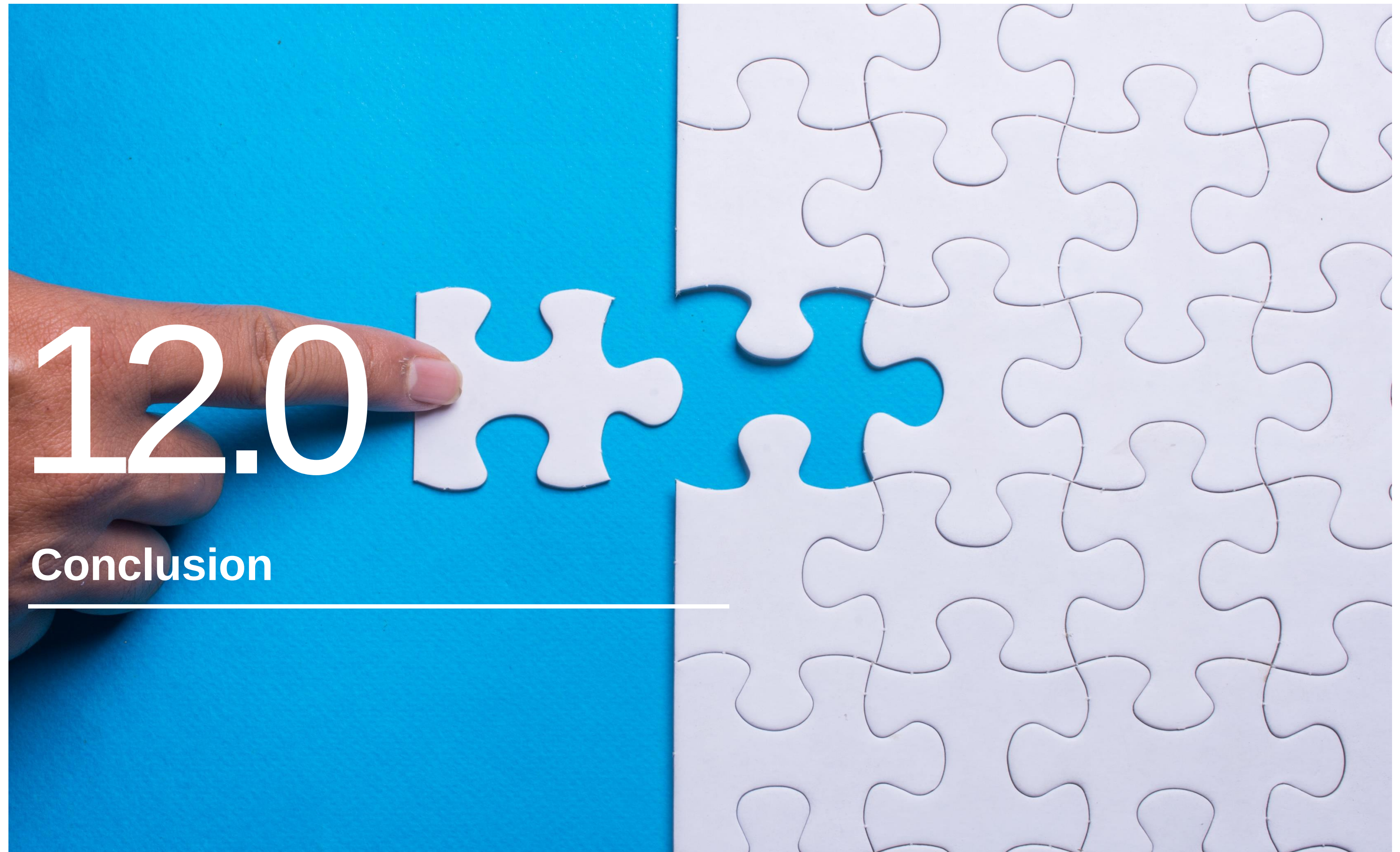
The minimum standards for ‘Excellent’ rating for BREEAM UK 2018 New Construction, non-domestic buildings are shown below:

