

Albert Bridge House.
Manchester.
Oval Real Estate Ltd..

SUSTAINABILITY
STAGE 2 REPORT – ENERGY STRATEGY

REVISION P03 – 28 MAY 2025



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
P01	11/04/25	Draft submission	C. Deamer	I. Bhatnagar	N. Bagshawe
P02	09/05/25	Final submission for planning	C. Brierley / I. Bhatnagar	J. Drane	N. Bagshawe
P03	28/05/25	Revised submission for planning	I. Bhatnagar	C. Brierley	N. Bagshawe

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Executive summary.

This energy strategy has been prepared by Hoare Lea on behalf of Oval Real Estate Ltd. (hereafter referred to as ‘the Applicant’) in support of the Full Planning Permission for the redevelopment of Albert Bridge House at Bridge Street, Manchester, M3 5AH, hereafter ‘the Proposed Development’.

This strategy summarises the relevant regulatory and planning policies and sets out how the Proposed Development will address and achieve the relevant policy targets. The strategy responds to the UK planning and regulatory framework, and to Manchester City Council (MCC) policy requirements.

The Proposed Development.

The Proposed Development will provide two residential buildings of 37- and 49-storeys and an office building of 18-storeys. These are to include residential units (Use Class C3), and a mix of amenity, retail spaces (Class E) and commercial spaces (Class E), with associated hard and soft landscaping, cycle parking, servicing, refuse and plant areas, new and improved public realm, highways work, and other works associated with the development.

Applicable policy and regulations.

With respect to energy and carbon performance, the Proposed Development must comply with all relevant national and local policies and regulations, including complying with Building Regulations Part L and Part O and meeting the key local policies listed below:

Manchester Core Strategy (CS) (July 2012)

- Policy EN4 – New development to be located and designed to take advantage of, and to provide, low and zero carbon (LZC) energy supplies, to improve energy efficiency and connect to decentralised energy schemes.
- Policy EN5 – The Proposed Development is located within the Regional Centre and so should contribute to an increase in the level of decentralised LZC energy supplies.
- Policy EN6 – An Energy Statement is required to set out the regulated energy demand and associated CO₂ emissions.
- Policy EN7 – Account for potential opportunities to connect, or have capability of future connection, to heating networks.
- Policy EN8 – Be adaptable to climate change and control overheating of buildings through passive design.

Places for Everyone Joint Development Plan (PfE) (March 2024)

- Policy JP-S2 – Support delivery of carbon neutral Greater Manchester through a range of measures including:
 - Incorporating LZC and nature-based solutions
 - Prioritising heat networks
 - Expectation for new development to be net zero carbon for regulated emissions
 - Offsetting of any residual regulated emissions
 - Residential development meeting heat demand reduction and renewable energy generation targets
 - Non-residential development achieving BREEAM ‘Excellent’ standard under the Ene 01 credit issue.

Manchester Climate Change Agency: A Roadmap to Net Zero Carbon New Buildings in Manchester

- Reduce energy demand and meet Energy Use Intensity (EUI) targets, consider design for performance methodology, and provide LZC energy supply onsite.

Further detail of relevant policies and regulations are provided within Section 1.3 and 1.4

Table 1: Site wide energy strategy summary

Be Lean.

A ‘fabric first’ approach has been taken in order to reduce the energy demand and CO₂ emissions for the Be Lean stage. This is demonstrated in the residential buildings with both Block A & B exceeding the Part L1 2021 Fabric Energy Efficiency target by 18% under a site-wide approach.

Reductions in the energy demand of amenity and commercial areas have been achieved through efficient building services and façade optimisation, as well as the aforementioned ‘fabric first’ approach.

Appendix A details the target fabric and system performance parameters.

Be Clean.

There are no existing or planned district energy networks within feasible vicinity of the site that would enable a connection the Proposed Development. However, the system shall be designed to allow future connection to an offsite district heating network in case such an opportunity presents itself. No further carbon reductions at this stage.

Be Green.

Air Source Heat Pumps (ASHP) will provide space heating and hot water for all areas of the development, as well as cooling for the non-residential areas. Solar photovoltaic (PV) array will be provided on available roof space.

Results

Overall reduction in regulated carbon emissions over current building regulations target.

Non-Residential Areas (Part L2): 13.45% carbon reduction.
Residential Areas (Part L1): 69.34% carbon reduction.

This equates to a sitewide carbon reduction of 52.6% over Part L 2021, as shown in Figure 7 below.

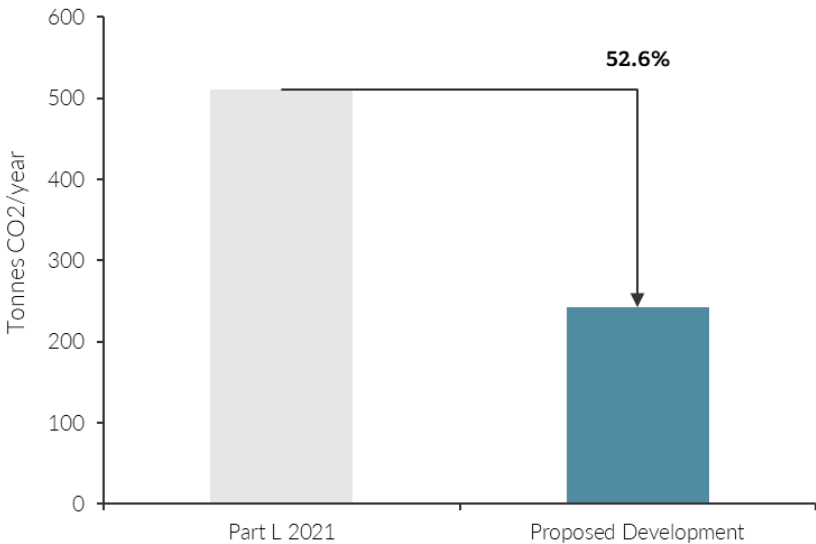


Figure 1: Sitewide carbon reduction against the Part L 2021 notional.

Carbon offset.

Target: 100% reduction over Part L 2021	In line with MCC policy, residual carbon emissions that cannot be fully mitigated onsite will be offset, through a financial contribution to an offset fund.
	Based on the current results, the current onsite savings are 269 tonnes CO ₂ /yr. Therefore, the current sitewide carbon shortfall that will be required to be offset is 242 tonnes CO ₂ /yr.

Overheating summary.

CIBSE TM59 is shown to be satisfied when the following criteria are achieved:

- Criterion A is achieved when the threshold temperature is not exceeded for more than 3% of the occupied hours.
- Criterion B is achieved when the operative temperature in bedrooms (from 10 pm to 7 am) does not exceed 26 °C for more than 1% of annual hours.

Both these criteria were met for the sample selection of 15 dwellings tested across the development. This has been achieved through the implementation of the following measures:

- Reduction of heat gain from the façade by introducing opaque panels and optimizing the g-value.
- Introduction of operable windows in all spaces to boost natural ventilation.

Accounting for the above façade strategy and the results presented within Section 2 of this report. It can be concluded that the risk of overheating has been minimised for the proposed development.

1. Introduction.

This energy strategy has been developed on behalf of the Applicant and forms part of a draft submission in support of the Proposed Development.

1.1 The Proposed Development.

Location: The Site is located on Bridge Street within Manchester City Centre at the border with the City of Salford, to which the Site is connected by two bridges. The River Irwell bounds the Site to the north-west, Bridge Street lies to the south of the Site, St. Mary's Parsonage to the east and the Trinity Bridge landing is located to the north-east.

Motor Square, an area of public realm, is located to the south-east of the Site, beyond this are a range of food and beverage / retail / commercial uses. Spinningfields, a largely commercial area, is located to the west of Bridge Street. Alberton House is located to the east of Trinity Bridge and has planning permission for redevelopment as an office development, beyond this is St Mary's Parsonage a largely commercial area. To the north of the River Irwell are residential properties, the Lowry Hotel and areas of public realm.

Proposed Development Description: The new scheme will provide three buildings consisting of 18 storeys of office space, two blocks of 37 and 49 levels of residential (Use Class C3) and a mix of amenity and retail (class E) spaces across the lower levels. This will be complimented by associated hard and soft landscaping, cycle parking, servicing, refuse and plant areas, new and improved public realm, highways work, and other works associated with the development.

