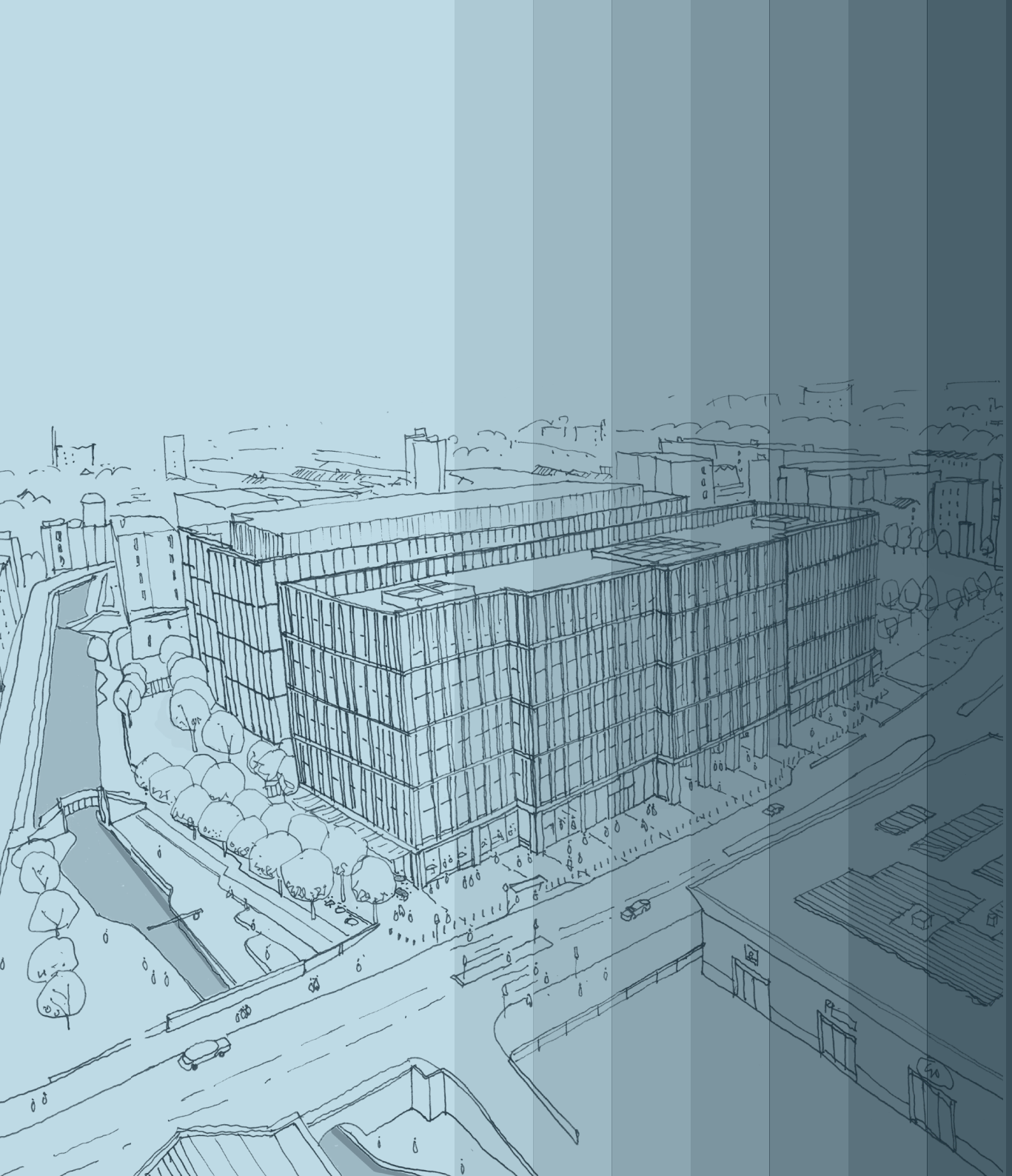


Government Property Agency

AtkinsRéalis

MANCHESTER DIGITAL CAMPUS

Energy Statement for Planning (Including Environmental Standards Statement)

NOVEMBER 2024

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INTRODUCTION

This Energy Statement has been prepared in support of the planning application submitted on behalf of the GPA (Government Property Agency) to Manchester City Council (MCC) for the creation of a new office campus with flexible ground floor commercial uses along with basement car parking, cycle parking, landscaping and public realm, servicing and access arrangements, highways alterations and other associated works.

The purpose of this Energy Statement is to provide a response to Policy EN 4, EN 6 (Target Framework for CO_2 reductions from low or zero carbon energy supplies) and Places for Everyone (PfE) Policy JP-S2 as defined in Manchester's Local Development Framework, Core Strategy Development Plan Document, published by MCC. This Energy Statement has been developed in accordance with the Energy Statement Methodology as set out in Appendix A of the aforementioned document.

We would note the following changes stated in the Addendum to Manchester Core Strategy 2024:

EN6 section to be replaced:

- *'shown in Tables 12.1 or 12.2' from first sentence of 1st paragraph*
- *2nd, 3rd, 4th and 5th paragraphs*
- *Tables 12.1 and 12.2*

  Replaced by Places for Everyone Policy JP-S2

This Energy Statement also incorporates the requirements of the Environmental Standards Statement. As outlined within the City Council's Guide to Development in Manchester SPD/SPG, (chapter 4) and Core Strategy policies EN4 and EN6 an Environmental Standards Statement should be submitted with the planning application, This addresses sustainability ratings and the provision of renewable energy within the development. This includes a BREEAM pre-assessment rating through the submission of a pre-estimator report which should demonstrate that a rating level of at least Very Good would be achieved. Where this standard is not achievable clear reasons why need to be set out within the submission. The statement addresses the guidance within Chapter 4 of the 'Guide to Development in Manchester and policies EN4 and EN6 of the Core Strategy for the City of Manchester, confirm the proposals for the provision of onsite renewable energy to provide 20% of final site energy demand and CO2 reduction.

MCC Core Strategy EN4 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:

- FIRST BULLET REPLACED BY PfE JP-S2
- 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.

Executive Summary

This Energy Statement has been prepared to provide a response to Policy EN 4, EN 6 and PfE Policy JP-S2 (following the Addendum to Manchester's Core Strategy 2024) as defined in Manchester's Local Development Framework, Core Strategy Development Plan Document, published by MCC, and applies to the MDC site which forms part of a larger Strategic Regeneration Framework. The MDC site consists of two new build office developments, North Building and South Building.