BREEAM issue	Minimum standards by BREEAM rating level				
	Pass	Good	Very Good	Excellent	Outstanding
Man 03 Responsible construction practices	None	None	None	One credit (responsible construction management)	Two credits (responsible construction management)
Man 04 Commissioning and handover	None	None	One credit (commissioning-test schedule and responsibilities)	One credit (commissioning-test schedule and responsibilities)	One credit (commissioning-test schedule and responsibilities)
Man 04 Commissioning and handover	None	None	Criterion 11 (Building User Guide)	Criterion 11 (Building User Guide)	Criterion 11 (Building User Guide)
Man 05 Aftercare	None	None	None	One credit (commissioning-implementation)	One credit (commissioning-implementation)
Hea 01: Visual comfort	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Ene 01 Reduction of energy use and carbon emissions	None	None	None	Four credits (Energy performance or Prediction of operational energy consumption*)	Six credits (Energy performance) and Four credits (Prediction of operational energy consumption*)
Ene 02 Energy monitoring	None	None	One credit (First sub-metering credit)	One credit (First sub-metering credit)	One credit (First sub-metering credit)
Wat 01 Water consumption	None	One credit	One credit	One credit	Two credits
Wat 02 Water monitoring	None	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Mat 03 Responsible sourcing of construction products	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only	Criterion 1 only
Wst 01 Construction waste management	None	None	None	None	One credit
Wst 03 Operational waste	None	None	None	One credit	One credit

**For the 'Prediction of operational energy consumption', it must be demonstrated that the operational energy performance has been substantially improved.*

Please note that for speculative developments where the tenant is not known, the criteria set on Man 05 Aftercare are not applicable, and therefore the Commissioning implementation minimum requirement for ‘Excellent’ rating is not applicable.

Please refer to BREEAM planning pre-assessment PFS-CDL-XX-XX-RP-SY-70220 issued by Cundall for further details regarding the credit requirements and evidence needed to complete the Design Stage Assessment.



12.0

Conclusion

12.0 Conclusions

The Plot 9a, First Street, Manchester development's energy and sustainability approach is aligned with the Manchester City Council planning requirements.

The energy strategy has been developed in accordance with the industry recognised Energy Hierarchy, Be Lean, Be Clean and Be Green, utilising the SAP 2012 emission factors to present the results.

- Be Lean' - **Energy demand** will be reduced by achieving a well-insulated envelope that is an improvement on Building Regulation values, which is both airtight and thermal bridge free. High performance glazing provides a positive energy balance whilst mechanical ventilation with heat recovery maintain good air quality with minimal heat loss. **Energy efficient** building systems such as LED lighting and low-power fans and pumps will further drive down regulated energy use. Robust quality control, commissioning and handover procedures on site will further drive down energy use.
- 'Be Clean' - Combined heat & power was considered however this has been discounted due to poor base load and desire to avoid on-site combustion of fossil fuels. Connection to the district heating scheme was also considered however the distance from the existing network means connection would be infeasible.
- 'Be Green' - The remaining energy demand will be met through **low and zero carbon** energy sources. The development's heating, cooling and part of the hot water needs will be provided through efficient air-source heat pumps.