Local Authority: Manchester City Council (MCC).



Figure 2 The Proposed Development [Credit: SEW]

1.2 Approach to the strategy.

This Energy Strategy proposes recommendations regarding the approach to reducing carbon dioxide (CO₂) emissions and optimising energy efficiency within the Proposed Development. This strategy summarises the pertinent regulatory and planning policies applicable to the Proposed Development and sets targets commensurate with these policies.

The Energy Strategy has been developed using a step-by-step approach to energy demand and emissions reduction through the 'Be Lean,' 'Be Clean,' 'Be Green' energy hierarchy. A 'fabric first' approach has been adopted to ensure energy efficiency is prioritised before the incorporation of low and zero carbon energy sources.



Figure 3: The energy hierarchy.

Disclaimer

The appraisals within this statement are based on Part L calculation methodology and should not be understood as a predictive assessment of likely future energy requirements or otherwise. Occupants may operate their systems differently, and/or the weather may be different from the assumptions made by Part L approved calculation methods, leading to differing energy requirements.

1.3 National policy.



Building Regulations: Approved Document Part L

Approved Document Part L (2021, England edition), here forward referred to as Part L 2021, is the Building Regulation relating to the conservation of fuel and power in buildings. Part L 2021 has two parts; Part L1 relates to dwellings and Part L2 relates to buildings other than dwellings.

Part L 2021 is the mechanism by which government is driving reductions in the regulated CO₂ emissions from refurbished, change of use and new buildings. For new buildings Part L 2021 has four performance metrics as follows:

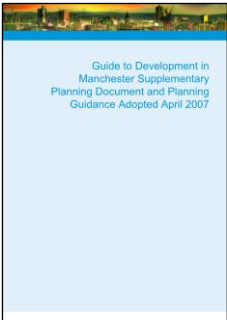
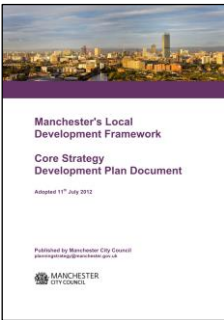
- Primary energy target
- CO₂ emissions target
- Fabric Energy Efficiency (FEE) target
- Minimum standards for fabric and fixed building services.

Building Regulations: Approved Document Part O

Approved Document Part O (2021, England edition), here forward referred to as Part O 2021, is the Building Regulation relating to overheating mitigation within new residential buildings. Part O 2021 requires that reasonable provision must be made to limit unwanted solar gains in summer and provide an adequate means to remove heat from the indoor environment. When meeting these requirements, account must be taken of occupant safety and enjoyment of the residence. Mechanical cooling must only be used where necessary.

1.4 Local policy.

1.4.1 Local Planning Policy



Manchester City Council (MCC) documentation:

- Core Strategy (CS) (July 2012)
- Supplementary Planning Documentation and Planning Guidance (SPDPG) (April 2007)
- Places for Everyone Joint Development Plan (PfE) (March 2024)
- Manchester Climate Change Agency: A Roadmap to Net Zero Carbon New Buildings in Manchester
- Saved policies from the Manchester Unitary Development Plan (1995)

This strategy summarises the response of the Proposed Development's design to the policy framework of the MCC Adopted Core Strategy, and SPDPG documentation that together form the city's policy landscape. The CS documentation supersedes the SPDPG and therefore the CS documentation will take precedence.

In March 2024, the Places for Everyone Joint Development plan was introduced. The policies within this document supersede sections of policies within the Core Strategy, as detailed in the 'Addendum to Manchester Core Strategy 2024' and affect points EN4 and EN6, replacing parts of them with PfE policy JP-S2 and its objectives.

The policies within the MCC CS, PfE and the Roadmap to Net Zero Carbon documents relating to the energy strategy for the scheme are detailed in Table 2.

Table 2: MCC CS and Places for Everyone Joint Development Plan Energy Policies Summary

Policy Reference	Target
Core Strategy	CS Policy EN4 – 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 LZC energy supplies. – Where possible new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide LZC energy supplies to existing buildings – Where appropriate new development and retrofit projects will be required to connect to and/or make contributions to LZC 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 <i>Note: this policy did include a section relating to the energy hierarchy, however this part has been superseded by PfE policy JP-S2</i>
	CS Policy EN5 – The Proposed Development is located within the Regional Centre, a strategic area indicated on the key diagram, which is expected to have a major role to play in achieving an increase in the level of decentralised, LZC energy supplies available. – Where investment or development is being undertaken into or adjacent to a public building/asset or district heating network, full consideration shall be given to the potential role that these can have in providing an anchor load within a decentralised energy network or in creating opportunities for CO₂ reduction funded by contributions.

Policy Reference	Target
CS Policy EN6	– For residential development of 10 or more units and all other development over 1,000sqm, an Energy Statement is required to set out the regulated energy demand and associated CO₂ emissions for all phases of development <i>Note: reduction targets were also included within this policy, however they are superseded by PfE policy JP-S2</i>
	CS Policy EN7 – Proposals must take account of potential opportunities to source heat from adjoining developments or nearby heating networks. – Heating and cooling systems will have capability of connecting to the decentralised heating network.
	CS Policy EN8 – All new development is expected to be adaptable to climate change, and should have regard to the following: – Reduction in heat island effect through green infrastructure – The need to control overheating of buildings through passive design. – Developers will be permitted to use green infrastructure elements to contribute to compliance with CO₂ mitigation under Policy EN6.
Places for Everyone Joint Development Plan	PfE policy JP-S2 Aims to support the delivery of a carbon neutral Greater Manchester no later than 2038, through a range of measures, including: – Promoting retrofitting of existing buildings with measures to improve energy efficiency, renewable energy generation, and low carbon building services – Capturing long-term development impacts through promoting use of Life Cycle Costing (LCC) and carbon assessment tools. – Positive approach to renewable and low carbon energy schemes, particularly schemes that meet the needs of local communities. – Increasing the range of nature-based solutions including carbon sequestration and natural flood management techniques. – Expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable: – Be net zero carbon in regulated operational carbon emissions, and from 2028 all 'in construction' emissions. – From 2025, calculate and minimise carbon emissions from unregulated emissions as well as regulated – Set out how this has been achieved in accordance with the energy hierarchy, which seeks to minimise energy demand, maximise energy efficiency, use renewable energy, use low carbon energy and utilise other energy sources – From 2025, residual carbon emission that cannot be fully mitigated onsite should be offset, through a financial contribution to an offset fund, in agreement with the local planning authority. – Incorporate adequate electric vehicle charging points. – 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. – In residential developments, achieve energy demand reduction targets for space heating and hot water energy demand, and the deliver on-site renewable energy generation (with PV as a priority). From 2025 onwards these targets are: – Space heat demand: 20kWh/m² for Houses, 15kWh/m² for Flats – Hot water energy demand: Over 20% energy demand reduction – Renewable energy generation targets: PV installation: 40% ground floorspace

Policy Reference	Target
	– In non-residential developments, achieve at least BREEAM ‘Excellent’ standard under ‘Ene 01 – reduction of energy use and carbon emissions’, rising to BREEAM ‘Outstanding’ equivalent for ENE 01 from 2028. – Include a detailed energy statement to demonstrate how the development has sought to maximize carbon emission reductions. Include minimisation of overheating risks, and appropriate measures for post-occupancy evaluation.
PfE policy JP-S3	– 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 have been identified where: – Existing heat/energy networks are operational or have been commissioned. – Proposals for new heat networks/energy networks are being progressed, or future opportunities have been identified. – Sufficient density of existing heat demand occurs; and – Significant future development is proposed. – Within the identified areas, unless it can be demonstrated that there are more effective alternatives or such connection is not practicable or financially viable, it is expected that: – New residential developments that are ‘10 dwellings or more’ or other developments over 1,000 m2 floorspace shall: - o Connect to an existing or planned heat/energy network or be designed to enable future connection (where within 500m of such a network); - o Install a site-wide or communal heat/energy network solution. – An expectation that new industrial development will demonstrate that opportunities for using waste heat locally have been fully examined, and included in proposals – 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 – An expectation that any site-wide networks will be designed to enable future expansion to adjoining buildings or assets as appropriate.
Manchester Climate Change Agency A Roadmap to Net Zero Carbon New Buildings in Manchester	– Reducing energy demand: – Domestic buildings should target EUI <60kWh/m²/yr (GIA) of operational energy use, excl. renewable generation (covers both regulated and unregulated consumption), with future uplift set out in advance e.g. <35kWh/m2/year from 2028) – New office development should target an EUI of <75kWh/m²/yr GIA from 2023, with future uplift set out in advance e.g. <55kWh/m²/yr from 2028. – At the design stage, demonstrate adherence to a design-for-performance methodology e.g. NABERS UK. – Low-carbon energy supply: – New development should not have any onsite combustion of fossil fuel. – All developments shall assess the viability for onsite renewable generation. For developments with SE/SW facing roof(s), a minimum 40% solar technologies installation as a percentage of building footprint area shall be met unless it can be clearly demonstrated that this is not practically viable. – All developments shall match their total annual energy demand through a combination of investment in renewable generation capacity or a 15-year minimum renewable energy PPA, energy storage and smart controls.

