

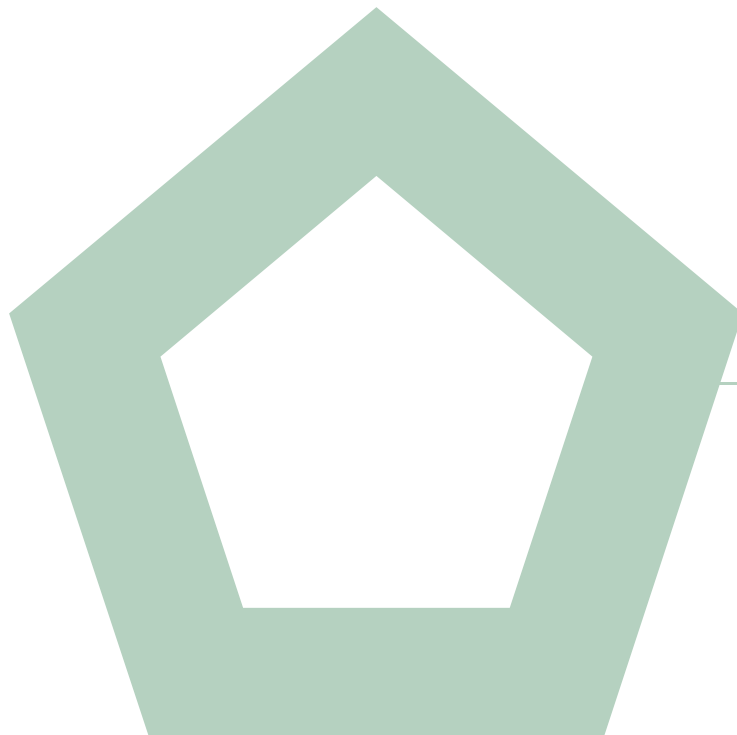
Mayfield - Plot O. Manchester.

U+I.

SUSTAINABILITY

ENERGY STRATEGY AND PART L2021 COMPLIANCE

REVISION 01 – 23 MAY 2023



STAGE 3

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	19/05/2023	Draft issue for comment.	H. Clifton	K.Krasowska	J. Nuttall
01	23/05/2023	Stage 3 Issued.	H. Clifton	K.Krasowska	J. Nuttall

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Executive summary

1.1 Development description

This energy strategy has been prepared by Hoare Lea on behalf of U+I and is submitted in support of an application for full planning permission of an office development Plot O at the new Mayfield Development. The description of development is as follows:

The proposals seek to utilise the previously cleared industrial site for the construction of a 11-storey office building plus rooftop amenity space of sustainable construction and high-quality design. The building will offer flexible office accommodation which will meet the needs of a range of tenants and also provide basement to ground floor commercial uses which will activate the ground floor frontage creating a unique arrival experience.

The building is of steel and concrete construction, utilising a quantity of recycled content and curtain wall glazing throughout. The building is bound by the A635 to the South and Baring Street to the West.

This strategy summarises the relevant regulatory and planning policies and sets out how the development will address and achieve the relevant policy targets. The strategy responds to the UK planning and regulatory framework, and specifically to the Manchester Core Strategy policy documentation.

1.2 Energy strategy summary

Passive design and energy efficiency measures will provide the cornerstone to the energy demand and CO₂ emission reduction achieved for the proposed development.

The baseline scenario, which each step of the energy hierarchy will be compared against, is established by the Part L Target Emission Rate for a notional building specification.

1.3 National drivers - Approved Document Part L of the Building Regulations

Part L of the Building Regulations is the mechanism by which government is driving reductions in the regulated CO₂ emissions from new buildings. The assessment of the proposed development against policy targets has been carried out using Building Regulations Part L 2021 methodology.

1.4 Planning Policy

The Manchester Core Strategy Policy EN6 states that all other non-residential developments over 1,000m² will be expected as a minimum to meet the following targets (*unless this can be shown not to be viable*):

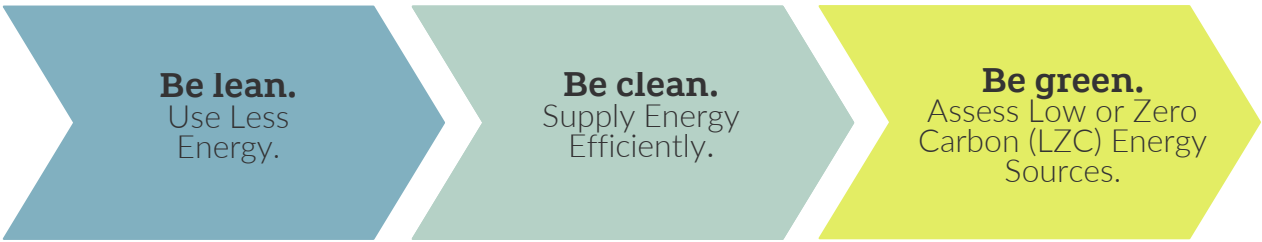
Target	% Minimum Requirement
Target 1; Network Development Area	CHP / District heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2; Electricity Intense Buildings	+ 10% increase on Part L 2010
Target 3; Micro Generation Area	+ 15% increase on Part L 2010

Table 1 CO₂ Emission Reduction Targets, Manchester Core Strategy

The Current Manchester Core Strategy 2012 requires the building to use BREEAM, but does not stipulate a rating. This project is targeting BREEAM UK Offices New Construction 2018 rating of Excellent (shell and core).

1.5 Approach

The design approach, in respect to minimising carbon emissions from the development, aligns with the best practise guidelines adopted by the Local Planning Authority in their Core Strategy policies. This policy states that Lean, Clean and Green energy savings should be considered sequentially.



Energy Hierarchy

	St John's Campus
Be Lean	A fabric first approach and energy efficiency building services will be utilised to reduce carbon emissions and energy demand through best practice passive design measures.
Be Clean	CHP would offer very little benefit in terms of carbon emission reduction and further loses any value as the grid decarbonises. Therefore, CHP has not been considered.
Be Green	Use of ASHPs and incorporation of PVs for the development is anticipated to significantly reduce energy consumption and carbon emissions in operation by generation zero carbon electricity onsite.
Office	Overall reduction in regulated carbon emissions is 41.2% over current building regulations target, with a 43.41% betterment in Primary Energy consumption over the notional building. The Office development is suggested to achieve an EPC of A.
Retail	The Retail development is suggested to achieve an EPC of A.

Energy Strategy Compliance Overview.

The energy strategy demonstrates that the Proposed Office Development achieves a reduction, over the Part L 2021 baseline, of 41.2% within the office development. As such, the proposed building's energy performance exceeds Policy EN6 within the Manchester Core Strategy document. The proposed energy strategy in this report ties in closely with Manchester City Councils carbon zero 2028 / 2038 targets.

Whilst the development demonstrates that the local policies are met i.e. carbon reduction targets over Part L 2010, the design has evolved to focus on operational energy, embodied carbon and health & wellbeing. In recent years, focus has shifted away from metrics such as regulated carbon emissions (Part L) to be more focussed on real world outcomes and operational energy and as such, the design is anticipated to follow this pathway.

It should be noted that deviation away from the parameters listed within this report may compromise the rating attributed to the Mayfield development. Avoidance of such should be achieved through informing the relevant parties to re-iterate the compliance result if changes occur.

1. Introduction

This report has been prepared by Hoare Lea on behalf of U+I (Landsec) and is submitted in support of an application for full planning permission of Plot O of the Mayfield redevelopment. The description of development is as follows:



Figure 1 Visualisation of the Proposed Development provided by Bennetts Associates.

This strategy summarises the relevant regulatory and planning policies applicable to the development and sets out how the development will address and achieve the relevant policy targets.

Manchester has recently set an ambitious target to be a 'zero carbon city' by 2038, with new development to be zero carbon by 2028. Whilst the shorter-term target is not included in current policy, the Proposed Development is expected to support these ambitions through incorporation of low carbon and renewable energy instead of fossil fuels.

Manchester Core Strategy (2012 – 2027) states within Policy EN6 that applications for commercial developments exceeding 1,000m² will be expected to achieve a minimum +10% increase on Part L 2010 and residential developments a minimum 15% increase on Part L 2010. Since the publication of the Core Strategy document, Approved Document Part L has since been updated in 2013, and again in 2021. Broadly speaking, compliance with Part L 2013 required a 9% reduction in carbon emissions compared to Part L 2010. A new non-domestic building built to ADL 2021 standards will deliver a 27% reduction in CO₂ emissions on average across the new non-domestic building mix relative to ADL 2013, and a new domestic building will deliver a 31% reduction.

1.1 Proposed Development

The proposed site is earmarked for the Mayfield Regeneration Area. As part of this, Mayfield Plot O is a 11-storey Office development with rooftop amenities and commercial space on the Ground and Lower Ground floors to increase the land-use diversity across the site.

The development will host spacious lounge areas and commercial areas on the ground floor. The plant rooms, dedicated to building services and systems, will be distributed between the basement and the rooftop. Moreover, the rooftop will host a temporary events space open to use by the tenants.

The table below details the indicative area of the Proposed Development

Table 2 Indicative areas schedule as provided by Bennetts Associates.

Area Type	m ²
GIA	11,246
NIA	8,725

2. Policy and Key Drivers

The following section outlines the national and local policies and drivers.