The focus has been to develop a site which is as energy efficient as possible by following the principles set out in the energy hierarchy to ultimately reduce CO_2 emissions associated with the operational energy of the development. Passive design measures have been considered to reduce overall energy demand, including the use of high performing building fabric, optimising glazing design and the inclusion of thermal mass and external shading. High efficiency building services shall also be specified to deliver heating, cooling, lighting etc where required to further reduce energy consumption where there is a demand once the passive measures have been taken into account. Available LZC technologies have also be appraised, with the most suitable and feasible technologies identified to provide further operational CO_2 emission reductions.

In addition to the EN 4, EN 6 and PfE Policy JP-S2 requirements, the development is subject to various other energy performance metrics. This includes the obligation to comply with Part L2 2021 of the Building Regulations, achieving the minimum number of credits required by BREEAM ENE01 to achieve BREEAM 'Excellent', and the aspiration of achieving a NABERS DfP rating of 5*.

Both the North Building and South Building have been subject to a dynamic thermal model in order to assess the energy performance of the buildings and to quantify the CO_2 emissions and how each building performs against the various energy performance metrics. The results indicate that, by following the principles of the energy hierarchy, both North Building and South Building achieve compliance with Policy EN 4, EN 6 and PfE Policy JP-S2. The modelling results also indicate that both buildings are on course to pass Part L2 2021 of the building Regulations, achieve the required credits under BREEAM ENE01, and achieve the aspirational NABERS DfP rating.

1. General

1.1 The Site

1.1.1 Site Overview.

Site Description

The Site is approximately 2.98 ha. (Site Location boundary) and comprises of vacant brownfield land, comprised mostly of hardstanding. There are existing trees / shrubs on the Site, mostly congregated on the southern, western, and northern boundaries. There is a significant level change across the Site, descending from the north to the southern extent at Great Ancoats Street. The Site has a main vehicular access point off Great Ancoats Street to the south.

Site and Surroundings

The Site is located within New Islington and forms the western portion of the Former Central Retail Park, the redevelopment of which is a long-standing strategic priority for MCC. MCC endorsed a Strategic Regeneration Framework (SRF) for the Former Central Retail Park in 2023, which sets out the vision to create a high-quality, sustainable office district with an attractive public realm at its centre, including a new green space.

The Site is bound by the Co-op Academy primary school and associated playground, Cotton Field Park and New Islington Medical Practice to the north,and the Rochdale Canal and associated towpath to the west, beyond which lie a number of commercial and residential buildings (including listed mill buildings) along Redhill Street. Although the Site is not located within the Ancoats Conservation Area, the boundary of the Conservation Area runsadjacent to the Site along the banks of the Rochdale Canal.

Great Ancoats Street, the inner-city ring road, runs along the southern boundary of the Site beyond which lies the Urban Exchange Retail Park,residential apartments in the Brownsfield Grade II* Listed Mill, and the serviced apartments on Laystall Street to the south.

The remainder of the Former Central Retail Park lies to the immediate east of the Site, separating it from Old Mill Street. The New Islington MedicalPractice occupies a plot outside of the north eastern extent of the Former Central Retail Park adjacent to New Islington Marina and Cotton Field Park. A number of residential apartments line Old Mill Street and rise up to 16 storeys in height, and beyond this to the east lie further residential uses, the Ashton Canal and the New Islington Metrolink stop.

The wider area of New Islington, Ancoats and Piccadilly has witnessed significant investment and regeneration over the last circa 20 years and now is characterised as a residential-led neighbourhood with a wide range of supporting commercial and amenity offerings.

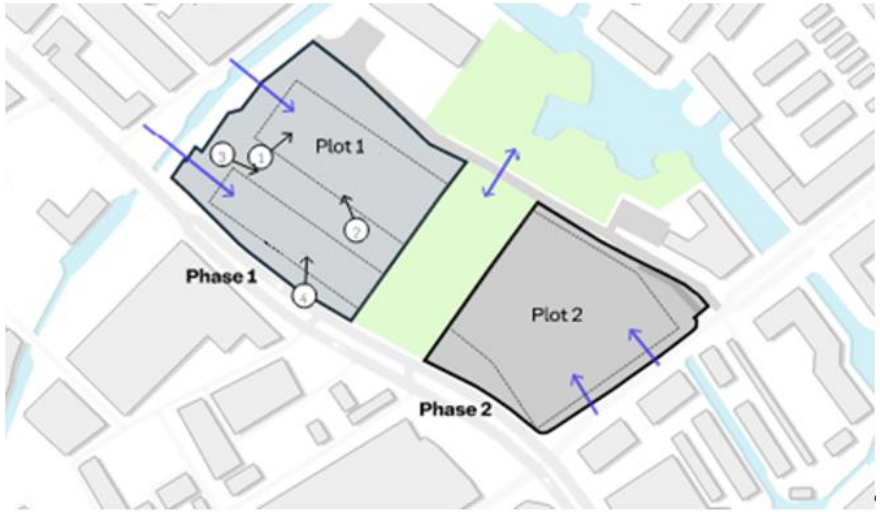
Plots

As part of the SRF master planning process, the former Central Retail Park site has been divided into 2 plots including:

- Plot 1 – Where North Building and South MDC buildings are located.
- Plot 2 – Future development plot, likely commercial
- The Garden

The site is being developed in two phases, with phase 1 of the SRF being the MDC Government project that this Energy Statement applies to.

Figure 1 1: Site Plan



1.1.2 Site Uses

The proposed use for North Building is commercial offices only, whereas the proposed use for South Building includes commercial offices, retail and café units. The overall site therefore includes planning class uses E(a), E(b) and E(c).

1.1.3 Schedule of Floorspace

The total GIA for the North and South Buildings combined is 84,000m^2. Of this 83,000sqm is office floorspace with 1000sqm given over to ground level Commercial Floorspace

1.1.4 Proposed Phasing

The MDC site will be constructed in one phase.

1.2 Proposed Servicing Strategy

In the design of the North Building and South Building, the mechanical, electrical and public health services have been proposed to provide a comfortable and healthy indoor environment, with an emphasis on energy efficiency and operational carbon reductions.

The mechanical, electrical and public health services have been developed in response to the Building Regulations, technical standards and design guides. The following engineering summaries relate to those systems with a direct impact and influence on the energy strategy of the buildings.

1.2.1 Mechanical Engineering Summary

The buildings are designed to operate in a mechanical ventilation scenario which benefits from high efficiency, low energy air handling unit systems. It combines low energy fans and high heat recovery capabilities. The use of variable air volume equipment to supplement and enhance the mechanical ventilation capabilities within the office areas better match the supply of ventilation to each building's demand.

The intention is to provide a gas free site, therefore no natural gas utility connections are required.