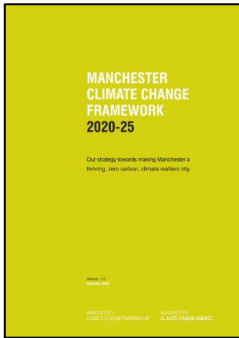
1.4.2 Net Zero Design Guidance - Greater Manchester Combined Authority (GMCA)

In order to support the implementation of the adopted policies in the Places for Everyone Joint Development Plan and the delivery of Truly Affordable Net Zero (TANZ) homes, three Net Zero guidance documents have been produced by the GMCA.



- Design guidance for Net Zero: This document explains the relevant strategies to design Net Zero buildings, in line with GMCA policies, specifically policies JP-S2 and TANZ net zero standard and linked to JP-S3 (refer Table 2).
- Low carbon heat: The purpose of this guidance is to summarise the many types of heating systems at different scales with a focus on the solutions which are likely to be compliant with Net Zero, in line with policy JP-S3, linked to JP-S2 (refer Table 2).
- Submission guidance for Places for Everyone policies: This document is aimed at helping pull together the calculations and outputs required for planning submissions, as influenced by JP-S2, JP-S3 and linked to TANZ.

1.4.3 Manchester Climate Change Framework (2020-2025)



The aim is that ““Manchester will play its full part in limiting the impacts of climate change and create a healthy, green, socially just city where everyone can thrive.””

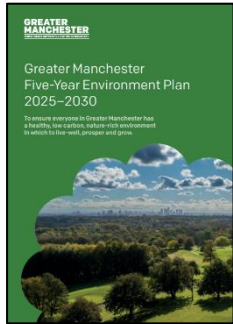
It identifies four objectives to be met by 2025.

- Objective 1 – Staying within our carbon budgets.
- Objective 2 – Climate adaptation and resilience
- Objective 3 – Health and wellbeing
- Objective 4 – Inclusive, zero carbon and climate resilient economy.

Six priority areas for action have been identified as follows:

1. Buildings (existing and new)
2. Renewable energy
3. Transport and flying.
4. Food
5. The things we buy and throw away.
6. Green infrastructure and nature-based solutions

1.4.4 5-Year Environment Plan for Greater Manchester

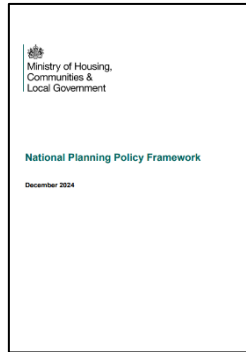


Greater Manchester Combined Authority (GMCA) sets an ambitious target to be a zero-carbon city by 2038. As part of this plan, the Greater Manchester Spatial Framework sets out plans for all new development to be zero carbon by 2028.

The five-year plan sets out a number of key items, including, but not limited to; increasing local renewable electricity generation, increasing the diversity and flexibility of energy supply, and decarbonising how buildings are heated (serviced). These items encourage passive design and a shift away from fossil fuels to service buildings. The five-year plan also notes that new developments should seek to generate 20% onsite / renewable energy generation.

Additionally, the strategy includes a clean air plan to help tackle poor air quality – safeguarding Manchester residents from high levels of Nitrogen Dioxide (NO₂).

1.4.5 National Planning Policy Framework



The updated National Planning Policy Framework (NPPF) was published in December 2024 and has superseded all Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) documents, with the exception of PPS10 (Waste). The NPPF sets out the Government's strategy on the delivery of sustainable development.

The NPPF places responsibility for policy making with the Local Planning Authority, who shall communicate their policies through Local Plans and facilitate the creation of Neighbourhood Plans. The NPPF states that there is a presumption in favour of sustainable development.

The following is extracted from paragraph 11 of the NPPF:

“Plans and decisions should apply a presumption in favour of sustainable development.

For plan-making this means that:

- a) plans should positively seek opportunities to meet the development needs of their area and be sufficiently flexible to adapt to rapid change.*
- b) strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses, as well as any needs that cannot be met within neighbouring areas, unless:*
 - i. the application of policies in this Framework that protect areas or assets of particular importance provides a strong reason for restricting the overall scale, type, or distribution of development in the plan area; or*
 - ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.*

For decision-taking this means:

- a) approving development proposals that accord with an up-to-date development plan without delay; or*
- b) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date⁷, granting permission unless:*
 - i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed ⁶; or*
 - ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole.”*

In respect of energy policy contained within the NPPF, paragraph 155 sets out that:

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

- a) provide a positive strategy for energy from these sources, which maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts).*
- b) 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.

1.4.6 Manchester Climate Change Agency – A Roadmap to Net Zero Carbon New Buildings in Manchester

The Manchester Climate Change Partnership, including Manchester City Council, has agreed the Manchester Climate Change Framework 2020-25 which includes a recommendation for all new development to be zero carbon from 2023. A Task Group, supported by the UK Green Building Council, has developed “A Roadmap to Net Zero Carbon New Buildings in Manchester” to provide guidance on how zero carbon should be defined for new buildings in Manchester and how this ambition could be implemented.

The focus of the roadmap is to detail the Manchester Standard and the steps to implement it. The following targets are relevant to the proposed energy strategy:

- Reducing energy demand:
 - New office development should target an Energy Use Intensity of <75kWh/m²/yr GIA from 2023, with future uplift set out in advance e.g. <55kWh/m²/yr from 2028.
 - At the design stage, demonstrate adherence to a design-for-performance methodology e.g. NABERS UK.
- Reducing embodied carbon:
 - Calculate whole life carbon emissions through a nationally recognised methodology and demonstrate actions taken to reduce lifecycle carbon.
 - New office developments should target <600kgCO_{2e}/m² upfront embodied carbon (RICS Modules A1-A5) with future uplift set out in advance e.g. <350kgCO_{2e}/m² from 2028 excluding sequestration.
- Low-carbon energy supply:
 - New development should not have any onsite combustion of fossil fuel.
 - All developments shall assess the viability for onsite renewable generation. For developments with SE/SW facing roof(s), a minimum 40% solar technologies installation as a percentage of building footprint area shall be met unless it can be clearly demonstrated that this is not practically viable.
 - All developments shall match their total annual energy demand through a combination of investment in renewable generation capacity or a 15-year minimum renewable energy PPA, energy storage and smart controls.

2. Cooling and overheating.

In tandem with the energy and CO₂ emissions appraisal, an assessment has been undertaken to determine the risk of summertime overheating and subsequently consider measures for the minimisation of cooling demand and mitigating risk of overheating.

2.1 Cooling hierarchy.

A ‘cooling hierarchy’ is has been used, see Figure 4, as a basis for the reduction of cooling and overheating within the development as a means to reduce overall energy consumption. This has been applied to the Proposed Development as outlined in section 2.2.