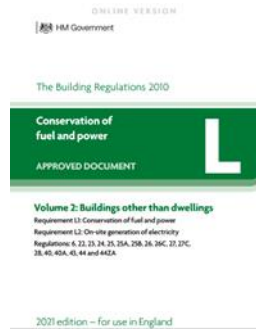
2.1.1 Building Regulations Part L (2021)

Approved Document Part L (2021, England edition) is the Building Regulations relating to the conservation of fuel and power in buildings. The Approved Document is separated into two sections: Volume 1 and Volume 2:

- Part L Vol.1 relates to dwellings specifically, with an individual criterion for this building-use type
- Part L Vol.2 relates to buildings other than dwellings 'Conservation of fuel and power in buildings other than dwellings' and sets out specific criteria for this building use type.

Schedule 1: Conservation of Fuel and Power.

Schedule 1 of the Building Regulations Part L states that reasonable provisions shall be made for:



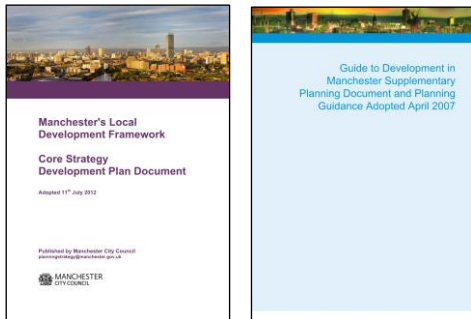
- Limiting Heat Gains and Losses through;
 - Thermal elements and other parts of the building fabric; and;
 - From pipes, ducts and vessels used for space heating, space cooling and hot water services.
- Providing fixed building services which are:
 - Energy Efficient;
 - Have effective controls; and;
 - Are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances

Developments should aim to at least meet the limiting values for system and fabric requirements in order to better the Building Emission Rate set by a notional building which uses standardised inputs based on the system and fabric design of each building.

Part L (2021) Conservation of Fuel and Power

With the release of the update to the Part L of Building Regulations in December 2021, the newest iteration is applicable to all developments commencing work after June 2022 which did not submit an initial notice.

2.1.2 Local Planning Policy

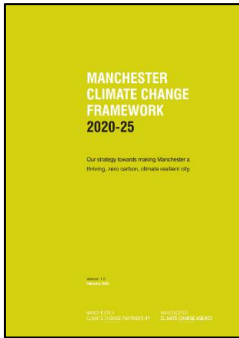


Manchester City Council (MCC) documentation:

- Core Strategy (CS) (July 2012)
- Supplementary Planning Documentation and Planning Guidance (SPDPG) (April 2007)

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.

2.1.3 Manchester Climate Change Framework (2020-2025)



The aim is states 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.””

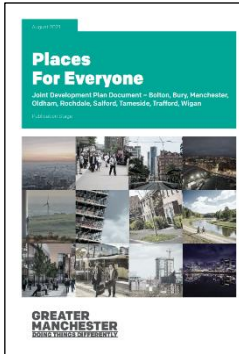
It identifies four objectives we need to meet by 2025.

- 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

2.1.4 Places For Everyone



Nine of the ten councils in Greater Manchester have submitted the Places for Everyone Joint Development Plan* to the Secretary of State for Levelling Up, Housing and Communities for independent review. Assuming the plan is approved, it sets out a framework for sustainable, inclusive growth across the nine districts. Of particular reference to the proposed development, the plan sets out the following strategic objectives:

- Objective 7: Promote carbon neutrality of new development by 2028, reduce car dependency, facilitate provision of infrastructure for cleaner vehicles and improve energy efficiency and generation of renewable and low carbon energy
- Policy JP-S 2 Carbon and Energy includes an expectation that, up to 2028, new development will follow the energy hierarchy to achieve operational net zero carbon. From 2028 onwards, the development will seek to achieve net zero carbon 'in construction' too.

2.1.5 5-Year Environment Plan for Greater Manchester



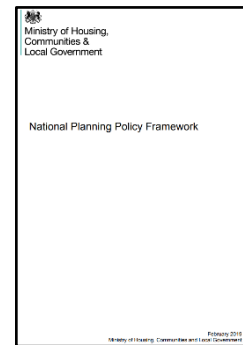
Greater Manchester Combined Authority (GMCA) set an ambitious target to be a zero-carbon city by 2038. As part of this plan, the Greater Manchester Spatial Framework sets out plans for all new development to be zero carbon by 2028.

Included in the five-year plan are 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 (served). 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).

* **Note:** At the time of writing, the Places for Everyone plan carries limited weight in the decision making process

2.1.6 National Planning Policy Framework



The updated National Planning Policy Framework (NPPF) was published in July 2021 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 areas⁵ , 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 area⁶ ; 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, that 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*
- c) 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."*

3. Assessment Methodology

The following is a summary of the data used and inputs / assumption made for simulation geometry modelling.

3.1 Site Context

The site is located close to Piccadilly Station, Manchester and features good transport links due to its city centre location.

The Mayfield site has been earmarked for a mix of Residential, Office and Commercial development, with Manchester's first Public City Centre park central to the design.

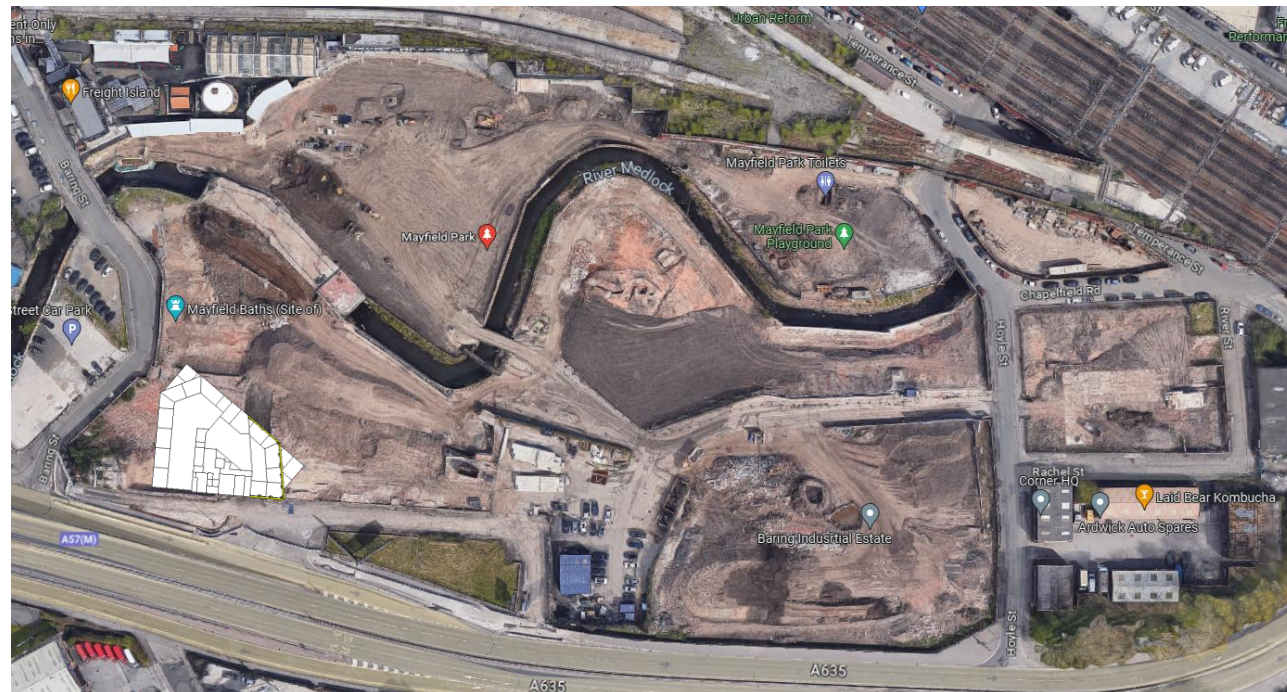


Figure 2: Location of the Mayfield Plot O development against the wider site-plan.

3.2 Site location and weather data

A building's thermal performance is its response to external environmental conditions. The more dependant a building is on passive features to achieve acceptable internal comfort, the more important the use of external weather information becomes.

Climate data is assigned to the virtual environment of the dynamic model to simulate external weather conditions that are likely to occur. Thermal comfort calculations require the simulation to be tested against Chartered Institute of Building Services Engineers (CIBSE) Design Summer Year (DSY) climate data to best assess how spaces will perform during a year with hot summer conditions.

The UK Meteorological Office (MO) collects weather data at stations across the UK. Climate variables measured at hourly intervals include air temperatures, wind speed and direction and air pressure amongst various other characteristics.

CIBSE licenses the historic weather data from the MO for 14 locations in the United Kingdom: Belfast, Birmingham, Cardiff, Edinburgh, Glasgow, Leeds, London (3 sites), Manchester, Newcastle, Norwich, Nottingham, Plymouth, Southampton and Swindon.