Air source heat pumps are proposed to provide a highly efficient solution to deliver heating, cooling and hot water to each building. Office heating will be provided by low temperature hot water (LTHW) and cooling will be provided by chilled water (CHW). Local emitters such as trench heating, chilled beams and fan coil units provide efficient and adaptable heating and cooling for specific areas or zones of each building. The local systems offer local control over temperature and airflow, allowing occupants to create a comfortable working environment.

Implementing zoning and advanced controls is essential in optimising the HVAC performance. Each building's zoning strategy allows for different areas of the building to be heated, cooled, or ventilated independently based on occupancy and comfort requirements. Smart controls can adjust temperature and air flow based on occupancy patterns and outdoor conditions, ensuring energy savings whilst maintaining comfort.

Indoor air quality monitoring of CO_2 levels will be incorporated into the design. Real time monitoring systems shall provide alerts and feedback to building operators, enabling them to take corrective actions promptly. This ensures a healthy and comfortable environment.

Dedicated ventilation systems provide supply and extract of air as required to each space. These include:

- Office General Ventilation
- MER/SER Ventilation
- UPS Ventilation
- Toilet Ventilation
- Shower/Change Ventilation
- Car Park Smoke and Fume Extract
- Basement Smoke and General Extract

High temperature, high efficiency water to water heat pumps serve the hot water requirements of the building. Domestic hot water is recirculated to reduce wastewater and ensure hot water is readily available at the outlets.

Proper insulation of pipework minimises heat losses from distribution or storage tanks and maintains the temperatures required to outlets.

A Building Management System (BMS) shall play a crucial role in the efficient management and operation of each building. The primary function of the BMS is to integrate and automate various building systems. The BMS will collect real-time data allowing centralised monitoring, analysis and control of these systems.

1.2.2 Electrical Engineering Summary

The general philosophy is to provide an efficient and resilient building, which prioritises occupant comfort.

Metered incoming electrical supplies terminate within basement Distribution Network Operator operated substations. The substations feed adjacent high voltage switchrooms, which house 11 kV/400 V transformers. Non-essential main switchboards are supplied from the low voltage side of the transformers and are housed within dedicated basement switchrooms. A comprehensive energy monitoring and recording system will be provided, offering facility to identify and remedy inefficient systems/zones.

Photovoltaic systems are proposed to deliver renewable energy and utilise all available roof space. A canopy may also be provided to supplement the roof installation and maximise renewable technologies.

Low voltage distribution to the occupiable floor plates, is generally via essential and non-essential rising busbars complete with tap offs, thus providing a flexible solution for future tenants.

Small power systems will provide safe and effective power supplies to all items of plant, equipment and socket outlets within the building.

The lighting design will strive to achieve the architectural vision, promote commitment to sustainable design, and provide technical compliance with all relevant good practice lighting design guidance and local statutory legislation. Lighting strategies are intended to promote the creation of a useful and visually appealing environment. Strategies will be developed which respond to how general, ambient and task lighting can be balanced with architectural furniture layouts and space and zoning requirements. Different lighting strategies will be applied within different space-use types to create a sense of place and focus, as well as to allow for intuitive navigation to other areas. High efficacy luminaires and smart lighting controls, with daylight compensation, will be provided throughout to offer an energy efficient sustainable design.

2. Site Energy Approach

2.1 Energy Hierarchy

The site shall be developed to be as energy efficient as possible and the strategic energy hierarchy shall be followed throughout the design process and applied across the site as described below.

- Be Lean – Use Less Energy
  - Optimising U-values and g-values for building fabric.
  - Improving building air tightness.
  - Façade design to block excessive solar gain.
  - Maximising the use of natural daylight.
- Be Clean – Supply Energy Efficiently
  - Utilise low specific fan power ventilation plant.
  - Incorporate high efficiency heat recovery.
  - Utilise high efficiency lighting where artificial lighting is required.
- Be Green – Use Renewable Energy
  - Implement Low and Zero Carbon Technologies such as heat pumps.
  - Renewable energy generation such as photovoltaic solar panels.

The energy hierarchy has been adopted to demonstrate how it is proposed to minimise energy consumption and carbon emissions associated with the MDC development. The priority will be to use passive measures to reduce the site's overall regulated energy demand (Be Lean). Where energy is then required to provide space heating, cooling, lighting etc, then this shall be achieved through well designed building services utilising high efficiency plant equipment (Be Clean). Then, where necessary to achieve energy and sustainability targets, LZC technologies shall be implemented to further reduce regulated energy demand and the site's net carbon emissions (Be Green). The site is also proposed to be a gas free site to reduce the reliance on fossil fuels with a focus on green, renewable energy sources.

2.2 Energy and CO_2 Emission Targets

2.2.1 Building Regulations Part L2

Part L2 of the Building Regulations establishes minimum energy performance requirements for buildings other than dwellings with respect to regulated energy use. Regulated energy use is such energy that is directly dependent on the building design, including energy for heating, cooling, domestic hot water generation, fans pumps and lighting. This is in comparison to unregulated energy use which is ultimately dependent on the occupier, such as IT equipment, plug in appliances and white goods, catering facilities etc., and is not covered under Part L2 of the Building Regulations.

The criteria to be achieved for Part L2 are as follows:

- Achieving building CO_2 emissions rate (BER) below a target established by Part L2 (TER). Also achieving a building primary energy rate (BPER) below a target established by Part L2 (TPER).
- Achieving minimum building fabric standards (U-value, air permeability) and fixed building services standards established by Part L2.
- Limiting the effect of excessive solar gains during summer months.
- Consideration of high efficiency alternative energy systems.

The 2013 version of Part L of the Building Regulations was revised in 2021, with the building performance requirements tightened in order to further improve the energy performance of new buildings. North Building and South Building will fall under the requirements of the 2021 regulations when constructed, and therefore the buildings have been assessed against the 2021 regulations.

Thermal modelling software (IES Virtual Environment) has been used to demonstrate the performance of each building against each of the criteria and a BRUKL Output Document has been generated for each building.

2.2.2 BREEAM

Both North Building and South Building are targeting an overall BREEAM rating of ‘Excellent’ and are subject to individual BREEAM pre-assessments. The specific energy performance metric that each building will be assessed against is that required by BREEAM Version 6.0 credit ENE01. Up to 9 credits are available based on the energy performance of the building. In order to achieve BREEAM ‘Excellent’, a minimum of 4 credits must be achieved, corresponding

to an energy performance ratio of 0.4. The calculation of the energy performance ratio (EPR_{NC}) considers three metrics of the modelled building performance when determining the number of credits achieved for this issue. The three metrics are:

1. The building's heating and cooling energy demand
1. The building's primary energy consumption
2. The total resulting CO_2-eq emissions

Each of these metrics are calculated as part of the Part L assessment and are displayed on the BRUKL Output Document. These credits will ultimately be awarded for each building at RIBA Stage 4 based on the 'As Designed' BRUKLs to reflect the design of each building at that stage. However, the BRUKL Output Documents produced at RIBA Stage 2 have been assessed to give an indicative EPR_{NC} and number of achievable credits for each building.