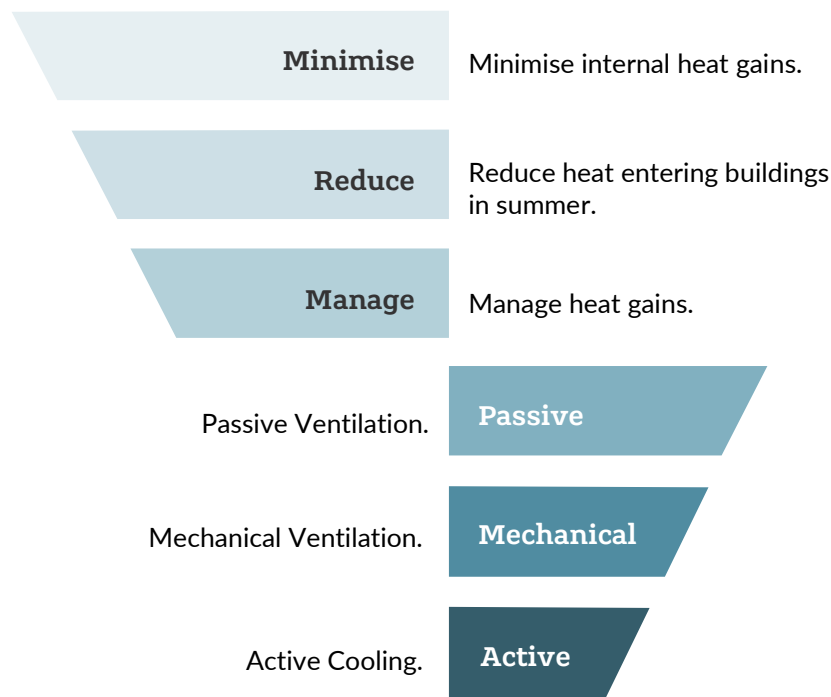


Figure 4: Cooling hierarchy.

2.2 Mitigation strategy.

Minimising Internal Heat Gains

The following mitigation methods will be implemented to minimise the internal heat generation through energy efficient design at the Proposed development:

- Energy efficient lighting (i.e. LED) with low heat output.
- Insulation to heating and hot water pipework and minimisation of dead-legs to avoid standing heat loss.
- Energy efficient equipment with low heat output to reduce unnecessary heat gain.

Reducing the Amount of Heat Entering the Building in Summer

The following mitigation methods will be implemented to reduce the amount of heat entering the building in summer within the proposed development:

- Facades have been developed to balance solar gains and daylighting, with particular focus on optimizing the curtain walling. Glazing ratios for the development are provided in Appendix A.
- Suitable g-values have been specified to further control solar heat gains as required.

Manage Heat Gains

Opportunities to expose thermal mass to help to further regulate internal temperatures will be explored where possible.

Passive Ventilation

The potential for passive ventilation via opening facades to facilitate a mixed-mode ventilation strategy has been considered within the facade design. Natural ventilation through openable windows has been incorporated for both the residential units and for the office spaces.

Mechanical Ventilation

Mechanical ventilation is an important element of building services, to maintain good indoor air quality throughout the day by providing fresh air and extracting vitiated air. Providing fresh air minimises the risk of stale and stagnant air and limits the risk of condensation and mould growth as well as benefitting the occupants’ physical and mental wellbeing. Mechanical ventilation through heat recovery (MVHR) mechanisms will be provided to save heating energy.

Mechanical ventilation units will be located away from pollution sources. It is anticipated that the design flow rates specified will aid the regulation of internal temperatures in summer months.

Active Cooling

As the final step active cooling is specified, in order to keep internal temperatures within acceptable limits.

2.3 Commercial cooling demand reduction.

The cooling energy demand of the proposed actual building has been compared against a notional building built to Part L2 parameters, indicating a reduction of the cooling demand.

From the work that has been undertaken with the design team on overheating mitigation across the development, the cooling energy demand of the actual building is less than the cooling energy demand of the notional building built to Part L2 parameters, as shown in Table 3 below.

Table 3: Cooling Demand Reduction.

Commercial Area	Cooling demand (kWh/m ²)	
	Notional building	Actual building
Office building (Block C)	2.67	2.33
Non-domestic areas within Block A & B	0.51	0.42

2.4 Residential assessment methodology.

Part O 2021 states that all new build residential units are within the scope of the approved document, whereby a residential dwelling is defined as both dwelling houses and flats (Part O (2021), Table 0.1).

Thermal comfort methodology has been used to assess the occupied spaces within a representative sample of 15 dwellings to determine their risk of overheating during the summer period (May to September inclusive). The spaces have been assessed against criteria stated within CIBSE Technical Memorandum 59 (TM59): Design methodology for the assessment of overheating risk in homes, in accordance with the dynamic thermal modelling method.

2.5 Overheating results.

CIBSE TM59 is shown to be satisfied when the following criteria are achieved:

- Criterion A is achieved when the threshold temperature is not exceeded for more than 3% of the occupied hours.
- Criterion B is achieved when the operative temperature in bedrooms (from 10 pm to 7 am) does not exceed 26 °C for more than 1% of annual hours.

The variations between each DSY file are briefly summarised below:

- DSY 1: moderately warm summer
- DSY 2: short, intense warm spell
- DSY 3: long, less intense warm spell

The results for the overheating assessment are shown below for each occupied space within the sample apartments assessed..

Table 4: Overheating modelling iterations

	TM59 Approach	Daytime	Night-time	Ventilation Rates
1	Adaptive	Open – unrestricted*	Part O 2021 Acoustic Guidance	Part F

*Where architecturally feasible to open and in line with the safety requirements as set out in Part O.

The results for the sample dwellings with the naturally ventilated scenario are summarised in the following table. All rooms pass the TM59 assessment.

Table 5: Part O results summary

Dwelling Unit	Room Reference	TM59 Criterion (<3% required for compliance)	Result
Block A-L02-Unit 1	A_L02_Unit 1_1B2P_LKD	0.0	Pass
	A_L02_Unit 1_1B2P_Dbl bedroom	0.0	Pass
Block B-L02-Unit 2	B_L02_Unit 2_2B4P_Dbl bedroom 1	0.0	Pass
	B_L02_Unit 2_2B4P_LKD	0.0	Pass
	B_L02_Unit 2_2B4P_Dbl Bedroom 2	0.0	Pass
Block B-L02-Unit 3	B_L02_Unit 3_2B3P_Dbl bedroom	0.0	Pass
	B_L02_Unit 3_2B3P_LKD	0.0	Pass
	B_L02_Unit 3_2B3P_Sgl bedroom	0.0	Pass
Block A-L29-Unit 4	A_L29_Unit 4_2B3P_Dbl bedroom	0.0	Pass
	A_L29_Unit 4_2B3P_LKD	0.0	Pass
	A_L29_Unit 4_2B3P_Sgl bedroom	0.0	Pass
Block A-L29-Unit 5	A_L29_Unit 5_1B1P_Studio	0.0	Pass
Block A-L29-Unit 6	A_L29_Unit 6_2B4P_Dbl bedroom 1	0.0	Pass
	A_L29_Unit 6_2B4P_Dbl bedroom 2	0.0	Pass
	A_L29_Unit 6_2B4P_LKD	0.0	Pass
Block A-L29-Unit 7	A_L29_Unit 7_3B5P_Dbl bedroom 1	0.0	Pass
	A_L29_Unit 7_3B5P_Sgl bedroom	0.0	Pass
	A_L29_Unit 7_3B5P_Dbl bedroom 2	0.0	Pass
	A_L29_Unit 7_3B5P_LKD	0.0	Pass