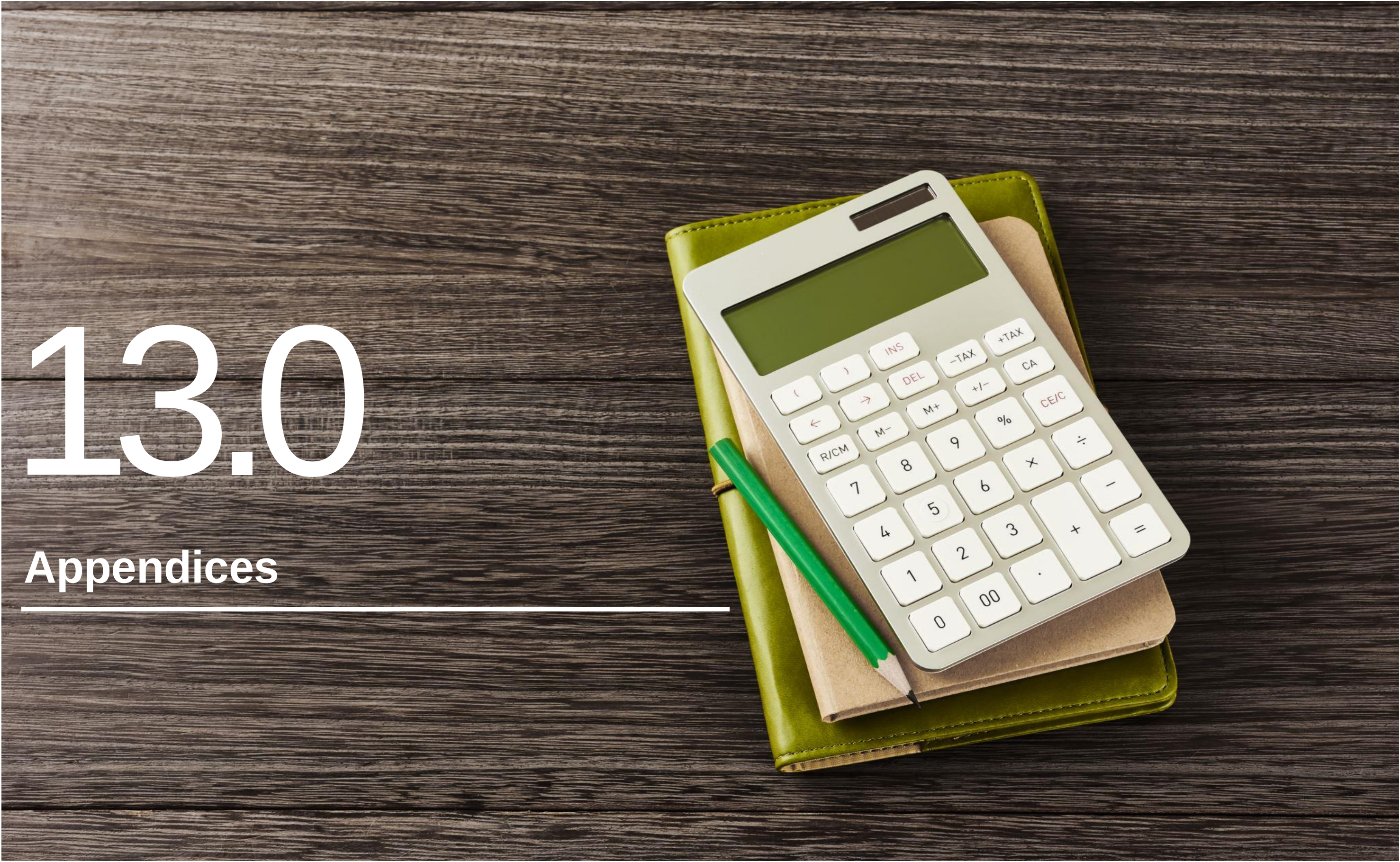
Through the above measures, the proposed development is performing significantly better than the minimum requirements of Part L of the Building Regulations and achieves an improvement of 24.6% over the Building Regulations Part L 2010 Target Emission Rate, which surpasses those outlined in the Manchester City Council Core Strategy.

In line with Manchester City Council policies and aspirations, other sustainability measures include:

- **Good daylight** will be achieved in occupied spaces through the balanced and considered use of glazing. High performance glazing will reduce energy loss.
- As part of the façade adjacent to glazed areas, there are to be automatically openable vents, that will provide free cooling during periods of lower demand. If demand exceeds the natural ventilations capabilities, the development will be mechanically cooled. This strategy ensures **thermal comfort** under normal operational hours.
- Mechanical ventilation with heat recovery will be used to maintain a consistent supply of filtered fresh air to maintain good **indoor air quality**. Low VOC materials and finishes will minimise internal sources of pollutants.
- The promotion of **walking and cycling** with strong connection links from the site to the surrounding area. This is further supported with the provision of cycle storage facilities for occupant use.
- Good **public transport** links in the immediate vicinity with further national links in the nearby city centre.
- **Water efficient** fixtures and fittings will be specified to reduce water consumption below the levels required for national building regulations.
- **Metering and sub-metering** of consumption will enable ongoing, targeted reductions in water use.
- **Leak detection and shut-off** will prevent both major and minor leaks within the buildings as well as in external areas.
- The need for **irrigation** will be minimised through appropriate landscaping which are adapted to the UK's conditions.
- All **timber** used in the project will be from a responsible or sustainable source, using certified FSC or PEFC sources.
- To ensure **responsible and sustainable procurement**, materials will be specified in line with a documented sustainable procurement plan. This will include the use of certification schemes such as ISO14001 and BES 6001.
- Materials that are **durable and resilient** will be specified to maximise their lifespan and avoid the need for disposal and replacement.
- The use of a **Resource Management Plan** will set targets for resource efficiency and procedures for waste management.
- Appropriate and accessible **waste facilities** will be provided to encourage occupants to recycle waste effectively.
- Using the roof area to integrate biodiversity and create a microclimate for planting, green walls and rainwater gardens.
- **Diversity of planting** to create valuable habitat throughout the seasons.
- The incorporation of a **blue roof** can offer temporary storage of rainfall to mitigate runoff impacts and storage for reuse such as irrigation.
- The site will feature no **on-site combustion** for heating and hot water which would be detrimental to local air quality.
- **External lighting** will be designed to minimise the impact of light pollution. Light fittings will be specified with a reduced light spill and

controlled using photocells and timeclocks to limit unnecessary operation.

- Limits to noise emitting plant to prevent impacts on its surroundings.
- Responsible construction practices to minimise resource use and the impact of noise, dust, and pollution.



13.0

Appendices

Appendix A – Policy

A review into the anticipated statutory compliance requirements in relation to sustainability has been undertaken. A summary of the finds, applicable policies and likely necessary actions has been provided below. Full planning guidance and validation requirements should be sought from the project's planning consultant.

National Planning Policy Framework

The revised National Planning Policy Framework (NPPF) was published in February 2019 and sets out the government's planning policies for England and states a clear presumption in favour of sustainable development. The revised Framework replaces the previous NPPF published in July 2018.

The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encourages the reuse of existing resources, including conversion of existing buildings, and encourages the use of renewable resources.

The NPPF, Section 14 outlines its energy and climate change policies. New developments should be planned for in ways that:

- avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and
- can help to reduce greenhouse gas emissions, such as through its location, orientation, and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
- consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
- identify opportunities for development to draw its energy supply from decentralised, renewable, or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

In determining planning applications, local planning authorities should expect new development to:

- comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the

applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

- take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

The key focus of the NPPF is to support local and regional planning authorities.

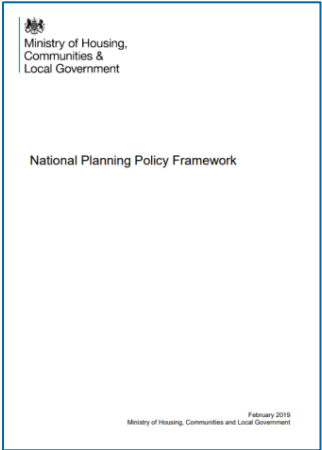


Figure A-1. Relevant planning documentation

Regional Policy

12.1 Regional Policy

The Greater Manchester Plan for Homes, Jobs and the Environment: The Greater Manchester Spatial Framework (GMSF) Revised Draft 2019 is the benchmark for Manchester planning regulation. It provides a useful tool to undertake energy and sustainability assessments.