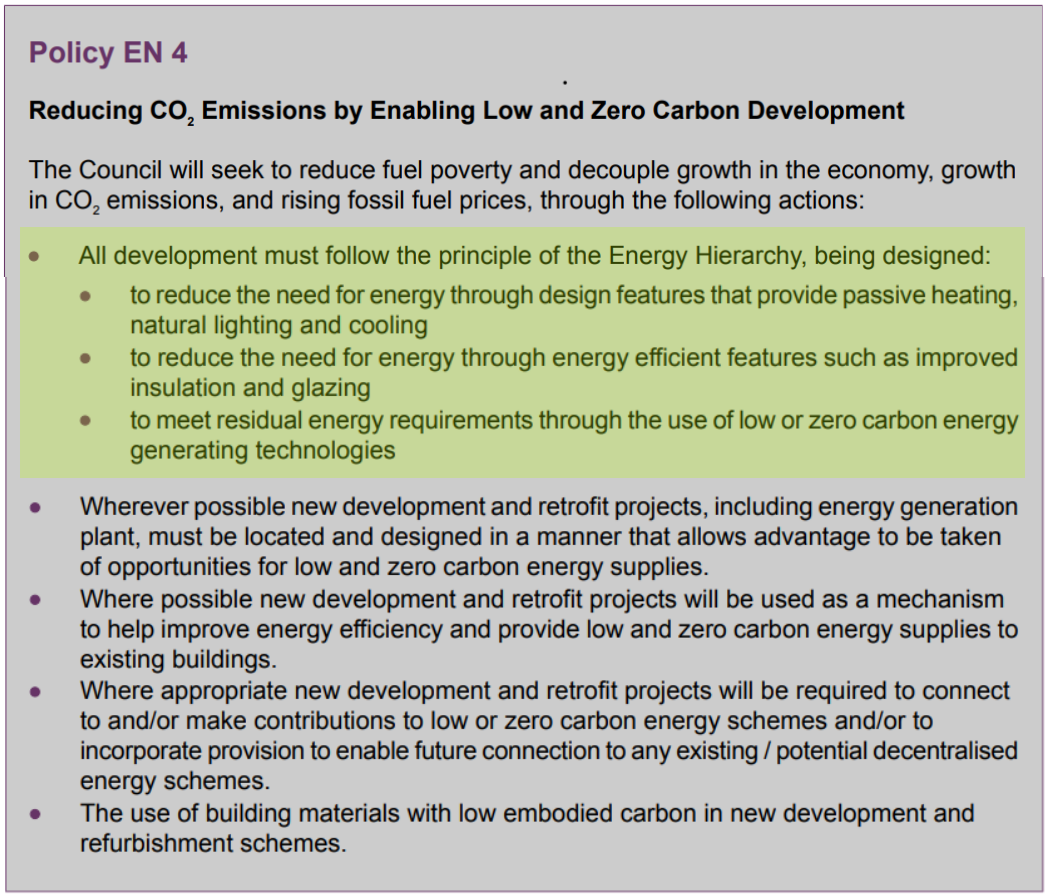
2.2.3 NABERS

Both North Building and South Building are targeting a NABERS Design for Performance (DfP) rating of 5*. Both buildings shall be subject to a full DfP analysis by RIBA Stage 4, and an operational energy assessment (including a base case model and suitable off-axis scenarios) shall be undertaken at each RIBA design stage to monitor progress towards achieving the desired DfP rating. It should be noted that the DfP model for the UK relates to base build energy consumption only.

2.2.4 Manchester City Council Policies

Policy EN 6 (Target Framework for CO2 reductions from low or zero carbon energy supplies) as defined in Manchester's Local Development Framework, Core Strategy Development Plan Document, published by MCC, sets out carbon emission reductions targets applicable to this development, and this Energy Statement is intended to provide a response to Policy EN 4, EN 6 and PfE policy JP-S2 following the Addendum to Manchester Core Strategy 2024. The key extract from Manchester's Local Development Framework, Core Strategy Development Plan Document, with respect to EN 6 is shown below.

Figure 2-1: EN 4 Policy Wording



Policy EN 4

Reducing CO_2 Emissions by Enabling Low and Zero Carbon Development

The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO_2 emissions, and rising fossil fuel prices, through the following actions:

- All development 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.

EN4 Policy sections replaced by PfE Policy JP-S2. As stated in Manchester Core Strategy Addendum 2024

Figure 2-2: EN 6 Policy Wording

Policy EN 6

Target Framework for CO_2 reductions from low or zero carbon energy supplies

Applications for residential development of 10 or more units and all other development over 1,000 sq m will be expected as a minimum to meet the target shown in Tables 12.1 or 12.2, unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO_2 emissions for all phases of the development.

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

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

- Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling).
- Target 2 Electricity intense areas: Locations where the predominant building type has an all electric fit-out such as retail units and leisure complexes.
- Target 3 Micro-generation areas: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical.

Domestic CO_2 emissions reduction targets

Table 12.1

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

Non-domestic 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 CO2/m2))	+10%increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Where the CO_2 emissions reduction required under any future revision to Part L of the building regulations becomes greater than the '% Minimum requirement', the reduction required under building regulations would apply.

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

The energy statement will be required to be submitted at the outset of any proposed development (outline application or before). Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO_2 mitigation, subject to the energy statement incorporating evidence such as modelling to demonstrate compliance.

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

EN6 Policy sections replaced by PfE Policy JP-S2. As stated in Manchester Core Strategy Addendum 2024

Figure 2-3: PfE Policy JP-S2 Wording

Policy JP-S2: 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. Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy, heating and cooling;
2. Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured;
3. Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities;
4. Increasing the range of nature-based solutions including carbon sequestration through the restoration of peat-based habitats, woodland management, tree-planting and natural flood management techniques;
5. An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable;

    a. Be net zero carbon[29] which applies:

    - from adoption – to regulated operational carbon emissions;
    - from 2028 – to all emissions 'in construction'.

    From 2025 development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions.

    Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which in order of importance seeks to:

    i. Minimise energy demand;
    ii. Maximise energy efficiency;
    iii. Use renewable energy;
    iv. Use low carbon energy; and
    v. Utilise other energy sources.

    From 2025 any residual carbon emissions that cannot be fully mitigated on-site should be offset, in agreement with the relevant local planning authority through a financial contribution to a carbon offset fund.