Dwelling Unit	Room Reference	TM59 Criterion (<3% required for compliance)	Result
Block B-L29-Unit 8	B_L29_Unit 8_2B4P_Dbl bedroom 1	0.0	Pass
	B_L29_Unit 8_2B4P_LKD	0.3	Pass
	B_L29_Unit 8_2B4P_Bedroom 2	0.0	Pass
Block B-L29-Unit 9	B_L29_Unit 9_2B4P_Dbl bedroom 1	0.0	Pass
	B_L29_Unit 9_2B4P_LKD	0.1	Pass
	B_L29_Unit 9_2B4P_Dbl bedroom 2	0.0	Pass
Block B-L29-Unit 10	B_L29_Unit 10_2B3P_Dbl bedroom 1	0.0	Pass
	B_L29_Unit 10_2B3P_LKD	0.8	Pass
	B_L29_Unit 10_2B3P_Sgl bedroom	0.0	Pass
Block B-L29-Unit 11	B_L29_Unit 11_1B2P_LKD	0.0	Pass
	B_L29_Unit 11_1B2P_Dbl bedroom	0.0	Pass
Block A-L37-Unit 12	A_L37_Unit 12_2B3P_Dbl bedroom	0.0	Pass
	A_L37_Unit 12_2B3P_LKD	0.0	Pass
	A_L37_Unit 12_2B3P_Sgl bedroom	0.0	Pass
Block A-L37-Unit 13	A_L37_Unit 13_1B2P_LKD	0.8	Pass
	A_L37_Unit 13_1B2P_Dbl bedroom	0.0	Pass
Block B-L49-Unit 14	B_L49_Unit 14_2B4P_Dbl bedroom 1	0.0	Pass
	B_L49_Unit 14_2B4P_LKD	0.0	Pass
	B_L49_Unit 14_2B4P_Dbl bedroom 2	0.0	Pass
Block A-L49-Unit 15	B_L49_Unit 15_2B3P_Sgl bedroom	0.0	Pass
	B_L49_Unit 15_2B3P_LKD	1.2	Pass
	B_L49_Unit 15_2B3P_Dbl bedroom	0.0	Pass
	B_L49_Unit 15_2B3P_Dbl bedroom	0.0	Pass

The results of this overheating risk assessment for a sample of dwellings within the proposed development indicate that the current architectural design and operational assumptions (as outlined in this report) are able to reduce the risk of overheating in the sample dwellings in line with industry guidance.

3. Be Lean.

Passive design and energy efficiency measures form the basis for the reduction in overall energy demand and carbon emissions for the Proposed Development. This energy strategy aims to reduce the energy demand initially by optimising the envelope and building services within the development.



3.1 Passive design and energy efficiency features.

Passive design measures are those which reduce the demand for energy within buildings, without consuming energy in the process. These are the most robust and effective measures for reducing CO₂ emissions as the performance of the solutions, such as wall insulation, is unlikely to deteriorate significantly with time, or be subject to change by future property owners. In this sense, it is possible to have confidence that the benefits of these measures will continue at a similar level for the duration of their installation.



Fabric Performance

A 'fabric first' approach has been taken to reduce the energy demand and CO₂ emissions from the Proposed Development. The overriding objective for the façade design of all of the new building elements will be to achieve the optimum balance between providing natural daylighting benefits to reduce the use of artificial lighting, the provision of passive solar heating to limit the need for space heating in winter and limiting summertime solar gains to reduce space cooling demands.

Typically, demand for space heating can be dominant in dwellings, whilst space heating can be less dominant in commercial spaces, and cooling demand can be higher. Therefore, for the non-residential spaces, heat losses and gains will be controlled by the optimisation of the fabric, i.e., ensuring appropriate levels of glazing to control winter heat loss and summer heat gain. Reducing the thermal transmittance of the building envelope where appropriate will help to reduce both heating and cooling requirement and result in lower energy requirements.

The proposed fabric performance parameters are detailed in Table 6.



Space Cooling

No cooling is proposed for the dwellings.

Cooling will be provided for the non-domestic elements. Efficient systems are proposed in line with the standards outlined in the Non-Domestic Building Services Guide (2021).



Mechanical Ventilation

MVHR units are an important addition to the building services to maintain good indoor air quality. Providing fresh air minimises the risk of stale and stagnant air and limits the risk of condensation and mould growth.

Coupled to a heat exchanger, the warmth in extracted air can be recovered and delivered to the supply air. In this mode, the MVHR unit reduces space heating demand. The heat recovery mechanism will be provided with a bypass to avoid returning hot air to the dwellings in summer months.



Natural Daylight and Lighting Strategy

Highly efficient, low energy lighting will be specified throughout the development to reduce the energy demand.

Within non-residential spaces, the lighting will be controlled through auto on-off and daylight dimming where appropriate to further reduce the energy demand.

Details of the proposed system parameters can be found in Appendix A.

3.2 Fabric performance.

Table 6 below summarises the fabric parameters of the Proposed Development for the residential and non-residential areas.

Table 6: Proposed fabric performance

Building element	Target Performance	
	Residential	Non-Residential
Air permeability (m ³ /h.m ² at (50Pa))	2.00	2.00 (Amenities) 3.00 (Office)
External wall u-value (W/m ² . K)	0.15	0.15 / 1.60
Windows (W/m ² . K)	0.80 (Triple Glazed)	1.20 / 1.30 (Double Glazed)
Roof u-value (W/m ² K)	0.10	0.10
Exposed floor u-value (W/m ² K)	0.10	0.12
Sheltered walls (W/m ² K)	0.18	-
Thermal Bridging	Part L 2021 Notional Values	Part L 2021 Notional Values
Opaque Doors (W/m ² K)	1.00	1.30
Vertical Glazing g-value	0.35	0.27 (Amenities) 0.40 (Office)
Frame Factor	80%	90% (Amenities) 80% (Office)

3.3 Domestic fabric energy efficiency.

Part L1 2021 requires compliance with the Fabric Energy Efficiency (FEE) metric. Table 7 below outlines the anticipated area weighted average FEE performance for the residential element, showing compliance with the FEE metric and demonstrating the performance of the proposed building fabric.

Table 7: Domestic fabric energy efficiency results.

	Dwelling fabric energy efficiency (DFEE) kWh/year	Target fabric energy efficiency (TFEE) kWh/year	Percentage variance
Block A area-weighted average:	17.99	22.01	18.27%
Block B area-weighted average:	18.64	22.88	18.52%
Site wide area-weighted average:	18.41	22.57	18.43%

4. Be Clean.

This stage of the energy hierarchy includes consideration of connection to available district heat networks, or the use of on-site heat networks and decentralised energy production, such as Combined Heat and Power (CHP), to provide energy, therefore reducing consumption from the national grid and gas networks, through the generation of electricity, heating and cooling on-site.



4.1 Be Clean: network and technologies.

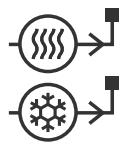
The following sections detail considerations of the infrastructure and low-carbon energy supply measures that have been considered.



Combined Heat and Power (CHP)

Changes to the carbon factor of grid electricity have meant that previously favoured systems such as CHP are becoming much less carbon efficient. In fact, CHP systems are now expected to lead to greater carbon emissions than conventional gas-fired boilers due to their lower efficiency.

Due to the decarbonisation of the electricity grid, alongside air quality concerns, CHP is not proposed.



Decentralised Heat Networks

A large part of central Manchester is identified as a Potential Heat Network zone i.e., areas where heat density is sufficient for heat networks to provide a competitive solution for supplying heat to buildings and consumers.

Under PfE policy JP-S3 the scheme must consider connections to any existing heat networks, with a current or future connection as it consists of over 10 dwellings.

The closest current heat network within Manchester is the Civic Quarter heat network, serving a selection of Manchester City Council buildings amongst others around the Central Convention Centre.

Figure 5 shows the location of the scheme compared to the heat network energy centre. As the distance is over 500m, a connection to this network has been discounted. Instead, the scheme has incorporated a communal network in each building, with ASHPs serving most spaces in a combined system, maximising efficiency.

The system shall be designed to allow future connection to an offsite district heating network in case such an opportunity presents itself.