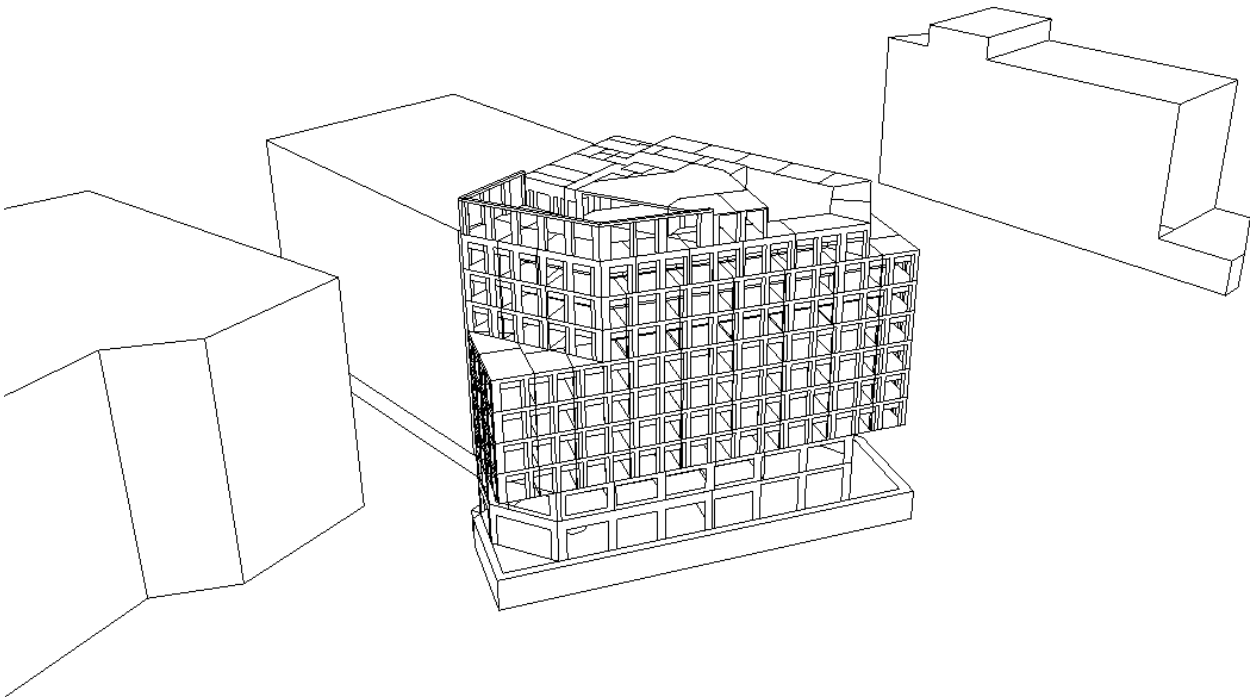
The weather variables are synthesised into 2 types of CIBSE weather file:

- **Design Summer Year (DSY): 2006 and 2016**
The DSY is a single continuous year rather than a composite one made up from average months. The DSY is used for overheating analysis.
- **Test Reference Year (TRY): 2006 and 2016**
The TRY is composed of 12 separate months of data each chosen to be the most average month from the collected data. The TRY is used for operational energy analysis and for compliance with the UK Building Regulations (Part L).

A Manchester CIBSE weather file exists therefore following the standardised methodology behind the Part L requirements, this weather was used.

3.3 Architectural drawings

The geometry used to assess the proposed development was determined by the following information



received.

We understand that minor updates to architectural drawings and models may have been made since the below issued documents, this list simply details the information our models have been developed from.

Table 3: Architectural Information received from Bennetts Associates.

Block	Information type	Document Package	Date Received
Plot O	Revit model	1811-BA-ZZ-ZZ-M3-A-0001_WIP (1)	27/04/2023
Plot O	Drawings	1811(SK)0193_WIP Ground Floor Plan_Rev B 1811(SK)0194_WIP First Floor Plan_Rev A 1811(SK)0195_WIP Typical plan for levels 2-5_Rev B 1811(SK)0196_WIP Sixth Floor Plan_Rev C 1811(SK)0198_WIP Eighth Floor Plan_Rev C 1811(SK)0207_WIP Ninth Floor Plan_Rev B 1811(SK)0223_WIP Basement plan 1811(SK)0230_WIP Roof Plan	28/04/2023

3.3.1 Dynamic Simulation Model.

Based on the information above a series of Dynamic Simulation Models were created to undertake appropriate assessments on the proposed design.

Integrated Environmental Solutions Virtual Environment (IESve) is an approved Dynamic Simulation Model (DSM) software package that has the capabilities of enabling the user to create a virtual representation of a building.

Models built in the IESve have been used to consider compliance with Approved Document Part L2 2021 using the National Calculation Methodology alongside the assessment of operational energy consumption.

One of the DSM models, with simplified versions of the speculative surrounding buildings (as appropriate) is displayed below.

Figure 3: DSM Model Image. Building Fabric Specification

3.3.2 Thermal Performance

Optimising the development’s fabric is seen to be the most robust and effective way to improve energy efficiency and in turn reduce carbon emissions whilst also impacting thermal comfort.

The performance of the envelope i.e., material performance is unlikely to deteriorate significantly with time and therefore the benefits of these measures will continue at a similar performance for the duration of their installation. The current values used are detailed below and should be confirmed with the Façade consultant and Architects to ensure alignment.

Table 4 Fabric Performance.

Parameter	Proposed values
Fabric Air Permeability (m3/m2.h @ 50Pa)	3.00
External Wall U-value (W/m².K)	1.10 (Average provided by FMDC)
Exposed Floor U-value (W/m².K)	0.12
Roof U-value (W/m².K)	0.12
Spandrel Panels (W/m².K)	1.10 (Average provided by FMDC)
Glazing U-value (W/m².K) (glazed doors / windows)	1.10 (Average provided by FMDC)
Glazing g-value	0.28
Solid Door (W/m².K)	1.20
Thermal bridges	Heat loss through thermal bridges to be minimised as far as reasonably possible during construction. The model assumes alpha value of 10%.
Basement	
External Wall (W/m².K)	0.15
Ground Floor (W/m².K)	0.12
Thermal bridges	Heat loss through thermal bridges to be minimised as far as reasonably possible during construction. The model assumes alpha value of 20%.

4. Energy Strategy

In order to develop the energy strategy, a ‘baseline’ case is created which aligns with notional building specification as per Building Regulations Part L2 2021.

The baseline case helps to inform the benefit of low and zero carbon technologies – which are implemented in the ‘clean’ and ‘green’ stages.

4.1 Baseline Case

	Fabric performance The notional case utilises the same fabric performance as the Building Regulations Part L2 ‘notional’ building; - External Walls; 0.26W/m²K - Exposed Floors; 0.22W/m²K - Roof; 0.18W/m²K - External Glazing; 1.60W/m²K - Air permeability; 5.00m³/hr.m² @ 50Pa
	Space heating & cooling For non- domestic developments, the notional building according to 2021 Building Regulations specified the same system and fuel as actual building with efficiencies as per NCM Modelling Guide 2021 Table 7, as follows: - Heat pump SCOP=264% - Direct electric SCOP=134% Cooling is assumed to be electrically powered. In air-conditioning mode, the baseline will have a cooling SSEER of 4.4.
	Mechanical ventilation The use of heat recovery is used throughout development. Recovering heat from the extract air can help reduce annual heating energy considerably with no impact on the air quality of the incoming fresh air. The air handling plant will have efficient fan motors and will be designed with low static fan pressures to help reduce the energy consumption associated with delivering fresh air into the building. All assumptions regarding auxiliary energy for notional building can be found on p.21 of NCM Modelling Guide 2021.
	Lighting The internal lighting design incorporates the use of high efficiency LED lighting combined with daylight linking (where applicable). The use of presence and absence detection prevents the internal lighting being ‘on’ when the occupied spaces are not occupied. The efficient lighting design also help to drive down the cooling energy consumption. The illuminance level used for the general lighting in the baseline building is determined by the illuminance values for the activity type in the NCM Activity Database and the design illuminance for the Actual building or higher, if specified in actual building.

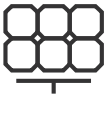
	Domestic hot water (DHW) system Domestic hot water is supplied via point-of-use (POU) in the offices and electric domestic hot water (DHW) heaters with 1200 litres of storage allowed for basement areas respectively in the base case scenario. - Electric system- SCOP= 100%
	Photovoltaic Panels The notional building in Building Regulations Part L2021 includes PV panels. The amount of area covered by PV in baseline case can be reduced by proportion of space heating demand covered in actual building by ASHP. This adds benefit for the proposed building over baseline. The Notional building’s PV array is specified as follows: - South orientation, - 30° pitch from the horizontal - ‘no or very little over-shading’ - ‘strongly ventilated or forced ventilated modules’

Table 5 Baseline Case Building Performance Parameters

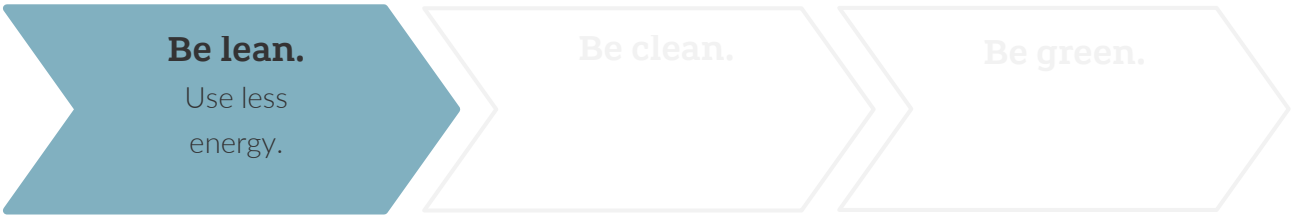
Targeting the following elements will help drive down and improve the buildings carbon emissions.

- Improved thermal envelope; targeting external walls and air tightness
- Improved air handling plant; reducing specific fan powers and associated controls
- Improved lighting systems; higher efficiency light fittings and controls

As a result of improving the above elements there will be knock on consequences i.e., reduced cooling demand due to improved lights, increased cooling loads due to retention of internal heat gains i.e., reduced heat loss.

4.2 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.



Passive design and energy efficient 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 these solutions, such as façade insulation, are 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 these measures will continue at a similar level for the duration of their installation.

	Fabric performance A ‘fabric first’ approach has been taken in order to reduce the energy demand and CO₂ emissions from the proposed development. The overriding objective for the façade design of the building 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. See Table 7 opposite.
	Mechanical ventilation The use of heat recovery is used throughout the office development. Recovering heat from the extract air can help reduce annual heating energy considerably with no impact on the air quality of the incoming fresh air. The air handling plant will have efficient fan motors and will be designed with low static fan pressures to help reduce the energy consumption associated with delivering fresh air into the building.
	Lighting The internal lighting design incorporates the use of high efficiency LED lighting combined with daylight linking (where applicable). The use of presence and absence detection prevents the internal lighting being ‘on’ when the occupied spaces are not occupied. The efficient lighting design also help to drive down the cooling energy consumption.