Greater Manchester Plan for Homes, Jobs and the Environment: The Greater Manchester Spatial Framework Revised Draft 2019

Greater Manchester's Vision is to be at the forefront of action on climate change and to make its 'fair' contribution to international commitments on climate change. To achieve this Greater Manchester will need to:

- Be 'carbon neutral' by 2038
- Hold cumulative carbon dioxide emissions to within the Greater Manchester carbon budget
- Initiate a programme of mitigation to reduce emissions including by:
 - Significantly upscaling photovoltaic energy;
 - Reducing heat demand in homes;
 - Moving away from carbon intensive gas as the primary source of heat;
 - Reducing heating and cooling demand for public and commercial buildings; and
 - Increasing biofuel use.

Following is an outline of the relevant objectives and policies for the Framework:

Objective 7 : Ensure that Greater Manchester is a more resilient and carbon neutral city-region.

To meet the 2038 carbon neutrality target, the Greater Manchester will:

- Promote carbon neutrality of new development by 2028;
- Promote sustainable patterns of development that minimise the need to travel and contribute to cleaner air;
- Locate and design development to reduce car dependency;
- Facilitate provision of infrastructure for cleaner vehicles;
- Improve energy efficiency and the generation of renewable and low carbon energy.

Policy GM-S 2: Carbon and Energy

The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including:

1. Securing a sustainable pattern of development;

2. Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy;
3. Taking a positive approach to renewable and low carbon energy schemes;
4. Keeping fossil fuels in the ground;
5. Planning for a balanced and smart electricity grid by identifying geographical locations which could support energy assets;
6. Increasing carbon sequestration through the restoration of peat-based habitats, woodland management and tree-planting;
7. Development of Local Energy Area plans to develop cost effective pathways to achieve carbon targets; and
8. An expectation that new development will:
 - a. Be zero net carbon from 2028 by following the energy hierarchy (with any residual carbon emissions offset), which in order of importance seeks to:
 - i. Minimise energy demand;
 - ii. Maximise energy efficiency;
 - iii. Utilise renewable energy;
 - iv. Utilise low carbon energy; and
 - v. Utilise other energy sources.
 - With an interim requirement that all new dwellings should seek a 19% carbon reduction against Part L of the 2013 Building Regulations.
 - b. Incorporate adequate electric vehicle charging points to meet likely long-term demand;
 - c. Where practicable, connect to a renewable/low carbon heat and energy network;
 - d. Achieve a minimum 20% reduction in carbon emissions (based on the dwelling emission or building emissions rates) through the use of on site or nearby renewable and / or low carbon technologies; and
 - e. Include a carbon assessment to demonstrate how the design and layout of the development sought to maximize reductions in whole life CO2 equivalent carbon emissions.

District Local Plans may set out specific carbon emission reduction targets or promote other measures through which energy efficiency of buildings can be achieved.

Policy GM-S 3: Heat and Energy Networks

The provision of decentralised energy infrastructure is critical to the delivery of Greater Manchester's objectives for low carbon growth, carbon reductions and an increase in local energy generation. The following measures will help to achieve this:

1. Delivery of renewable and low carbon energy schemes will be supported with particular emphasis on the use of decentralised energy networks in areas identified as "Heat and Energy Network Opportunity Areas". These will be identified where:
 - a. Existing heat/energy networks are operational or have been commissioned;