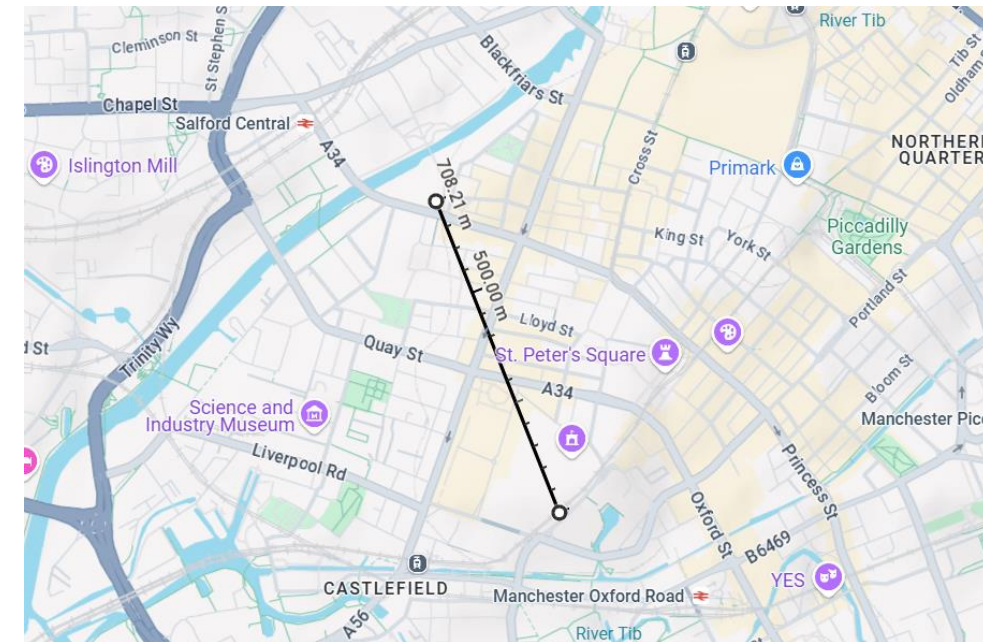
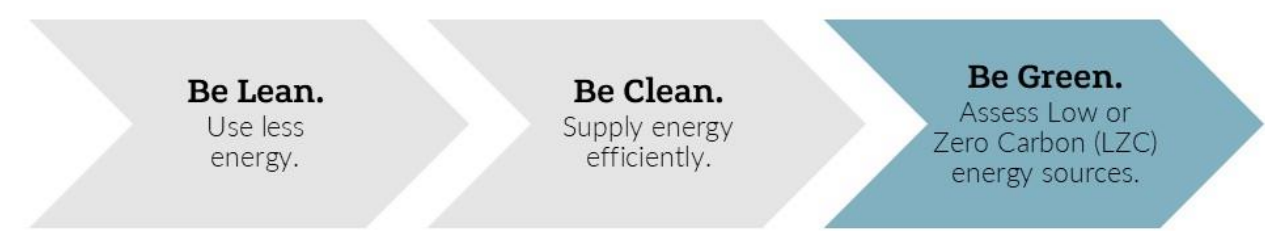


Figure 5: Site location relative to Civic Quarter Heat Network

5. Be Green.

The final step of the energy hierarchy explores the feasibility of Low and Zero Carbon (LZC) technologies to allow for the production of renewable energy onsite in order to deliver further reduction in carbon emissions.



5.1 Low and zero carbon (LZC) technology assessment.

Renewable or zero carbon technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available; however, not all of these are commercially viable or suitable for city centre locations.

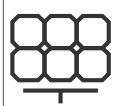
Discounted Technologies

- 

Ground Source Heat Pumps
Ground Source systems would require extensive below ground works to bury and install the system on site. Given the separated basements and high environmental impact of drilling near the river, this has been discounted.
- 

Solar Thermal
Available roof area is to prioritise solar PVs, since the electrical output from PV panels will be more suitable for implementation with the heat-pump led energy strategy and building energy usage.

Proposed Technologies

- 

Photovoltaics
Solar irradiance analysis on the site has shown a good opportunity for the deployment of solar PV technologies for onsite electricity generation.

The current provision for PV is 105m² across all three buildings (32m² each on Blocks A & B, 41.6m² on Block C), producing a total of 975 kWh across the development, which is all accounted for within the non-domestic modelling. As the project progresses, any opportunities to maximise the PV allowance will be explored.
- 

Air Source Heat Pumps
The heating and hot water demand for the all areas will be provided by on-site Air Source Heat Pumps (ASHP), located at roof level (albeit topped up by electric boilers for an average 5% of time of the year when the ambient temperature is too cold for ASHPs to meet heating demand).

Full simulation inputs depicting the Proposed Development at the Be Green stage is provided in Appendix A. The Proposed Development, in keeping with the energy hierarchy, aims to exhaust all feasible and practical passive and active design measures to maximise carbon reductions on-site, achieving significant carbon reductions.

5.2 Be Green summary.

Residential	An LTHW system connected to HIUs, driven by 4-pipe ASHP will provide approximately 95% of space heating and hot water, with electric boilers providing 5% as a top up during peak demand. Sitewide 69% carbon reduction over the Part L1 notional.
Non-residential	Air source heat pumps will provide space heating, cooling, and hot water for the non-domestic areas. Office spaces will be served by dedicated AHUs with heat. Recovery. Sitewide 11% carbon reduction over the Part L2 notional.

7. Summary.

This strategy has been prepared to demonstrate that at the planning stage, the Applicant and design team have given due consideration to the principles of energy and sustainability to ensure that the Proposed Development will result in a highly efficient, low-carbon scheme.

Optimised building fabric and high-efficiency servicing equipment will minimise the energy usage of the building. Using the established energy hierarchy (see Figure 6), reduction in energy demand via passive measures has been prioritized before the incorporation of low and zero-carbon strategies ensuring that the Proposed Development is highly efficient as well as economical.



Figure 6: The energy hierarchy.

7.1 The energy strategy.

The strategy has been developed using the ‘Be Lean, Clean and Green’ energy hierarchy which utilises a fabric first approach to maximise reduction in energy through passive design measures.

Table 8: Site wide energy performance results summary

Be Lean.

A ‘fabric first’ approach has been taken in order to reduce the energy demand and CO₂ emissions for the Be Lean stage.

This is demonstrated in the residential buildings by both Block A & B exceeding the Part L1 2021 Fabric Energy Efficiency target by 18% under a site-wide approach.

Reductions in the energy demand of amenity and commercial areas have been achieved through efficient building services and façade optimisation, as well as the aforementioned ‘fabric first’ approach.

Appendix A details the proposed target fabric and system performance parameters.

Be Clean.

There are no existing or planned district energy networks within feasible vicinity of the site that would enable a connection the Proposed Development.

However, the system shall be designed to allow future connection to an offsite district heating network in case such an opportunity presents itself.

Be Green.

Air Source Heat Pumps (ASHP) will provide space heating and hot water for all areas of the development, as well as cooling for the non-residential areas.

Solar photovoltaic array will be provided on available roof space.

Results

Overall reduction in regulated carbon emissions over current building regulations target.

Non-Residential Areas (Part L2): 11.5% carbon reduction.
Residential areas (Part L1): 69.3% carbon reduction.

This equates to a sitewide carbon reduction of 52.6% over Part L 2021, as shown in Figure 7 below.

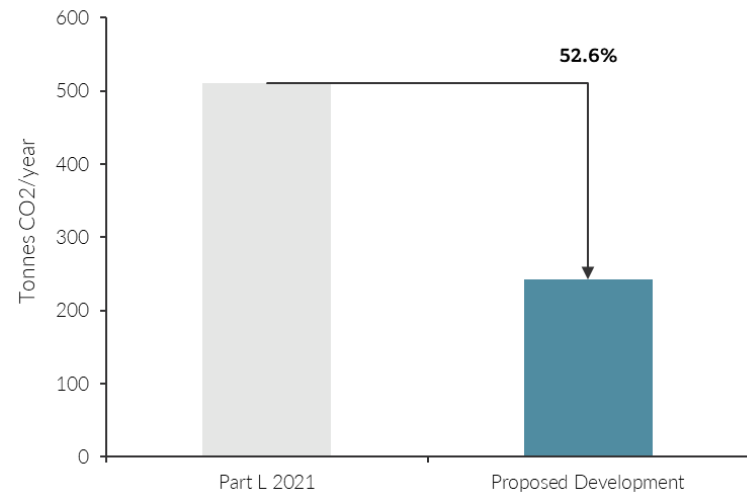


Figure 7: Sitewide carbon reduction against the Part L 2021 notional.

7.2 Carbon offset payment.

In line with MCC policy, residual carbon emission that cannot be fully mitigated onsite will be offset, through a financial contribution to an offset fund. Table 9 below sets out the calculation of the current estimated carbon shortfall that would be offset.