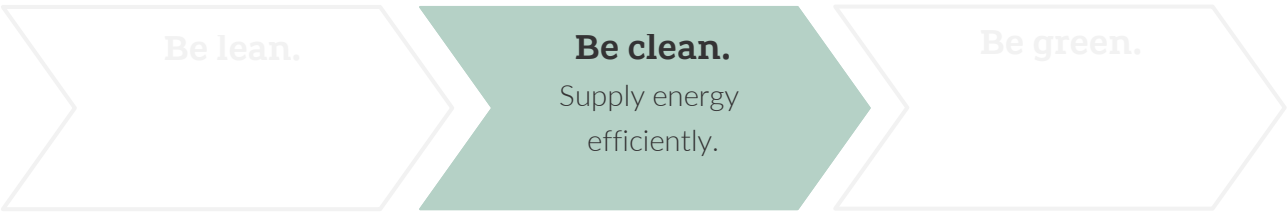
Table 6 Passive Design Measures

Table 7 Fabric Performance

Parameter	‘Standard Building’ Part L 2021 – Notional	‘Proposed Building’ Target Initial
Fabric Air Permeability (m ³ /m ² .h at 50Pa)	5.00	3.00
External Wall U-value (W/m ² .K)	0.26	1.10 Unitised Wall
Ground Floor U-value (W/m ² .K)	0.22	0.12
Roof U-value (W/m ² .K)	0.18	0.12
Door U-value (W/m ² .K)	1.90	1.20
Glazing (External Windows / Glazed doors) (g-value)	0.40	0.28
Glazing light transmittance (inclusive of External Windows / Glazed doors / External and Internal Atrium Glazing)	71%	71%
Basement External Wall U-value (W/m ² .K)	0.26	0.15

4.3 Be Clean

This stage of the energy hierarchy refers to the use of heat networks which typically consists of Combined Heat and Power (CHP) to provide carbon emission reductions. A CHP system consists of an engine, usually gas fired, which generates thermal energy and electrical energy – which is fed into the development.



Due to the development being electrically led the utilisation of technology such as CHP would offer very little benefit in terms of carbon emission reduction. Furthermore, due to grid decarbonisation, the carbon emission benefit of gas fired CHP will diminish as the national grid continues to decarbonise.

	Combined heat and power (CHP) Due the proposed changes to the carbon emission factors in future revisions of Part L – the use of Combined Heat and Power (CHP) is likely to offer a ‘negative benefit’ within the next five years and therefore has not been explored as part of the energy strategy.
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Table 8 Clean Energy Supply

4.4 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 offer a further reduction in carbon emissions.

Table 9 Examples of Low and Zero Carbon Technology

	Be lean. Be clean. Be green. Assess 'low or zero carbon' (LZC) energy sources.
	Energy from Waste Energy from waste (EfW) is the process of generating electricity and/or heat from the primary treatment and processing of waste usually by incineration. It is generally placed higher in the waste hierarchy than throwing waste into landfill as described above. Further, where an EfW facility is in place to generate electricity, with heat generation essentially a by-product, it can be considered a low carbon heat source. Suitability to proposed development: Although a low carbon heat source, Energy from Waste systems usually operate on a large scale rather than on a single building basis. Furthermore, since EfW is not yet ubiquitous across the country and is not yet available in Manchester, Connection to this EfW district heat network (DHN) is not deemed a solution for the proposed development. Therefore, Energy from Waste is currently not proposed for the development.
	Air source heat pumps Air source heat pumps (ASHP) use thermodynamic principles to convert heat from the air into useable heat within the building. Unlike some other sources of renewable energy, heat pumps do require energy (typically electricity or gas) to pump and compress refrigerant through the system. However, under the Renewable Energy Directive 2009/28/EC they are classified as renewable technologies provided that the final energy output significantly exceeds the primary energy input required to drive the heat pump. ASHP need to be located externally with access to the ambient air, typically at roof level. They can typically operate at an efficiency of around 350% when delivering heating for space conditioning. Suitability to proposed development: Air source heat pumps use the air temperature to reject to and extract heat from to provide energy within the building. The ability of the heat pump to transfer heat from the outside air to the building depends on the outdoor temperature. As this temperature drops the ability of the heat pump to absorb heat also drops. In the UK external ambient temperatures do not historically drop to levels that would make air-to-air heat pumps unviable. In this way Air Source Heat Pumps (ASHP) technology could potentially be used to provide heating and/or hot water to the office development. The use of this technology fits well with grid decarbonisation. Therefore, this technology is proposed for the development.

	Ground Source Heat Pumps (GSHPs) GSHPs work similarly to ASHP, except they extract heat from the ground. GSHPs are best suited to developments with a balanced heating and cooling load, to avoid long-term heating or cooling of the ground /ground water and associated decreased efficiency of the heat pump. Suitability to proposed development: There will be a relatively small cooling demand for the proposed building, as a mechanical ventilation strategy has been taken to cool and ventilate the rooms. In addition, the groundworks for a GSHP system are significant, and would require higher costs and effort than the proposed connection to low carbon local district, overall making this option unsuitable. Therefore, this technology is not proposed for the development.
	Photovoltaics Photovoltaic (PV) panels harness energy from sunlight and convert this into useful energy in the form of electricity. A PV system requires sufficient roof space for the system array to be installed and function effectively. Suitability to proposed development: Although photovoltaic panels are a convenient and affordable renewable energy source, they require a significant amount of roof space to accommodate a substantial number of panels. Often, roof space can cause conflict of interest between the necessity to provide plant space, PV panels or social spaces. In this specific case, 390 m² of roof space has been dedicated to PV panels with plant area accommodated on top level and in the basement. Therefore, the PV panels have been proposed for the development as 'Be Green' measure.
	Solar thermal Solar Thermal Panels are similar to PV Panels in that they harness energy from solar energy. This technology however converts solar energy into thermal energy that can offset the demand on hot water generation systems. Suitability to proposed Development: Often, solar PVs would be prioritised over solar thermal panels since the electrical output from PV panels will be more suitable for implementation. However, in this case, neither technology can be considered because the roof space has been dedicated to building services which take priority as they provide the fundamental functions of the building. Therefore, solar thermal is not proposed for the development.

	Wind turbine For efficient operation and to yield high energy output, wind turbines require a consistent flow of air to generate electricity using wind energy. Suitability to proposed development: The proposed development is located within a dense urban environment. Therefore, the wind flow profile is erratic and consequently is not conducive to high annual yields from a turbine. Moreover, mounting wind turbines on the roof of the building could result in unacceptable vibration and resonance being felt within occupied spaces. The turbines are also likely to generate noise which may be a nuisance to neighbouring buildings. Therefore, given the complexities of installing this technology, the use of wind turbines is not proposed at the proposed development.
	Biomass Biomass boilers burn wood fuel or other bio-fuel sources to generate heat. These boilers can operate at high efficiencies, comparable to condensing gas boilers. However, they require a large fuel store to maintain continuous operation during the winter months. As such, area take for such plant is high. Furthermore, fuel deliveries in city-centre locations can prove difficult and security of fuel supply is an important consideration. Suitability to proposed development: The reasons listed above alongside high maintenance implications and air quality implications mean that biomass boilers are not considered a suitable technology for the scheme. Therefore, given the implications associated, the use of biomass boiler technology is not proposed at the proposed development.

4.5 Be Green Results - Office

Utilising Air Source Heat Pumps (ASHP) and Photovoltaic (PV) panels to provide space heating and cooling as well as generate energy provides a significant reduction in regulated carbon emissions.

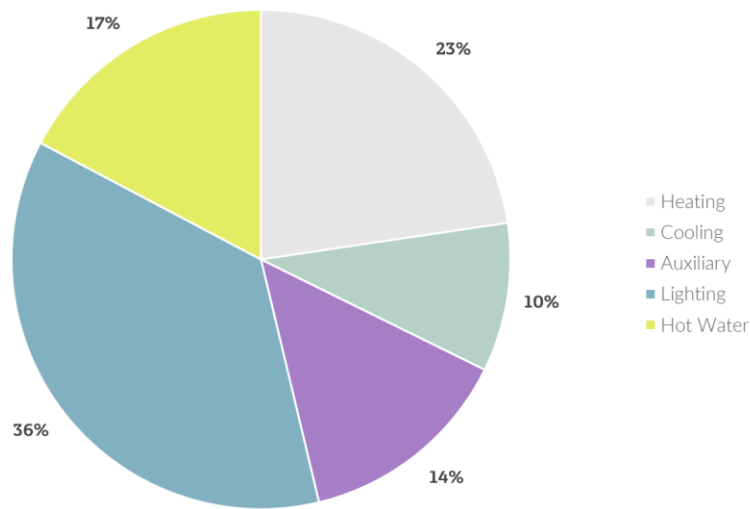


Figure 4 Be Green Energy demand and emissions

4.5.1 Energy Consumption and Associated Emissions

The combination of passive design, the use of ASHPs and generation of renewable energy results in a **41.2%** reduction in annual regulated carbon dioxide emissions compared to the Part L 2021 baseline.

If observed independently, if PV panels were not to be installed, the improvement above Part L standards would be **21.05%**.

The overall results surpass Policy EN6 within the Manchester City Core Strategy documentation.

It should be noted that deviation away from the parameters listed within this report may compromise the rating attributed to the Mayfield development. Avoidance of such should be achieved through informing the relevant parties to re-iterate the compliance result if changes occur.