    As an interim measure, development should be consistent with the 2022 Part L Building Regulations unless superseded by changes to building regulations and/or national or local planning policies.

    b. Incorporate adequate electric vehicle charging points, in line with Part S of the Building Regulations, unless superseded by relevant Local Plan policies, to future proof for the likely long-term demand, taking account of the potential maximum energy demand for the site;

    c. Where practicable, prioritise connection to a renewable energy/heating/cooling network in the first instance or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels at a later date;

    d. In residential developments, achieve energy demand reductions in terms of space heat demand; hot water energy demand and the delivery of on-site renewable energy generation, in accordance with Table 5.1.

Figure 2-3: PfE Policy JP-S2 Wording

For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced.

e. For non-residential developments, achieve at least BREEAM excellent standard (or equivalent) for the 'Ene 01 – reduction of energy use and carbon emissions' category rising to 'BREEAM outstanding' equivalent for ENE 01 from 2028.

f. Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximize reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate measures for post occupancy evaluation. Whole life cycle emissions should be considered where possible.

Districts may set out specific carbon emission reduction and energy demand targets within Local Plans.

Heat and Energy Networks

5.25 Around two-thirds of Greater Manchester's carbon emissions come from domestic and commercial buildings. Government analysis[30] identifies heat/energy networks as a cost-effective solution to this issue within areas of high heat density, with modelling suggesting that heat networks could be an important part of the least-cost mix of technologies needed to achieve UK-wide decarbonisation targets by 2050. Figure 5.1 shows the broad 'Heat and Energy Network Opportunity Areas' across the nine districts and these areas will be further refined by the districts when more local evidence becomes available.

5.26 Heat and energy networks have the potential to achieve significant emissions reductions and have significant potential for promoting regional growth in the Low Carbon sector. The shift to a low carbon economy creates the emergence of new sectors and technologies, which in turn requires new occupations, skills and expertise to be developed in the labour market. This Plan seeks to ensure that its residents will be ready for these new opportunities.

5.27 Further analysis[31] has identified heat networks as among the technologies/systems offering the highest technical potential to contribute to the reduction in carbon emissions. The dense urban nature of some parts of Greater Manchester and the scale of development proposed in the Plan allocations means that there are opportunities for significant growth of heat networks aligned with, and building out from, strategic development sites. Analysis by Government[32] suggests a threshold of around 26 kWh/m2 /year above which heat networks are likely to be viable (noting that this figure is

Figure 2-2: PfE Policy JP-S2 Wording

one of several factors that may affect viability and is commonly used to inform early-stage analysis only). National Heat Map data suggests many of our urban areas are above this viability threshold.

5.28 The UK Clean Growth Strategy (CGS)[33] sets out possible pathways to decarbonise the UK's economy by 2050 if the requirement of at least 100% for the reduction in greenhouse gas emissions[34] is to be achieved.

5.29 To comply with policy JP-S3, heat and energy network assessments will be required as part of an energy statement to support planning applications for new developments within the identified "Heat and Energy Network Opportunity Areas" to demonstrate compliance with PfE energy policies. To ensure consistency of approach and to aid the decision-making process, decentralised heat/energy network 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[35], or equivalent); and
g. Adopting appropriate consumer protection standards (e.g. Heat Trust[36] or equivalent).

Both North Building and South Building have been assessed against the 2010 version of Part L of the Building Regulations to demonstrate performance against the Policy EN 4, EN 6 criteria and PfE Policy JP-S2, and they have also been assessed against the 2021 version of Part L of the Building Regulations as this is the current version and the version that compliance will need to demonstrated for to satisfy Building Control.

3. Passive Energy Measures

The following provides an overview of the passive design measures adopted to reduce building energy demand for North Building and South Building in accordance with the energy hierarchy.

3.1 Building Orientation and Layout

North Building and South Building are orientated within the plot as shown below. The building orientations are ultimately constrained by the plot shape and size. The building cores are positioned centrally, meaning that occupied office spaces are typically located around the perimeter of each building. This then maximises natural daylight through building facades to reduce reliance on artificial lighting to occupied spaces, particularly to the south-east and south-west facing facades. Both buildings also include atria to further enhance natural daylight.

Some building facades incorporate curved precast fins to provide visual privacy, which also reduce solar gain. This reduction in solar gain then reduces the reliance on room level mechanical cooling in order to maintain summer thermal comfort.

Figure 3-1: Site Layout



3.2 Building Fabric

Consideration has been given to minimising building fabric U-values and optimising building air tightness in order to reduce building heat losses. Part L2 2021 sets out limiting U-values for each element of the external thermal envelope and also sets out a limiting air permeability. It is proposed that the fabric elements used across the MDC site shall offer improvements when compared to the Part L2 limiting values as set out in the table below.

Table 3-1: Part L2 Limiting U-values and Proposed U-values

Element	Part L Limiting Value	Proposed Value
Wall U-Value	0.26 W/m^{2}K	0.15 W/m^{2}K
Floor U-Value	0.18 W/m^{2}K	0.12 W/m^{2}K
Roof U-Value	0.18 W/m^{2}K	0.12 W/m^{2}K
Window U-Value	1.6 W/m^{2}K	1.35 - 1.5 W/m^{2}K
Rooflight U-Value	2.2 W/m^{2}K	2.0 W/m^{2}K
Air Permeability (at 50Pa)	8.0 m^3/(h.m^2)	3.0 m^3/(h.m^2)

3.3 Thermal Mass

The use of exposed concrete slab soffits to utilise thermal mass is included within the concept design. This approach will contribute to each building's passive cooling strategy and will result in operational CO_2 savings.

4. LZC Technologies

4.1 Technology Appraisal

A Low and Zero Carbon feasibility study has been undertaken in full for each of the buildings on the site. The feasibility studies have been undertaken to assess each potential LZC technology and understand how feasible it would be to implement the technologies across the site, and to discount any unsuitable options at an early stage. The feasible options have then been assessed to quantify the possible regulated energy savings and carbon emission reductions that could be achieved if the LZC technologies are implemented.

A summary of the LZC technology appraisal is shown in the table below.