Table 9: Sitewide carbon shortfall calculation.

	Site-Wide Regulated Carbon Dioxide Emissions (tonnes CO ₂ /yr.)	
Notional: Part L 2021 Building Regulations (SAP 10.2 carbon factors)	510	
Actual: Proposed Development assessed results	242	
	Site-Wide Regulated Carbon Dioxide Savings	
	(tonnes CO ₂ /yr.)	(%)
On-site savings	269	52.6%
Total target savings	510	100.0%
Shortfall	242	47.4%

7.3 Energy use intensity and space heating demand.

The Proposed Development has set an EUI and a space heating demand target for the Residential buildings, in line with MCC policy requirements. For the Office building, a baseline EUI target has been set that aligns with the MCC policy requirements, and an aspirational target has been set to facilitate the achievement of a NABERS 5-star rating, in line with the Applicant’s aspirations for the Office. The EUI and space heating targets for the Proposed Development are summarised in Table 10.

Table 10: EUI and space heating demand targets

Target	EUI (<i>kWh/m²/yr</i>) Excluding renewables	Space heating demand (<i>kWh/m²/yr</i>) Excluding renewables	Methodology
Residential buildings (Flats): Baseline target	60	15	MCC policy target
Residential buildings (Flats): Aspirational target	35	-	Truly Affordable Net Zero Homes (TANZ) target
Office building: Baseline target	75	-	MCC policy target
Office building: Aspirational target	69	-	Base building requirement for the targeted NABERS 5-Star rating

The EUI and space heating demand have been calculated through:

- Operational energy modelling using the Passivhaus Planning Package (PHPP) for the Residential buildings,
- Operational energy modelling in line with TM54 guidance for the Office building.

The initial modelling results for the EUI and space heating demand are summarized in Table 11 below. It should be noted that these results are from early-stage modelling and therefore, early-stage assumptions have been used for the modelling where detailed design information and specifications are not yet known. Additionally, while the relevant guidance defines the EUI and space heating demand targets specifically for flats, the results have been calculated for the whole residential building, i.e. flats and amenity areas.

As the project progresses and more detailed inputs and design specific information becomes available, the accuracy of the operational energy modelling will improve. In order to achieve the project targets, opportunities to reduce the EUI and space heating demand will be explored and included within the design and modelling. Throughout the design process the project team will seek to ensure the design meets the targets.

Table 11: EUI and space heating demand results

Target	EUI (<i>kWh/m²/yr</i>)* Excluding renewables	Space heating demand (<i>kWh/m²/yr</i>)* Excluding renewables	Methodology
Residential buildings (Flats)	61.3	20.53	PHPP for residential buildings.
Office building	107.02	-	TM54 for office buildings.

*GIA includes all residential spaces, including amenity areas.

Appendix A: Modelling inputs.

Table 12: Fabric Performance

Building element	Unit	Part L 2021 Notional	Energy strategy
Residential			
Curtain Walling U-value	(W/m²K)	0.18	1.20
Sheltered Wall U-value	(W/m²K)		0.18
Window U-value	(W/m²K)	1.20	0.80
Window g-value	-	-	0.35
Door U-value	(W/m²K)	1.00	1.00
Air permeability	(m³/m².hr @50Pa)	5.00	2.00
Commercial			
External Wall U-value	(W/m²K)	0.18	0.15
Sheltered Wall U-value	(W/m²K)	0.18	-
Window U-value	(W/m²K)	1.20	1.20
Window g-value	-	-	0.35
Door U-value	(W/m²K)	1.00	1.30
Air permeability	(m³/m².hr @50Pa)	5.00	3.00

Table 13: Proposed system parameters

System parameters	Residential Blocks	Non-Residential (Block A & B - Amenity)	Non-Residential (Block C - Office)
Ventilation	Mechanical ventilation with heat recovery <i>(Nuair MRXBOXAB-ECO5)</i> Specific fan power (SFP): Varies on number of wet rooms. 1 Wet room: SFP 0.63 W/l/s (90% efficiency) 2 Wet room: SFP 0.61 W/l/s (89% efficiency)	Mechanical ventilation with heat recovery (Air handling unit) Heat recovery efficiency: 83%. Specific fan power (SFP): 2.0 W/l/s	Mechanical ventilation with heat recovery (Air handling unit) Heat recovery efficiency: 89%. Specific fan power (SFP): 2.0 W/l/s
	Supplied from ASHP HIU: – Loss (kWh/day): 1.44 Less than 125litres per person per day water use.	Supplied from ASHP Hot Water Cylinder: – Delivery efficiency: 95% – Storage volume: 540.00L – Storage Loss (kWh/day): 1.89	
Heating	Heat Network: 95% Space and Water Combined: Heat Source 1: Heat Network ASHP	Main Heating 1 – FCU + AHU Heat Source: Heat Network ASHP Heat Emitter: Local Fan Coil Units Efficiency: 348	Main Heating 1 – FCU + AHU Heat Source – Heat Network ASHP Heat Emitter: Local Fan Coil Units Efficiency: 345

System parameters	Residential Blocks	Non-Residential (Block A & B - Amenity)	Non-Residential (Block C - Office)
	Product: Mitsubishi i-FX-N-GO5 /SL-A /0472 SL-A Heat Emitter: Heat interface unit supplying radiators Block A Efficiency: 300% Block B Efficiency: 250% Heating controls: Time and temperature zone control by arrangement 5%– Radiators Heat Source – Electric boiler Heat Emitter: Radiators Efficiency: 100	Main Heating 2 – Radiators Heat Source – Heat Network ASHP Heat Emitter: Radiators Efficiency: 345	Main Heating 2 – Radiators Heat Source: Heat Network ASHP Heat Emitter: Radiators Efficiency: 345
Cooling	No cooling specified	ASHP: – SEER: 4.45	ASHP: – SEER: 2.50
Lighting		Low energy LED lighting Efficacy: 130 lm/W for office, retail, and amenity spaces Efficacy: 95 lm/W for core spaces Efficacy: 147 lm/W for plant spaces	Low energy LED lighting Efficacy: 130 lm/W for office, retail, and amenity spaces Efficacy: 95 lm/W for core spaces Efficacy: 147 lm/W for plant spaces
	Low energy LED lighting Efficacy: 100 lm/W	<i>Display lighting efficiency has been artificially improved due to S&C simplification and its application to the entire floor area where in reality this would only be reception/entrance.</i> Lighting Controls: Auto on-off and daylight dimming in residential amenity. Auto on-dimmed in common corridors.	<i>Display lighting efficiency has been artificially improved due to S&C simplification and its application to the entire floor area where in reality this would only be reception/entrance.</i> Lighting Controls: Auto on-off and daylight dimming in perimeter office areas.
Wastewater Heat Recovery (WWHR)	Shower design and legionella risk concerns means WWHR has not been included in the calculations to date.		

Appendix B: Sample SAP units detailed results.