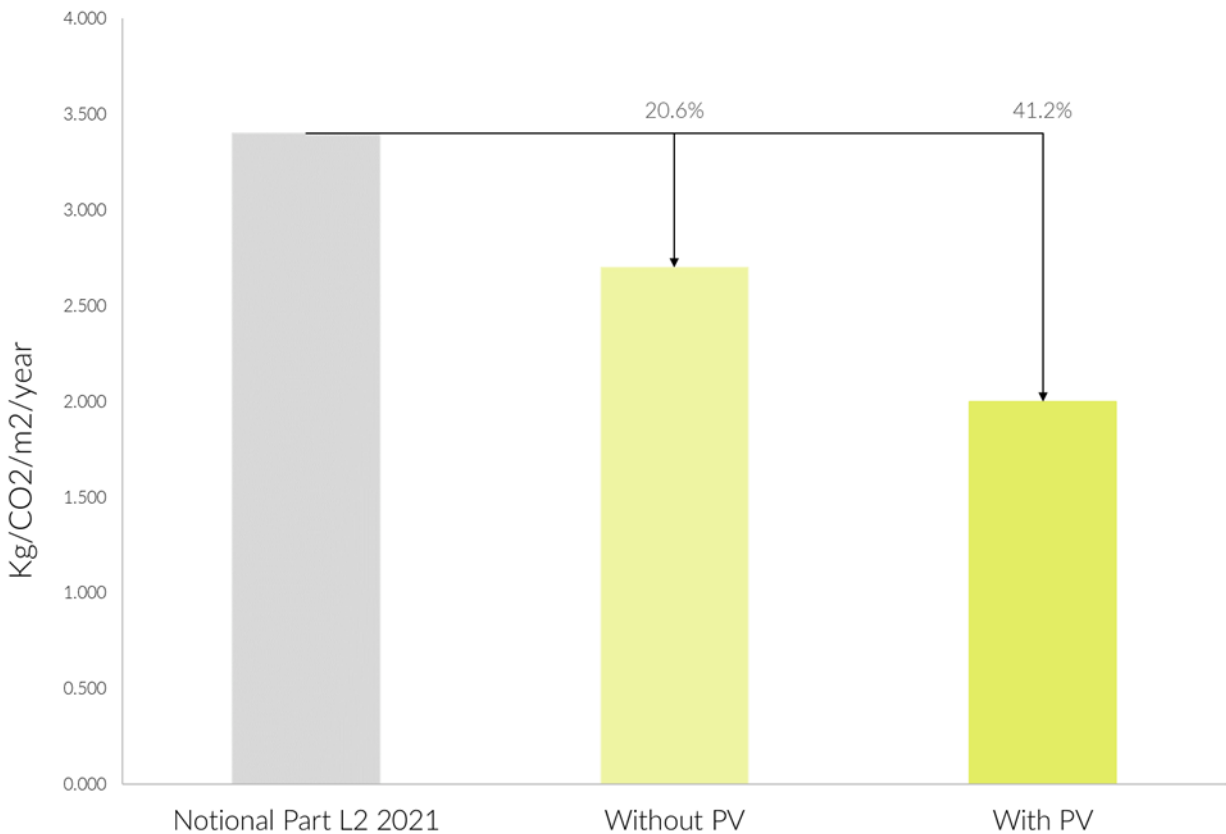


Figure 5 Baseline and Green; regulated carbon emission reduction with and without PV

4.5.2 Primary Energy Rate

Although not part of the Manchester Core Strategy Policy, Part L 2021 introduced a Primary Energy Rate analysis as part of the assessment. The result of this is as follows

	Primary Energy Rate (kWh/m²/year)
Notional Building	37.52
Mayfield Plot O	21.23
Betterment	-43.42%

4.5.3 EPC- Office

It is anticipated that the proposed office development would achieve an EPC rating of A – 7 when using the parameters listed within this report.

4.6 Be Green Results – Retail

As the Commercial spaces are intended to be fit out by a prospective tenant, a Shell and Core assessment has been undertaken using the Part L 2021 NDCM. This involves using the as-built fabric with values which have a higher efficiency than the Notional HVAC and lighting values as it is expected the tenant will be responsible for the specification of these elements.

The following energy demand is expected from the Commercial elements.

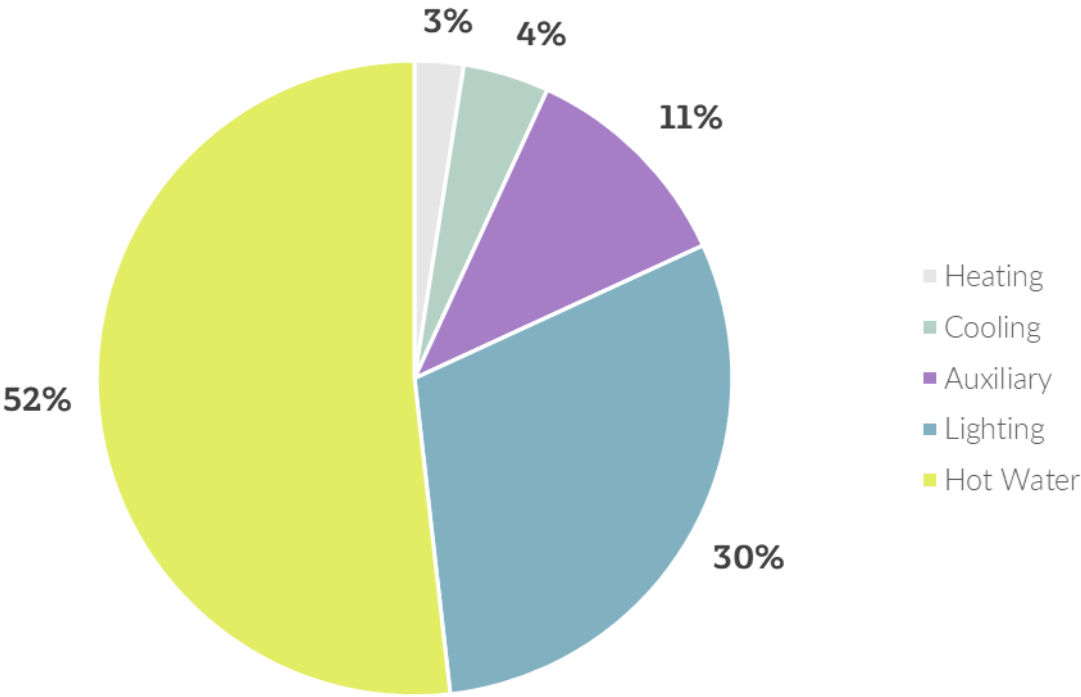


Figure 6 Be Green Energy demand and emissions

When using the Shell and Core Values, the proposed Commercial elements of the development are anticipated to achieve a betterment over the notional carbon emission value by 3.80%.

As the Commercial aspect is anticipated to achieve an EPC of A using the parameters listed within this report, it is recommended that Highly efficient HVAC and Lighting systems are installed.

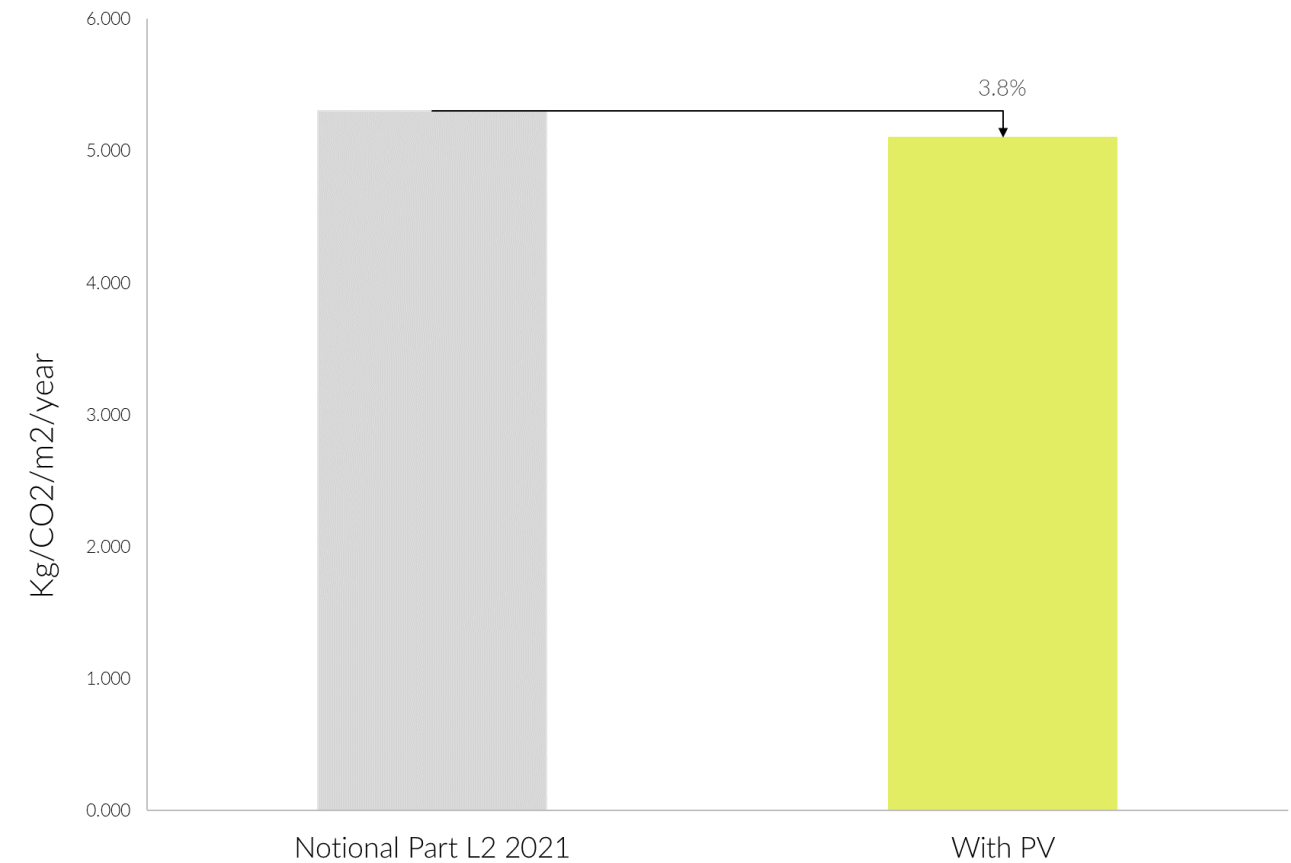


Figure 7 Baseline and Green; regulated carbon emission reduction for the retail elements.