Table 4-1: LZC Technology Summary

Technology	Functionality	Cost Effectiveness	Potential CO_2 Savings	Potential Suitability
Solar Thermal – generation of hot water from the sun	Energy generation would be modest, however solar collectors and hot water storage could be coordinated close to each other to reduce circulation losses. Hot water demand is not likely to be consistent throughout the day however so its effectiveness would be limited.	Generally a lower capital cost compared to other LZC technologies. Payback period could be around 20 years, but a larger system could reduce this.	Low – this will depend on whether it displaces an electric or gas based systems, and the demand for hot water. Either way, it is likely to have a modest impact on carbon emissions.	No – the lack of steady hot water demand and modest energy generation mean the roof space required for solar collectors would be better used for an alternative technology such as PV.
Photovoltaics (PV) – generation of electricity from the sun	Both buildings have south facing roof areas where PV could be located. Once installed, maintenance is minimal and reliability is high. A wide range of installation options are available.	Electricity bill reductions will depend on the size of the systems installed. Typical payback figures quoted are usually in the region of 25-30 years.	Low/Medium – this however depends on the size of the system used. The larger the system, the lower the net carbon emissions.	Yes – this technology is feasible as it can be physically coordinated, is reliable and can offer good carbon emission reductions.
Combined Heat & Power (CHP) – generation of electricity on site and use of heat by product	Considered as a low carbon rather than a zero carbon technology, unless it is fuelled on a renewable fuel. Requires a predictable and relatively constant load, however this cannot be guaranteed in this case.	Payback could be as low as 8 years for a fully utilised system, but where it cannot run for long periods and is poorly sized leading to heat dump in summer then the return period will be higher.	Medium - the overall system can have a big effect on emissions. Although the heating side is generally less efficient than say a gas system, the electricity generated is then carbon 'free'. However, if the CHP is only sized for the base load, the benefits can be greatly reduced as it may not command a large part of the peak load.	No - the lack of a guaranteed constant load and the potential need to 'dump' excess heat from what is a low heat loss building would make CHP plant impractical and unviable.

Technology	Functionality	Cost Effectiveness	Potential CO_2 Savings	Potential Suitability
Ground Source Heat Pumps (GSHPs) – generation of heat from the ground	Can be a very efficient way of heating a building, using the ground as a heat source. An efficient system can produce 3 to 4 units of heat for every unit of electricity used. Closed loop horizontal or vertical pipework systems required within the ground to utilise the ground as a heat source.	A medium sized system with an overall COP of 3:1 could be expected to achieve a payback of about 20 years. The ground works are the most expensive part of the system, while the heat pumps can be of a comparable price to conventional boilers.	Medium/High – high COPs are dependent on relatively low supply temperatures.	No - there is insufficient accessible ground space around the building to install a closed loop system. Also, given the city centre location of the site, the ground is unlikely to be free from obstructions, such as sewers and other services.
Air Source Heat Pumps (ASHPs) – generation of heat from external air	COPs are inferior to that of GSHPs due to varying air temperatures. Also generate low grade heat typically used to serve LTHW systems. ASHPs work best when serving a steady base load and at a constant output. Both buildings have suitable external roof space to locate ASHPs.	Capital cost is lower when compared to GSHP installations with similar capacities. A medium sized system with an overall COP of 2.5:1 could be expected to achieve a payback of about 15 years.	Medium/High – depends on the size of system and COPs that can be achieved.	Yes – this technology would be feasible as there is suitable plant space and can offer reasonable carbon savings.
Wind – generation of electricity from wind	Best performance in open, non-urban locations. Can be installed on or integrated into a building.	Generally the small scale units generate only modest levels of power, which lead to extremely high payback periods. Medium sized units can generate paybacks of about 8 to 12 years depending on selection and the application site.	Low/Medium – Large sized turbines in non-urban or off-shore locations will be more effective.	No - given that the project is in an urban area, it is expected that obstacles will be present and wind patterns will be poor.

Technology	Functionality	Cost Effectiveness	Potential CO_2 Savings	Potential Suitability
Biomass – generation of heat from burning biological material	Is seen as a zero carbon technology because it uses the closed loop of the carbon cycle. Can replace gas boilers, however requires a large fuel storage facility.	More expensive than conventional gas fired boilers. It is generally considered that there is no realistic payback as the benefits are purely their low carbon contribution.	Medium/High – this can have a significant impact on the carbon emission of the heating system, but since electricity commands the larger share of a buildings' overall emissions, the impact will be somewhat limited.	No – there is no suitable location to site a silo and sourcing a consistent and reliable supply in an urban area is likely to be difficult.

4.2 Estimated Energy and Carbon Savings

Calculations have been undertaken in order to demonstrate the regulated energy savings and carbon emission reductions that could be achieved if the LZC technologies are implemented.

An approved way of calculation is to use a Dynamic Simulation Model. This is a software tool that models energy inputs and outputs for different types of building over time. IES Virtual Environment 2023 software has been used to construct the models for both North Building and South Building. A base case building has been modelled, and this building includes the passive design measures as described previously. The base case also includes mains gas (for heating and hot water generation) and grid electricity as the energy supplies.

Further to the base case building, additional iterations have been undertaken which include roof mounted PV (a feasible area of PV which could be coordinated on the roof of each respective building), ASHPs for heating and hot water generation, and then both PV and ASHPs (as recommended in the technology appraisal). As summary of the results is shown in the table below.

Table 4-2: LZC Tech. Energy and Carbon Savings for North Building

Energy/Carbon Metric	Base Case Building	Base Case Building with PV	Base Case Building with ASHPs	Base Case Building with ASHPs and PV
Regulated Energy Consumption (kWh/m^2.annum)	31.83	31.83	21.29	21.29
Renewable Energy Production (kWh/m2.annum)	0	1.91	0	1.91
Building CO2 Emission Rate (kgCO_2/m^2.annum)	5.46	5.21 (4.6% reduction compared to the base case)	2.94 (46% reduction compared to the base case)	2.7 (51% reduction compared to the base case)

Table 4-3: LZC Tech. Energy and Carbon Savings for South Building

Energy/Carbon Metric	Base Case Building	Base Case Building with PV	Base Case Building with ASHPs	Base Case Building with ASHPs and PV
Regulated Energy Consumption (kWh/m^2.annum)	23.32	23.32	18.29	18.29
Renewable Energy Production (kWh/m2.annum)	0	5.01	0	5.01
Building CO2 Emission Rate (kgCO_2/m^2.annum)	3.75	3.1 (17% reduction compared to the base case)	2.58 (31% reduction compared to the base case)	1.93 (49% reduction compared to the base case)

For both buildings, the introduction of ASHPs for space heating and domestic hot water generation has a significant impact on the regulated energy consumption. This is due to the favourable plant efficiencies that can be achieved with heat pump technology. This then in turn gives a large reduction in the overall carbon emissions. The introduction of roof mounted PV, along with the ASHPs means that a proportion of the regulated energy consumption can be generated by the PV, which then further reduces the overall carbon emission rate of each building when compared to the base case (51% reduction for North Building, 49% reduction for South Building).

It is considered then that the strategy of implementing ASHPs for heating and hot water generation, and PV for renewable energy generation, will be the most appropriate to demonstrate compliance with the requirements of Policy EN 4, EN 6 and PfE Policy JP-S2. Therefore, these LZC technologies should be implemented into the design of both North Building and South Building, and suitably developed through each design stage. Each of the other LZC technologies considered have been deemed not viable for this development due to cost, likely carbon savings, or a variety of technical reasons.