Block	Dwelling reference	GIA	Multiplier	Total area	CO2 emissions			Primary Energy			Fabric energy efficiency			Overall compliance	EPC
					Target Emissions Rate (TER)	Dwelling Emission Rate (DER)	Variance	Target Primary Energy Rate (TPER)	Dwelling Primary Energy Rate (DPER)	Variance	Target Fabric Energy Efficiency (TFEE)	Dwelling Fabric Energy Efficiency (DFEE)	Variance		
-	-	m²	-	m²	kgCO ₂ /m²/yr.	kgCO ₂ /m²/yr.	%	kWh/m²/yr	kWh/m²/yr	%	kWh/m²/yr	kWh/m²/yr	%	-	
Block A	Unit 01	75.15	1	75.15	14.89	4.00	73.14%	82.10	42.54	48.19%	36.88	31.01	15.92%	YES	B
Block A	Unit 02	65.28	33	2154.24	13.13	3.60	72.58%	72.66	38.68	46.77%	26.09	20.61	21.00%	YES	B
Block A	Unit 03	87.53	33	2888.49	10.42	2.99	71.31%	57.94	32.14	44.53%	19.52	16.31	16.44%	YES	B
Block A	Unit 04	38.92	33	1284.36	14.84	4.51	69.61%	82.90	48.70	41.25%	16.84	13.76	18.29%	YES	B
Block A	Unit 05	50.79	33	1676.07	13.66	3.98	70.86%	76.03	42.78	43.73%	21.45	17.95	16.32%	YES	B
Block A	Unit 06	74.09	33	2444.97	12.04	3.33	72.34%	66.78	35.76	46.45%	23.59	19.12	18.95%	YES	B
Block A	Unit 07	75.15	1	75.15	14.68	5.26	64.17%	80.98	34.86	56.95%	35.93	31.17	13.25%	YES	B
	Block compliance		167	10,598.43	12.45	3.56	71.44%	69.19	38.09	44.95%	22.01	17.99	18.27%	YES	
Block B	Unit 08	78.33	1	78.33	13.63	4.27	68.67%	75.50	45.43	39.83%	31.68	27.50	13.19%	YES	B
Block B	Unit 09	72.78	45	3275.10	12.60	3.86	69.37%	69.97	41.44	40.77%	25.68	20.40	20.56%	YES	B
Block B	Unit 10	76.87	45	3459.15	12.04	3.71	69.19%	66.88	39.83	40.45%	24.14	19.43	19.51%	YES	B
Block B	Unit 11	66.47	45	2991.15	12.31	3.97	67.75%	68.49	42.62	37.77%	22.71	18.25	19.64%	YES	B
Block B	Unit 12	50	45	2250.00	14.09	4.63	67.14%	78.40	49.75	36.54%	23.83	19.92	16.41%	YES	B
Block B	Unit 13	63.47	45	2856.15	11.96	4.00	66.56%	66.74	43.00	35.57%	18.96	15.83	16.51%	YES	B
Block B	Unit 14	89.28	45	4017.60	10.71	3.40	68.25%	59.59	36.49	38.76%	21.47	17.70	17.56%	YES	B
Block B	Unit 15	76.87	1	76.87	14.62	4.52	69.08%	80.78	48.05	40.52%	36.00	31.11	13.58%	YES	B
	Block compliance		272	19,004.35	12.15	3.87	68.14%	67.56	41.55	38.50%	22.88	18.64	18.52%	YES	
	Site compliance		439	29,602.78	12.26	3.76	69.34%	68.14	40.31	40.85%	22.57	18.41	18.43%	YES	

Appendix C: BRUKLs.

Office building BRUKL

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Albert Bridge House

As designed

Date: Fri May 02 16:43:18 2025

Administrative information

Building Details

Address: Bridge Street, Manchester, M60 1WJ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

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

Certifier details

Name: Hoare Lea

Telephone number: +44 1202 654600

Address: Enterprise House, Old School Cl, Ferndown, BH22 9UN

Foundation area [m²]: 1482.83

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m²annum	4.09
Building CO ₂ emission rate (BER), kgCO ₂ /m²annum	3.54
Target primary energy rate (TPER), kWh _{tp} /m²annum	44.66
Building primary energy rate (BPER), kWh _{tp} /m²annum	38.44
Do the building's emission and primary energy rates exceed the targets?	BER =< TER BPER =< TPER

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

Fabric element	U _a -Limit	U _a -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.38	1.6	GF00000A:Surf[10]
Floors	0.18	0.12	0.12	RM000000:Surf[3]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	RM000000:Surf[4]
Windows** and roof windows	1.6	0.78	1.2	GF00000A:Surf[0]
Rooflights***	2.2	1.3	1.3	NW000005:Surf[0]
Personnel doors^	1.6	1.3	1.3	L1000081:Surf[0]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	1.2	1.2	GF000012:Surf[8]
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)] * Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows. ** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position. ^ For fire doors, limiting U-value is 1.8 W/m²K NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.				
Air permeability	Limiting standard	This building		
m³/(h.m²) at 50 Pa	8	3		

Technical Data Sheet (Actual vs. Notional Building)		
Building Global Parameters		Building Use
	Actual	Notional
Floor area [m²]	30706	30706
External area [m²]	16609.8	16609.8
Weather	MAN	MAN
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	8349.2	8052.96
Average U-value [W/m²K]	0.5	0.48
Alpha value* [%]	25.33	10
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging		
% Area	Building Type	
3	Retail/Financial and Professional Services	
96	Restaurants and Cafes/Drinking Establishments/Takeaways	
	Offices and Workshop Businesses	
	General Industrial and Special Industrial Groups	
	Storage or Distribution	
	Hotels	
	Residential Institutions: Hospitals and Care Homes	
	Residential Institutions: Residential Schools	
	Residential Institutions: Universities and Colleges	
	Secure Residential Institutions	
	Residential Spaces	
	Non-residential Institutions: Community/Day Centre	
	Non-residential Institutions: Libraries, Museums, and Galleries	
	Non-residential Institutions: Education	
	Non-residential Institutions: Primary Health Care Building	
	Non-residential Institutions: Crown and County Courts	
	General Assembly and Leisure, Night Clubs, and Theatres	
	Others: Passenger Terminals	
	Others: Emergency Services	
	Others: Miscellaneous 24hr Activities	
	Others: Car Parks 24 hrs	
	Others: Stand Alone Utility Block	

Energy Consumption by End Use [kWh/m²]		
	Actual	Notional
Heating	3.57	2.3
Cooling	2.33	2.67
Auxiliary	8.38	9.82
Lighting	7.33	10.29
Hot water	4.64	5.2
Equipment*	44.63	44.63
TOTAL**	26.25	30.28
* Energy used by equipment does not count towards the total for consumption or calculating emissions.		
** Total is net of any electrical energy displaced by CHP generators, if applicable.		

Energy Production by Technology [kWh/m²]		
	Actual	Notional
Photovoltaic systems	0.24	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	0.24	0

Energy & CO ₂ Emissions Summary		
	Actual	Notional
Heating + cooling demand [MJ/m²]	73.59	67.51
Primary energy [kWh _{tp} /m²]	38.44	44.66
Total emissions [kg/m²]	3.54	4.09

Residential buildings BRUKL (Amenities and retail spaces)

BRUKL Output Document

 HM Government

Compliance with England Building Regulations Part L 2021

Project name

Albert Bridge House - Amenities

As designed

Date: Tue May 06 15:09:16 2025

Administrative information

Building Details

Address: Bridge Street, Manchester, M60 1WJ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

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

Certifier details

Name: Hoare Lea

Telephone number: +44 1202 654600

Address: Enterprise House, Old School Cl, Ferndown, BH22 9UN

Foundation area [m²]: 602.4

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m²·annum	1.9
Building CO ₂ emission rate (BER), kgCO ₂ /m²·annum	1.9
Target primary energy rate (TPER), kWh _{tp} /m²·annum	20.61
Building primary energy rate (BPER), kWh _{tp} /m²·annum	20.37
Do the building's emission and primary energy rates exceed the targets?	BER =< TER BPER =< TPER

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

Fabric element	U _o -Limit	U _o -Calc	U _i -Calc	First surface with maximum value
Walls*	0.26	0.87	1.6	GF00004C:Surf[1]
Floors	0.18	0.13	0.21	GF00004C:Surf[4]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.1	0.1	B1000002:Surf[1]
Windows** and roof windows	1.6	1.2	1.2	RS000000:Surf[1]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.3	1.3	GF00004C:Surf[0]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	1.2	1.2	GF00000F:Surf[5]

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

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

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

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

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m²K

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

Air permeability	Limiting standard	This building
m³/(h.m²) at 50 Pa	8	2

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	11484.5	11484.5
External area [m²]	10770	10105.3
Weather	MAN	MAN
Infiltration [m³/hm²@ 50Pa]	2	3
Average conductance [W/K]	4476.51	2578.15
Average U-value [W/m²K]	0.42	0.26
Alpha value* [%]	30.63	10

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
16	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
61	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
23	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	3.6	1.19
Cooling	0.42	0.51
Auxiliary	3.08	3.42
Lighting	7.5	8.67
Hot water	0.16	0.15
Equipment*	61.67	61.67
TOTAL**	14.76	13.94

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

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

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	1.06	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	1.06	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	47.86	20.39
Primary energy [kWh _{tp} /m²]	20.37	20.61
Total emissions [kg/m²]	1.9	1.9



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