4.6.1 Primary Energy Rate

Although not part of the Manchester Core Strategy Policy, Part L 2021 introduced a Primary Energy Rate analysis as part of the assessment. The result of this is as follows

	Primary Energy Rate (kWh/m²/year)
Notional Building	58.4
Mayfield Plot O - Retail	56.1
Betterment	+3.94%

4.6.2 EPC- Retail

It is anticipated that the proposed office development would achieve an EPC rating of A – 15 when using the parameters listed within this report.

5. Conclusion

This energy strategy has been prepared by Hoare Lea on behalf of XX, a subsidiary of XX, and is submitted in support of an application for full planning permission at the new Mayfield Regeneration development of Plot O.

This strategy summarises the relevant regulatory and planning policies and sets out how the development will address and achieve the relevant policy targets. The strategy responds to the UK planning and regulatory framework, and specifically to the Manchester Core Strategy policy documentation.

5.1 Planning Policy

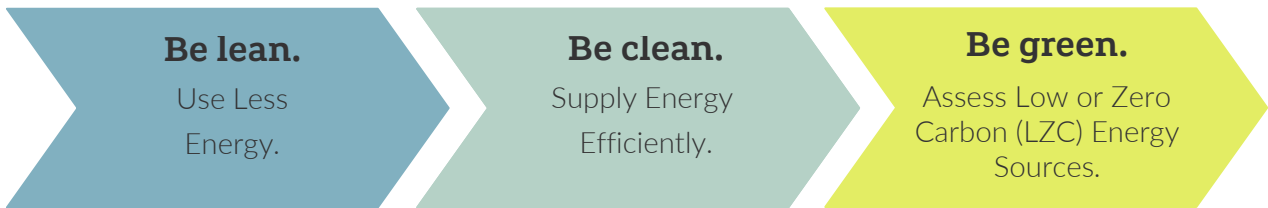
The Manchester Core Strategy Policy EN6 states that for all developments over 1,000m² will be expected as a minimum to meet the following targets (*unless this can be shown not to be viable*):

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	+ 10% increase on Part L 2010
Target 3; Micro Generation Area	+ 15% increase on Part L 2010

Table 10 CO₂ Emission Reduction Targets, Manchester Core Strategy

5.2 Approach

This report evaluates the Proposed Development against the energy hierarchy; be lean, be clean and be green.



Be Lean

The building fabric performance and engineering systems have been optimised in order to use less energy prior to the inclusion or consideration of Low and Zero Carbon (LZC) technology.

Be Clean

The be clean step of the energy hierarchy refers to the use of ‘clean energy supply’. This includes, but is not limited to, the use of Combined Heat and Power (CHP) and District Heat Networks. Because the majority of the building’s energy is electrically fuelled i.e., chillers, fans, pumps and lighting the benefit of connecting or using a CHP system is limited. Given that the national grid is continually decarbonising, the use of gas systems are less preferential over electrically fuelled systems.

Be Green

The final step of the energy hierarchy is to utilise low and zero carbon technology. The energy strategy identified that the use of Air Source Heat Pumps (ASHP) in combination with energy generating PV panels can provide a substantial reduction in regulated carbon dioxide emissions.

Energy Strategy

Combining efficient fabric design and efficiency building services systems provides the following regulated carbon emission results when using the parameters listed within this report;

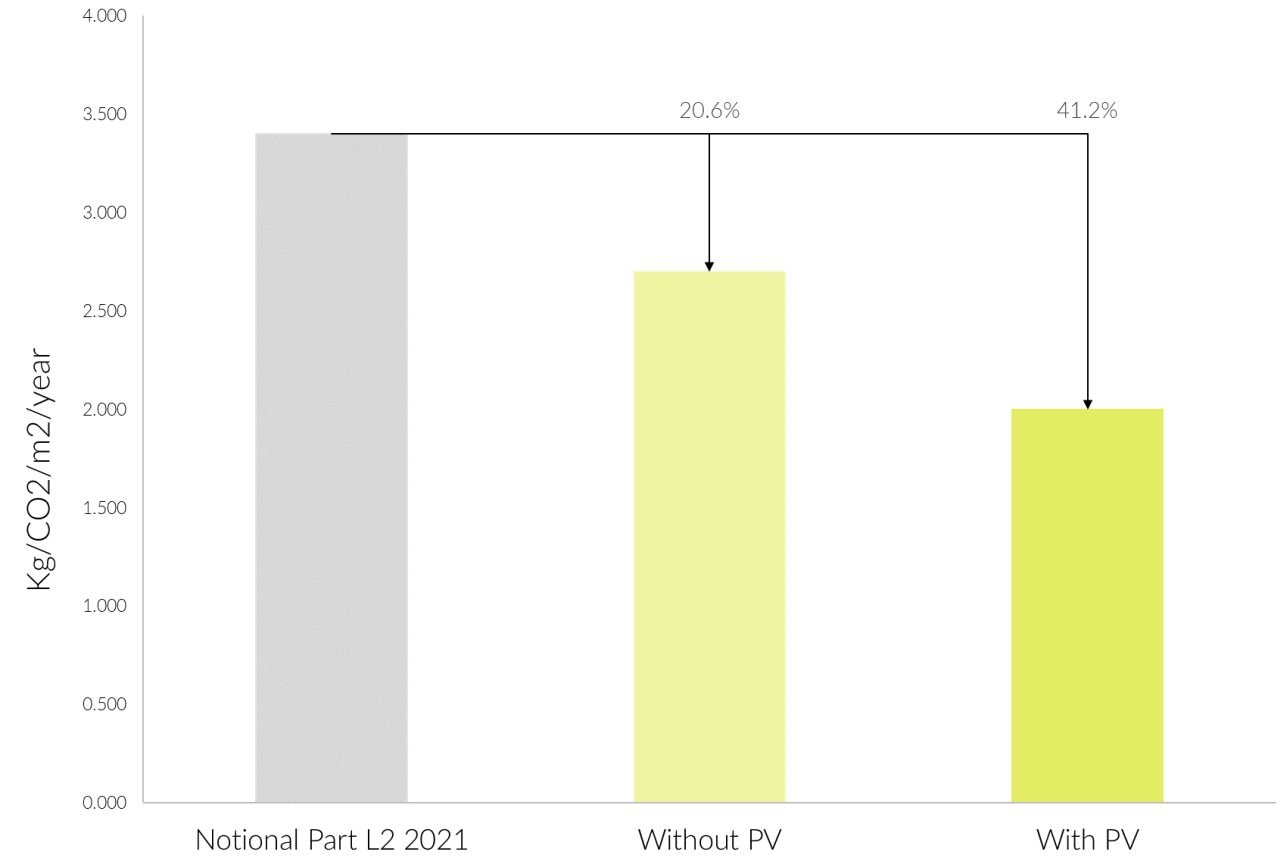


Figure 8 Energy Strategy summary- Building Emission Rate of the Office Development

Although not part of the Manchester Core Strategy Policy, Part L 2021 introduced a Primary Energy Rate analysis as part of the assessment. The result of this is as follows

	Primary Energy Rate (kWh/m ² /year)
Notional Building	37.52
Mayfield Plot O - Office	21.23
Betterment	-43.42%

It is anticipated, when using the parameters listed within this report, the Office and Landlord elements of this development will achieve an EPC of A. The retail elements are anticipated to achieve an EPC of A.

5.3 Compliance

The energy strategy indicates that the Proposed Development achieves a 41.2% reduction over the Part L 2021 baseline and as such exceeds requirement in Policy EN6 within the Manchester Core Strategy document.

The decarbonisation of the grid has resulted in the carbon intensity of mains gas being higher than for electricity, and therefore strengthening the argument that building services strategies moving forward should be electric led.

The proposed energy strategy in this report reflects this philosophy and ties in closely with Manchester City Councils carbon zero 2028 / 2038 targets.

It should be noted that deviation away from the parameters listed within this report may compromise the rating attributed to the Mayfield development. Avoidance of such should be achieved through informing the relevant parties to re-iterate the compliance result if changes occur.

Appendix A – Grid decarbonisation.

Future projections.

The Future Energy Scenarios (FES) document, produced by the National Grid, discusses how the UK's energy landscape is changing. The FES 2022 makes projections of how the mix of generation in the grid is likely to change between now and 2050 – the year by which the Climate Change Act 2008 set the target of reducing the UK's CO₂ emissions by 80% from 1990 levels. This target has now been revised to be Net Zero in light of the Committee on Climate Change's recent report and the declaration of a Climate Emergency.