5. Energy Assessment

5.1 Introduction

The proposed development shall be assessed against each of the energy and CO_2 emissions requirements as set out previously, including the requirements for Building Regulations Part L2, BREEAM, NABERS, MCC Policy EN 6 and PfE Policy JP-S2. Each building shall be evaluated by compiling a thermal model in IES Virtual Environment 2023 software.

The thermal models have then been used to perform a Part L2 assessment in order to calculate the total regulated energy demand for the development and the associated equivalent annual carbon emissions which are weighted to reflect the emissions factors for the fuels and energy sources used. The output of the assessment is a Part L2 2010 BRUKL to demonstrate compliance with EN 4, EN 6, and PfE Policy JP-S2 by comparing the calculated BER displayed on the BRUKL against the TER as defined by the notional building. The assessment shall also output a Part L 2021 BRUKL to demonstrate compliance with Part L2 of the Building Regulations, and to inform the number of credits achievable under BREEAM ENE01.

The thermal model for each building has also been developed further to undertake a full operational energy assessment to provide an estimate for all regulated and un-regulated energy consumptions. The results from the operational energy assessments haven then informed an indicative achievable NABERS DfP rating. The DfP rating is only indicative at this stage due to the early design stage each building is currently at and the lack of design maturity. The DfP rating at this stage purely provides an indication that the buildings are on the correct course for achieving the desired rating once the buildings are in use.

5.2 Energy Modelling Inputs

The passive design features and the LZC technologies discussed previously have been included in the model for each building. An image of the thermal model for North Building is shown in Figure 5-1: North Building IES Thermal Model, and an image of the thermal model for South Building is shown in Figure 5-2: South Building IES Thermal Model A summary of the thermal model inputs is shown in Table 5-1: IES Thermal Model Inputs.

Figure 5-1: North Building IES Thermal Model

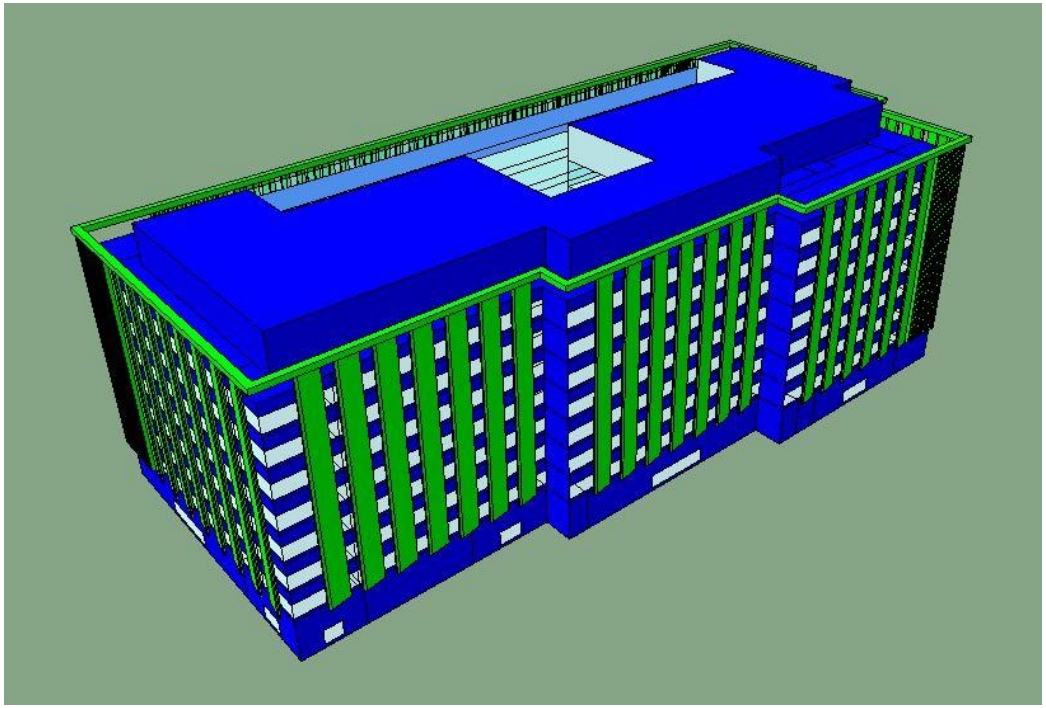


Figure 5-2: South Building IES Thermal Model

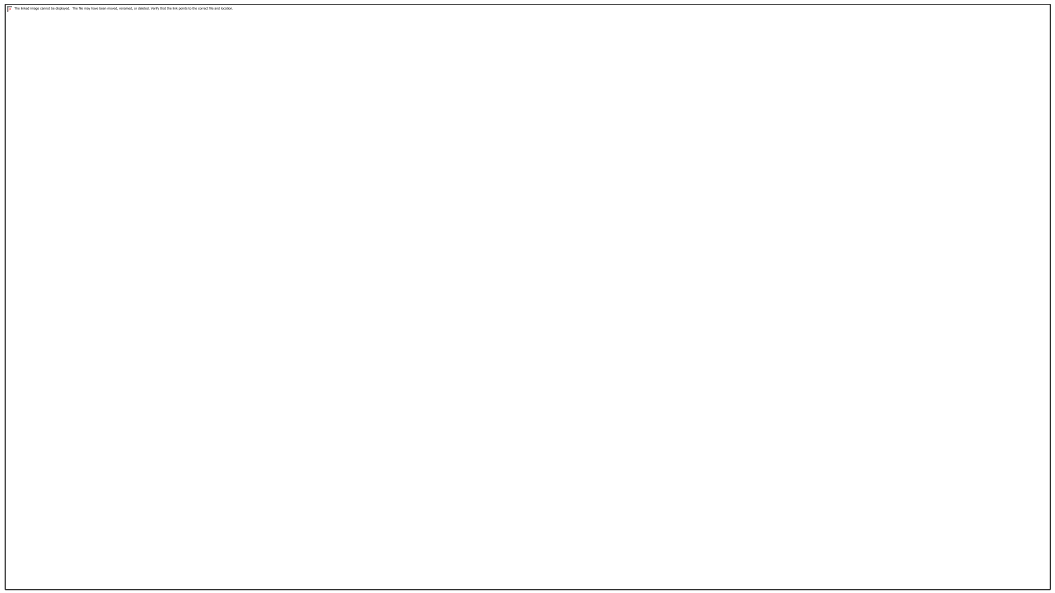


Table 5-1: IES Thermal Model Inputs

Element	Performance
Wall U-Value	0.15 W/m^{2}K
Floor U-Value	0.12 W/m^{2}K
Roof U-Value	0.12 W/m^{2}K
Window U-Value	1.35 - 1.5 W/m^{2}K
Window g-Value	0.27 - 0.33
Rooflight U-Value	2.0 W/m^{2}K
Air Permeability (at 50Pa)	3.0 m^3/(h.m^2)
ASHP SCOP (Heating)	2.9