- b. Proposals for new heat networks/energy networks are being progressed, or future opportunities have been identified in city-region master planning.
 - c. Sufficient density of existing heat demand occurs(31); and
 - d. Significant future development is proposed at the strategic development locations.
2. Within the identified "Heat and Energy Network Opportunity Areas", there will be:
 - a. A requirement that new residential developments over 10 dwellings or other developments over 1,000 m² floorspace should evaluate the viability of:
 - i. Connecting to an existing or planned heat/energy network (where such a network has been identified within the Heat Network Opportunity Areas); and/or
 - ii. Installing a site-wide or communal heat/energy network solution.
 - b. A requirement, where unviable to connect to an existing network or install a site-wide or communal heat/energy network, for new development to incorporate appropriate capability to enable future connection (e.g. adequate space in plant-room for plate heat exchangers, capped-off flow/return connections);
 - c. A 'presumption in favour of network connection' where new residential developments over 10 dwellings and other developments over 1,000 sq m floorspace are within 500m of an existing heat network, or where a network is being delivered;
 - d. An expectation that new industrial development will demonstrate that opportunities for using waste heat locally have been fully examined, and included in proposals unless proven to not be viable;
 - e. An expectation that where publicly-owned buildings and assets adjoin new major development sites, opportunities for these buildings and assets to connect to site-wide proposals will be considered; and
 - f. An expectation that any site-wide networks will be designed so as to enable future expansion to adjoining buildings or assets as appropriate.
 3. In support of the above, all decentralised heat/energy network viability assessments are required to demonstrate consideration and analysis of:
 - a. Identification of existing and proposed heat/energy loads;
 - b. Identification of heat/energy supply sources;
 - c. Identification of opportunities to utilise renewable and low carbon energy sources;
 - d. Identification of opportunities to utilise waste and secondary heat sources;
 - e. Impact of proposals and technology choices on local air quality;
 - f. Design according to national best practice in relation to efficient heat network design(e.g. CIBSE CP1 Heat Networks: Code of Practice for the UK, or equivalent); and

- g. Adopting appropriate consumer protection standards (e.g. HeatTrust, or equivalent).

12.2 Local Policy – Manchester City Council

Manchester City Council Council's Core Strategy was adopted in July 2012 and is the key development plan within the Local Development Framework. Policy EN 4 outlines the Manchester City Council's response to climate change by reducing CO₂ emissions in developments. Policy EN 6 outlines the targeted CO₂ emissions reductions for the proposed development from low or zero carbon energy supplies.

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;
- The use of building materials with low embodied carbon in new development and refurbishment schemes;

EN 6: Target Framework for CO₂ reductions from low or zero carbon energy supplies

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.

Non-domestic CO ₂ 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 (>45 kg CO ₂ /m ²))	+10%increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Figure A-2 Non-domestic CO₂ emissions reduction targets

EN 8: Adaption to Climate Change

All new development will be expected to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:

- 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

EN 14: Flood Risk

In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).

In addition to the requirements for site-specific Flood Risk Assessments (FRAs) set out in PPS25, an appropriate FRA will also be required for all development proposals, including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.

All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure.

Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.

The City of Manchester contains many sections of rivers which are culverted or 'hidden'; where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure.

EN 15: Biodiversity and Geological Conservation

The Council will seek to maintain to enhance sites of biodiversity and geological value throughout the City. Particular consideration will be given to:

- The Council's objective to protect and conserve the City's existing trees and woodlands and the aim for a net increase in trees across the City.

Developers will be expected to identify and implement reasonable opportunities to enhance, restore or create new biodiversity, either on-site or adjacent to the site, contributing to linkages between valuable or potentially valuable habitat areas where appropriate.

EN 16: Air Quality

The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.

When assessing the appropriateness of locations for new development the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas.

EN 17: Water Quality

With reference to the Manchester-Salford-Trafford SFRA and other relevant documents:

- Development should avoid any adverse impact on water quality, including during the construction phase, and wherever possible should seek to enhance water quality, both chemical and ecological;
- Development should minimise surface water run-off from development and associated roads, and maximise the use of appropriate sustainable drainage systems, to minimise groundwater contamination, and to avoid pollutants reaching watercourses;

- Development close to a watercourse should also ensure that waste or litter cannot enter the watercourse from the site;
- Development should, where feasible and appropriate, seek to open up any culverted or hidden watercourse beneath the site to improve the ecological status of that watercourse.

T 1: Sustainable Transport

To deliver a sustainable, high quality, integrated transport system to encourage modal shift away from car travel to public transport, cycling and walking, to support the needs of residents and business and to prepare for carbon free modes of transport.