The latest version, FES 2022, discusses these projections in four scenarios and Figure combines these future trajectories with the actual carbon intensity of the National Grid over the past 13 years. The reported emissions associated with electricity generation have fallen steeply since 2012 and in three cases, the FES 2022 scenarios see carbon factors trending towards zero by the early 2030s. This is on the basis that FES 2022 have deemed it necessary to offset other industries such as freight, shipping and aviation, which will be unable to reduce their carbon emissions to zero. Offsetting the emissions of other industries will involve Carbon Capture and Storage (CCS) technologies on a significant scale in order for the UK as a nation to meet net zero carbon by 2050. It is important to note that CCS technology is not currently commercially demonstrated at a large scale, but the FES 2022 studies are useful as future forecasts.

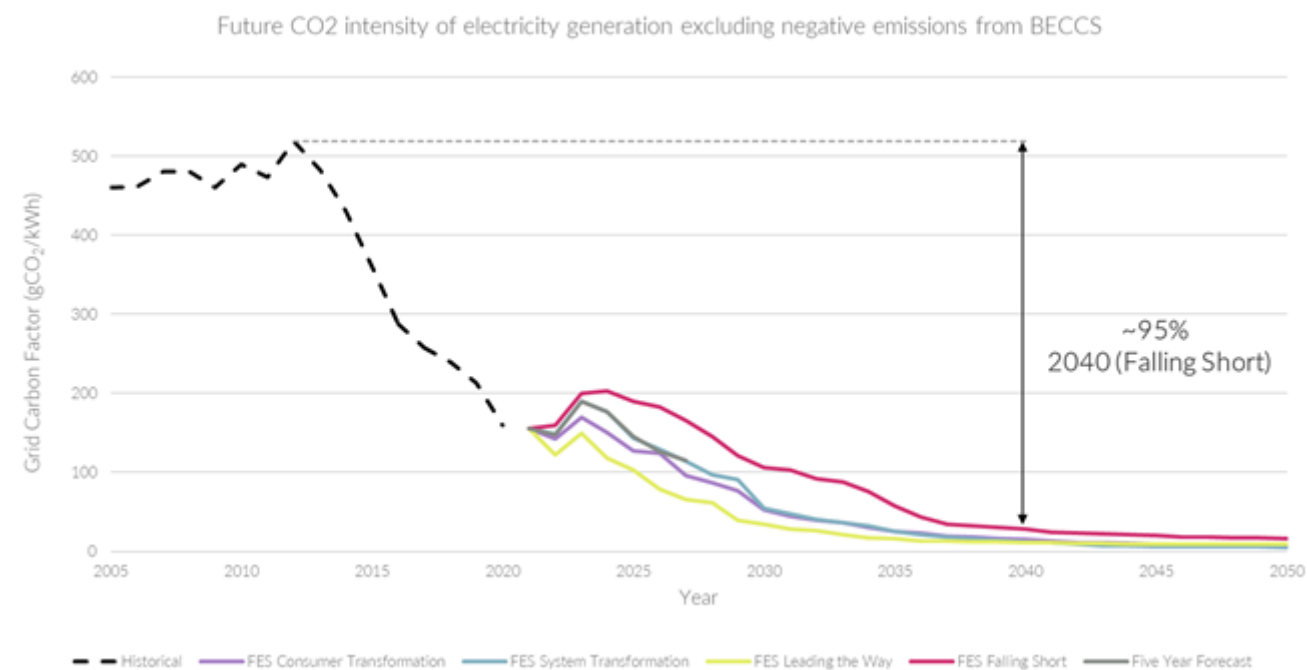


Figure 9: Historic and future projected carbon factor for the National Grid. 8% transmission and distribution losses are included. Sources: BEIS Green Book (historic carbon factors); National Grid Future Energy Scenarios (FES) 2022 (future projected carbon factors).

As a response to the decarbonisation trend, the latest Building Regulations (ADL 2021) include a significantly reduced carbon emission factor for grid electricity of 0.136 kgCO₂/kWh (SAP10.2) compared to 0.519 kgCO₂/kWh used in ADL 2013. This reduction reflects the increased contribution of renewable energy into the national mix of electricity generation. In 2020, renewable sources accounted for 43% of the electricity generated in the UK, up from 24.4% in 2016 (Ofgem).

Historic progress.

Figure shows how the mix of generation technologies serving the National Grid, as well as the associated carbon factor, has varied between 2012 and 2018 based on the mix of generation techniques serving the National Grid over this six-year period.

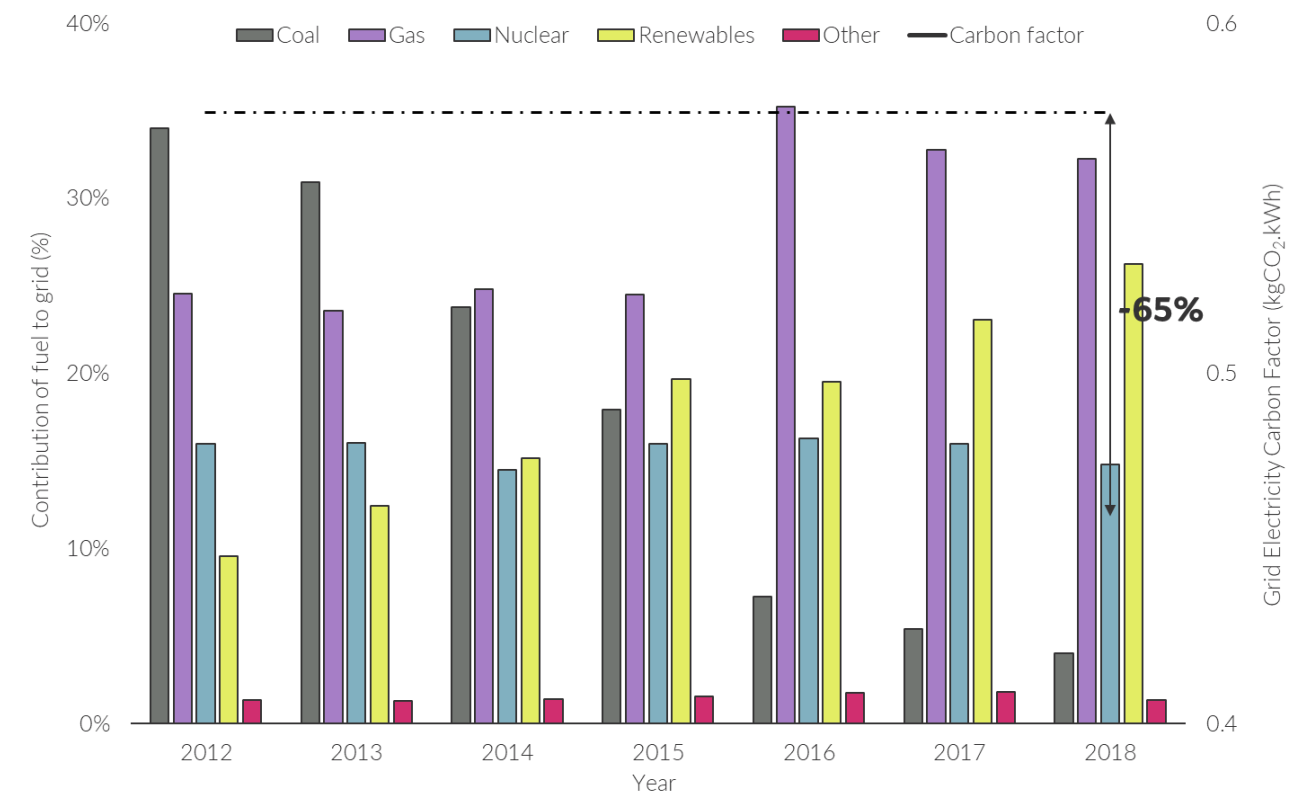


Figure 10: Historic mix of generation methods and associated carbon factor for the National Grid. 8% transmission and distribution losses are included. Sources: electricityinfo.org (generation mix); BEIS Green Book (historic carbon factors).

Appendix B: Software Details

Compliance software and procedure

The proposed Mayfield Plot O development has been assessed using the National Calculation Methodology to demonstrate compliance with Approved Document Part L2. 2021.

Part L2 Non-domestic

Integrated Environmental Solutions Virtual Environment (IESve) is an approved Dynamic Simulations Modelling (DSM) software package which has the capabilities of enabling the user to create a virtual representation of a building. The results presented in this report for the Non-residential aspects were calculated using the approved compliance software IESve 2022 (v2022.2.0.0).

The IESve models were drawn using information provided by the relevant architects.

IESve modelling disclaimer

The calculations produced by Hoare Lea have been carried out with the information provided by the architects to determine whether the proposed development can achieve compliance with Approved Document Part L2 of the Building Regulations.

It should be noted that the data generated by this work is obtained using approved calculations and computer simulations. These simulations are the best means of predicting the performance of the buildings at this stage. Full certainty can only be achieved by measuring the performance of the building and associated systems after a period of use.

The actual energy usage for the buildings once occupied may vary from the calculated values submitted to Building Control. These differences will occur due to several variable parameters between the modelled building and the actual building. Such differences will include the hours, levels of occupancy, how the plant is used and the design criteria with regards to how the rooms are environmentally controlled.

Whilst the simulations have been undertaken in good faith using reasonable skill and care, Hoare Lea can take no responsibility for differences between the computer simulations and the actual performance of the completed buildings due to the inherent complexity and variability of the physics in a building and its environment.