Element	Performance
ASHP EER (Cooling)	3.3
Electric Heating Efficiency	1.0
Split DX SCOP/EER	4.0/3.8
Air Handling Unit SFP	1.7 W/l/s
Air Handling Unit Heat Recovery	80%
MVHR SFP	1.3 – 1.4 W/l/s
MVHR Heat Recovery	75%
Extract Ventilation SFP	0.4 W/l/s
Lighting Luminous Efficacy	110 lm/W
PV	500m^2 North Building 980m^2 South Building
Weather File	Manchester TRY16 (2021 regulations) Manchester TRY05 (2010 regulations)

5.3 Energy Modelling Results

The following tables show the calculated thermal modelling results and how each building performs against the various energy and CO_2 emissions targets.

Table 5-2: Energy Modelling Results for North Building

Energy Performance Metric	Result	Comments
Part L2 2010	TER ($kgCO_2/m^2$.annum): 20.3 BER ($kgCO_2/m^2$.annum): 10.2 Notional Building Regulated Energy Consumption (kWh/m^2.annum): 40.34 Actual Building Regulated Energy Consumption (kWh/m^2.annum): 21.78	The building achieves a reduction in carbon emissions associated with regulated energy use of 50% when compared to the Building Regulations notional building.
Part L2 2021	TER ($kgCO_2/m^2$.annum): 3.39 BER ($kgCO_2/m^2$.annum): 2.7 Notional Building Regulated Energy Consumption (kWh/m^2.annum): 25.57 Actual Building Regulated Energy Consumption (kWh/m^2.annum): 21.29	The building achieves a reduction in carbon emissions associated with regulated energy use of 20% when compared to the Building Regulations notional building. This also in part demonstrates compliance with Part L2 of the Building Regulations.
BREEAM ENE01	No of Credits (EPR_{NC}): 5 (0.570)	This EPR_{NC} corresponds to a BREEAM rating of 'Excellent'
NABERS	Indicative DfP Rating: 5*	This aligns with the minimum targeted DfP rating, although is only indicative at this time.

Table 5-3: Energy Modelling Results for South Building

Energy Performance Metric	Result	Comments
Part L2 2010	TER ($kgCO_2/m^2$.annum): 16.4 BER ($kgCO_2/m^2$.annum): 7.6 Notional Building Regulated Energy Consumption (kWh/m^2.annum): 32.5 Actual Building Regulated Energy Consumption (kWh/m^2.annum): 19.93	The building achieves a reduction in carbon emissions associated with regulated energy use of 54% when compared to the Building Regulations notional building.
Part L2 2021	TER ($kgCO_2/m^2$.annum): 2.48 BER ($kgCO_2/m^2$.annum): 1.93 Notional Building Regulated Energy Consumption (kWh/m^2.annum): 18.44 Actual Building Regulated Energy Consumption (kWh/m^2.annum): 18.29	The building achieves a reduction in carbon emissions associated with regulated energy use of 22% when compared to the Building Regulations notional building. This also in part demonstrates compliance with Part L2 of the Building Regulations.
BREEAM ENE01	No of Credits (EPR_{NC}): 5 (0.500)	This EPR_{NC} corresponds to a BREEAM rating of 'Excellent'
NABERS	Indicative DfP Rating: 5.5*	This aligns with the minimum targeted DfP rating, although is only indicative at this time.

6. Conclusion

Manchester City Council's Policy EN 4, EN 6 and PfE Policy JP-S2 sets out a framework for CO_2 reductions from low or zero carbon energy supplies. This Energy Statement provides the projected regulated energy demand and associated CO_2 emissions for the two buildings which form the MDC development, and how they perform against the requirements set out within the framework.

The site shall be developed to be as energy efficient as possible, and the approach described within the energy hierarchy has been followed during the development of the design of each building. Dynamic thermal models have been produced in order to undertake energy assessments of each building, and all aspects of the building designs have been accounted for including:

- Architectural layout
- Building form and orientation
- Weather data
- Passive design measures
- High efficiency MEP strategies
- LZC technologies

The energy modelling results show that the proposed design of each building satisfy the Policy EN 4, EN 6 and PfE Policy JP-S2. The calculated BER when compared to the TER as defined by the Building Regulations notional building (when assessed against Part L2 2010) shows that the North Building has demonstrated a CO_2 improvement of 50%, and South Building has demonstrated an improvement of 54%.

As the MDC site is proposed to be a gas free site with an all electric solution adopted (i.e. electrically powered ASHPs to provide heating and hot water), this provides the benefit that as the electricity grid continues to become more green over time with decreasing associated carbon factors, the development's operational CO_2 emissions will decrease in accordance with this.

The energy modelling has also demonstrated how each building is forecasted to achieve the various other energy performance requirements, including Part L2 2021 compliance, the BREEAM ENE01 minimum requirements to achieve a rating of 'Excellent', and the required NABERS DfP rating.

APPENDICES

Appendix A. North Building BRUKL Output

A.1 2010 BRUKL

BRUKL Output Document — HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

North Building — As designed

Date: Thu May 09 10:15:29 2024

Administrative information

Building Details

Address: ,

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:

Telephone number:

Address: , ,

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	20.3
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	20.3
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	10.2
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

A.2 2021 BRUKL

BRUKL Output Document — HM Government

Compliance with England Building Regulations Part L 2021

Project name

North Building — As designed

Date: Thu Apr 25 14:00:26 2024

Administrative information

Building Details

Address:

Certifier details

Name:

Telephone number:

Address: , ,

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m^2]: 5588

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	3.39	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	2.7	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	37.47	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	29.35	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

Appendix B. South Building BRUKL Output

B.1 2010 BRUKL

BRUKL Output Document — HM Government

Compliance with England and Wales Building Regulations Part L 2010

Project name

South Building — As designed

Date: Fri Jun 28 15:57:43 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

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: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

1.1	CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	16.4
1.2	Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	16.4
1.3	Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	7.6
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

B.2 2021 BRUKL

BRUKL Output Document — HM Government

Compliance with England Building Regulations Part L 2021

Project name

South Building — As designed

Date: Fri May 31 14:40:10 2024

Administrative information

Building Details

Address: Address 1, Manchester, Postcode

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.25

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.25

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

Foundation area [m^2]: 3968.78

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	2.48	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	1.93	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	27.14	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	20.42	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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