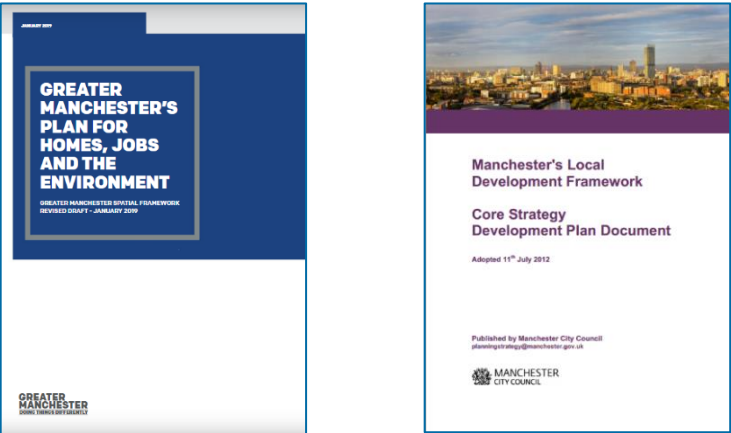


Figure A-3. Relevant planning documentation

Appendix B – Services Input

The tables below provide a summary of the fixed building services inputs used for the ‘Be Lean’ and ‘Be Green’ scenarios of the development.

Space Heating & Cooling:	
IES System	ASHP with Mech Vent – Offices
NCM Type	Fan coil systems
Space heating emitters type 1	FCU
Space heating fuel type 1	Electricity
Space heating seasonal efficiency type 1 (SCOP)	2.8
Space cooling emitters	FCU
Space cooling fuel	Electricity
Space cooling seasonal efficiency (SEER)	5.51
Space cooling nominal efficiency (EER)	3.48
Ventilation type	Central AHU
AHU SFP central (W/l/s)	1.8
Heat recovery type 1	Thermal Wheel
Heat recovery efficiency type 1	80.0%
IES System	ASHP with Mech Vent – Toilets and changing rooms
NCM Type	Other local room heater - unfanned
Space heating emitters type 2	Radiant heater
Space heating fuel type2	Electricity
Space heating seasonal efficiency type 2 (SCOP)	2.8
Cooling Type	None
Ventilation type	Central AHU
AHU SFP central (W/l/s)	1.6
Heat recovery type 1	Plate heat exchanger
Heat recovery efficiency type 1	80.0%

Domestic Hot Water (DHW):	
IES System	DHW 1 - ASHP
NCM Type	Central heating using water: radiators
DHW heating type	Heat pump
DHW heating fuel	Electricity
DHW heating seasonal efficiency (%)	280
DHW heating delivery efficiency (%)	90.0
DHW heating storage volume (L)	2000
DHW heating storage losses (kWh/(l day))	0.0026

Lighting:	
Luminaire efficacies (Lm/cW) - offices, reception	100
Luminaire display efficacies (Lm/cW) - reception	30
Luminaire efficacies (Lm/cW) - other	80
Lighting controls - offices, reception, circ, toilets, chng rms	Auto on / Auto off
Daylight dimming (applied to perimeter zones 6.0m deep) - offices, reception	Yes
Time Switch (photoelectric / occupancy)	No / No
Parasitic power (photoelectric / occupancy) - Offices only	0.1/ 0.1

Other:	
Pump speed	Variable Speed - Multiple pressure sensors
HVAC systems metering	Yes
HVAC systems out of range warning	Yes
Lighting systems metering	Yes
Lighting systems out of range warning	Yes
Power factor correction	>0.95

Community Heating	Base Case
None	-

PV	Value
Module nominal efficiency	0.17
Module array type	Monocrystalline
Array size (m2)	30
Azimuth (°)	180
Inclination (°)	30
Shading factor	-

DHW circulation losses calculations	Value
Loop length (m)	145
Circulation losses (W/m)	15
Pump power (kW)	0.16
Time Switch	Yes

Appendix C – Be Lean and Be Green BRUKL Document

Be Lean BRUKL output document

BRUKL Output Document

 HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

Plot 9a First Street Be Lean

As designed

Date: Tue Dec 21 19:46:15 2021

Administrative information

Building Details

Address: First Street, Manchester,

Certification tool

Calculation engine: Apache

Calculation engine version: 6.4.0.16

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 6.4.0.16

BRUKL compliance check version: v4.1.h.0

Certifier details

Name: Darnell Fox

Telephone number:

Address: Fourways House, Manchester, M1 2EJ

Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target

1.1	CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	23.8
1.2	Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	23.8
1.3	Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	20.2
1.4	Are emissions from the building less than or equal to the target?	BER <= TER
1.5	Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

2.a Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.22	0.22	GF000000:Surf[2]
Floor	0.25	0.15	0.15	GF000000:Surf[3]
Roof	0.25	0.1	0.1	BC000001:Surf[3]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	1F000008:Surf[0]
Personnel doors	2.2	0.61	1.4	GF000026:Surf[0]
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	1.4	1.4	GF000004:Surf[4]

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]

U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]

U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** 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.

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

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	3

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	17824.7	17824.7
External area [m ²]	11396.3	11396.3
Weather	MAN	MAN
Infiltration [m ³ /hm ² @ 50Pa]	3	5
Average conductance [W/K]	5702.77	6680.87
Average U-value [W/m ² K]	0.5	0.59
Alpha value* [%]	10.11	10

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

Building Use

% Area	Building Type
	A1/A2 Retail/Financial and Professional services
	A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
100	B1 Offices and Workshop businesses
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	C1 Hotels
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: Crown and County Courts
	D2 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	8.4	13.47
Cooling	4.87	3.01
Auxiliary	16.75	17.15
Lighting	9.97	17.17
Hot water	12.95	11.47
Equipment*	38.13	38.13
TOTAL**	52.94	62.27

* Energy used by equipment does not count towards the total for 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
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	73.85	81.52
Primary energy* [kWh/m ²]	114.02	134.43
Total emissions [kg/m ²]	20.2	23.8

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

Be Green BRUKL output document

BRUKL Output Document

 HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name	
Plot 9a First Street Be Green	As designed
Date: Tue Dec 21 19:50:22 2021	

Administrative information

Building Details

Address: First Street, Manchester,

Certification tool

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Calculation engine version: 6.4.0.16

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Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

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Roof	0.25	0.1	0.1	BC000001:Surf[3]
Windows***, roof windows, and rooflights	2.2	1.4	1.4	1F000008:Surf[0]
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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)]				
* There might be more than one surface where the maximum U-value occurs. ** 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. N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	3

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Area [m ²]	17824.7	17824.7		A1/A2 Retail/Financial and Professional services
External area [m ²]	11396.3	11396.3		A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
Weather	MAN	MAN	100	B1 Offices and Workshop businesses
Infiltration [m ³ /hm ² @ 50Pa]	3	5		B2 to B7 General Industrial and Special Industrial Groups
Average conductance [W/K]	5702.77	6680.87		B8 Storage or Distribution
Average U-value [W/m ² K]	0.5	0.59		C1 Hotels
Alpha value* [%]	10.11	10		C2 Residential Inst.: Hospitals and Care Homes
				C2 Residential Inst.: Residential schools
				C2 Residential Inst.: Universities and colleges
				C2A Secure Residential Inst.

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

- Residential spaces
- D1 Non-residential Inst.: Community/Day Centre
- D1 Non-residential Inst.: Libraries, Museums, and Galleries
- D1 Non-residential Inst.: Education
- D1 Non-residential Inst.: Primary Health Care Building
- D1 Non-residential Inst.: Crown and County Courts
- D2 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	2.73	4.39
Cooling	2.55	3.01
Auxiliary	16.72	17.11
Lighting	9.97	17.17
Hot water	3.81	3.74
Equipment*	38.13	38.13
TOTAL**	35.78	45.42

* Energy used by equipment does not count towards the total for 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	0.25	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Indicative Target
Heating + cooling demand [MJ/m ²]	73.85	81.52
Primary energy* [kWh/m ²]	104.47	132.63
Total emissions [kg/m ²]	17.9	22.9

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