Appendix C: Input Parameters

Heating, Cooling and Ventilation systems

The table below details the systems associated with each space type

System summary

	01 – Tenant 1 VRF, AHU	02 – Tenant 2 VRF, AHU	03 – GF Tenant VRF, MVHR	04 – Top floor Tenant VRF, MVHR	05 – Landlord VRF, AHU	06- VRF Reception, MVHR	07 – DX Split AHU	08 – DX Split IT	09 – Electric Radiator - AHU
System type	Variable Refrigerant flow	Variable Refrigerant flow	Variable Refrigerant flow	Variable Refrigerant flow	Variable Refrigerant flow	Variable Refrigerant flow	Split System	Split	Other local room heater-unfanned
Heating source	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	Direct Electric
Heating fuel	Elec	Elec	Elec	Elec	Elec	Elec	Elec	Elec	Elec
Heating efficiency	4.50	4.50	4.50	4.50	4.50	4.50	3.93	2.00	1.00
Cooling System type	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	-
Cooling Fuel	Elec	Elec	Elec	Elec	Elec	Elec	Elec	Elec	-
Cooling Seasonal Energy Efficiency Ratio (SEER)	9.94	9.94	9.94	9.94	9.94	9.94	4.93	6.50	-
Cooling Nominal Energy Efficiency Ratio (EER)	3.92	3.92	3.92	3.92	3.92	3.92	4.93	6.50	-
Ductwork Leakage tested	Yes - Class B	Yes - Class B	Yes - Class B	Yes - Class B	Yes - Class B	Yes - Class B	Yes - Class B	Yes - Class B	-
AHU CEN Leakage Standards	Class L3	Class L3	Class L3	Class L3	Class L3	Class L3	Class L3	Class L3	-
AHU Specific Fan Power	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s	1.60 W/l/s
Pump Type	-	-	-	-	-	-	-	-	-
System Metering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Out of Range warning	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ventilation Type	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech	Central Balanced A/C Mech
Heat Recovery	Plate Heat Exchanger	Plate Heat Exchanger	Thermal Wheel	Thermal Wheel	Plate Heat Exchanger	Plate Heat Exchanger	Thermal Wheel	Thermal Wheel	Plate Heat Exchanger
Seasonal Efficiency	75%	75%	75%	75%	75%	75%	75%	75%	75%
System Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Demand Controlled Ventilation (DCV)	Demand Control based on Gas	Demand Control based on Gas	Demand Control based on Gas	Demand Control based on Gas	Demand Control based on Gas	Demand Control based on Gas	-	-	-

	sensors where applicable	sensors where applicable	sensors where applicable	sensors where applicable	sensors where applicable	sensors where applicable			
DCV Airflow Regulation	Speed Control	Speed Control	Speed Control	Speed Control	Speed Control	Speed Control	-	-	-
Zones served	Offices Zone 1	Offices Zone 2	GF Office/ Retail space	L09 Event Space, Meeting Rooms	Lift Lobby, FF Lobby, Stair Lobby, BOH Offices and Staff Areas, Kitchen Breakout Room	GF Reception	Security Offices	Comms, MER	Stairs, Toilet, Shower, Lockers/ Changing Room
Heating Radiant Fraction	0.00	0.00	0.00		0.00		0.00	0.00	0.67
Cooling Radiant Fraction	0.00	0.00	0.00		0.00		0.00	0.00	0.00

	10 – Electric Radiator - NV	11 – Local Ventilation	12 – Retail VRF, MVHR
System type	Other local room heater-unfanned	-	Variable Refrigerant Flow
Heating source	Direct Electric	-	Air Source Heat Pump
Heating fuel	Elec	-	Electric
Heating efficiency	1.00	-	450%
Cooling System type	-	-	Air Source Heat Pump
Cooling Fuel	-	-	Electric
Cooling Seasonal Energy Efficiency Ratio (SEER)	-	-	520%
Cooling Nominal Energy Efficiency Ratio (EER)	-	-	520%
Ductwork Leakage tested	-	-	-
AHU CEN Leakage Standards	-	-	-
AHU Specific Fan Power	-	0.6W/l/s- extract SFP	1.10 W (l/s) (MVHR)
Pump Type	-	-	-
System Metering	-	-	Y
Out of Range warning	-	-	Y
Ventilation Type	NV	Local Extract	Air Conditioning
Heat Recovery	-	-	Thermal Wheel
Seasonal Efficiency	-	-	80%
System Controls	-	Y	-

Demand Controlled Ventilation (DCV)	-	-	-
DCV Airflow Regulation	-	-	-
Zones served	Stairs	Switch Room – 2 ACH Refuse – 10 ACH Cleaners Cupboard	Commercial Units
Heating Radiant Fraction	0.67	0.00	0.00
Cooling Radiant Fraction	0.00	0.00	0.00

Domestic Hot Water Systems

5_DHW_Office (Point Of Use)		
Generator	Electric - Office Instantaneous Seasonal efficiency: 100%	Electric - Retail Instantaneous Seasonal efficiency: 100%
Storage	Storage volume: 330l Storage losses: 0.016 kWh/l/day	Storage volume: 100l Storage losses: 0.047 kWh/l/day 8 W/m Circulation Losses 20m Loop Length 0.20 Pump Power

Photovoltaic Panels Yield

390 m² = 53,314 kWh/yr applied to the Office and Landlord Areas

Lighting Parameters.

Table 1 shows the target installed power densities and lighting controls for each space. The values are specified as an average for these space types.

Lighting loads have been set at the W/m²/100 lux shown below. It is considered that this lighting level is achievable but needs to be confirmed at the next Stage.

Table 11 Lighting Installed Power Densities and Controls per Space Type

Zone type	NCM Lux	Lamp Efficacy (lm/W)	Light Output Ratio (LOR)	Constant illuminance control	Lighting Controls *	Photoelectric (Daylight) Control	Total Parasitic Power (W/m²)	Time Switch	Display lamps (lm/W)	
BoH Office	300	110	1.0	-	MAN-ON-AUTO-OFF	-	0.05	-	-	
Circulation/Lift Lobby	100				AUTO-ON-OFF			Y		
Core Offices	400			Yes	MAN-ON-AUTO-OFF			Yes, Dimming		
Events space	300			Yes	MAN-ON-AUTO-OFF					
IT Comms Room	200			-	-	-				
Meeting Room	400				MAN-ON-AUTO-OFF	Yes, Dimming				
Perimeter Offices	400			Yes	MAN-ON-AUTO-OFF	Yes, Dimming				
Security Room	300			-	-	-		-		-
Plant	200					-				-
Reception	300					AUTO-ON-OFF		Yes, Dimming		Y
Retail	300	125	None			Yes, Dimming	N	100		
Stairs	100	100	AUTO-ON-OFF			-	Y	-		
Store	50		-				-			
WCs	200		AUTO-ON-OFF				-			

*Lighting Controls are defined as follows:

Auto On – Auto Off: Specifies presence detection sensors within the space which automatically switches lighting on when occupants are detected and switches lighting off when the space is detected to be unoccupied.

Manual On – Auto Off: Specifies absence detection sensors within the space. Lighting is required to be manually switched on. Automatically switches lighting off when the space is detected to be unoccupied.

**TBD values are to be determined as design progresses- assumed as per NCM Activity Template

Photoelectric (Daylight) Control: Yes – Dimming/Standalone*: Where this has been specified the following profile has been assumed is the IES model **ramp(e1,0,1,400,0.1)**

This formula modulates the lighting gain as a function of the illuminance on the working plane, e1. The value of the profile falls from 1 at zero illuminance to 0.2 at illuminance 400 lux, thereafter, remaining constant at this value.

The value 0.1 represents the fraction of the space’s lighting gain which is not subject to daylight control. The illuminance e1 has been computed using the link to Radiance for each zone.

Appendix D: BRUKL document Office

BRUKL Output Document

 HM Government

Compliance with England Building Regulations Part L 2021

Project name

The Poulton Mayfield - Stage 3 - With PV

As designed

Date: Mon May 22 09:45:23 2023

Administrative information

Building Details

Address: Address 1, City, Postcode

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.18

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.18

BRUKL compliance module version: v6.1.d.0

Certifier details

Name: Name

Telephone number: Phone

Address: Street Address, City, Postcode

Foundation area [m²]: 851.65

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

Target CO ₂ emission rate (TER), kgCO ₂ /m²annum	3.42
Building CO ₂ emission rate (BER), kgCO ₂ /m²annum	2.02
Target primary energy rate (TPER), kWh/m²annum	37.52
Building primary energy rate (BPER), kWh/m²annum	21.23
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	0.26	0.26	LV0000EC:Surf[5]
Floors	0.18	0.14	0.22	LV000011:Surf[6]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.14	0.18	LV00009F:Surf[13]
Windows** and roof windows	1.6	1.1	1.1	GR000021:Surf[0]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.2	1.2	GR000019:Surf[0]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

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

Appendix E: BREEAM Compliance

The project is targeting a BREEAM 'Excellent' rating with an aspiration to achieve 'Excellent'. In both cases, a minimum number of credits are required under Ene 01 Reduction of energy use and carbon emissions. Credits are awarded based on modelled performance of the following three metrics:

- 1. Heating and cooling energy demand
- 2. Primary energy consumption
- 3. Carbon dioxide emissions

BREEAM weights these evenly into a single metric, EPR_{NC} , to determine the number of credit awarded. The performance of each model against the BREEAM requirements is outlined below.

BREEAM Rating	EPR _{NC} Performance Office	EPR _{NC} Performance Retail
	Excellent ≥0.4 Outstanding ≥0.6	Excellent ≥0.4 Outstanding ≥0.6
ADL 2021 / BREEAM UK NC V6	5.0	0.0

Table 12 Performance against BREEAM requirements

Currently, the project achieves 5.0 credits from the above analysis within energy performance section and 4 credits for prediction of Operational Energy under NABERS Assessment. This is sufficient to achieve BREEAM 'Excellent' rating.

Appendix F: EPC rating

Building	Predicted EPC rating
Mayfield Plot O - Office	A – 7
Mayfield Plot O - Retail	A – 15



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