

Energy Statement

Ref: Z71876A

**Storage World,
Old Hall Street,
Middleton**

for

**Self Storage Performance
Management International
Limited**



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Executive Summary

This Energy Statement has been developed in support of the planning application for the proposed Commercial development at Old Hall Street, Middleton. This Energy Statement will evaluate the technical and economic feasibility of using both passive and low and zero carbon technologies and will assess the practical levels of CO₂ reduction possible for this development to comply with the following Rochdale Borough Council's planning requirements:

- National Planning Policy Framework (2025)
- Places for Everyone Joint Development Plan (2024)

The following low and zero carbon technologies have been evaluated:

- | | |
|--|-------------------------------|
| • Biomass | • Geothermal |
| • Wind | • Combined Heat & Power (CHP) |
| • Biogas | • Solar Hot Water |
| • Air Source Heat Pumps & Exhaust Air Heat Pumps | • Solar Photovoltaic |

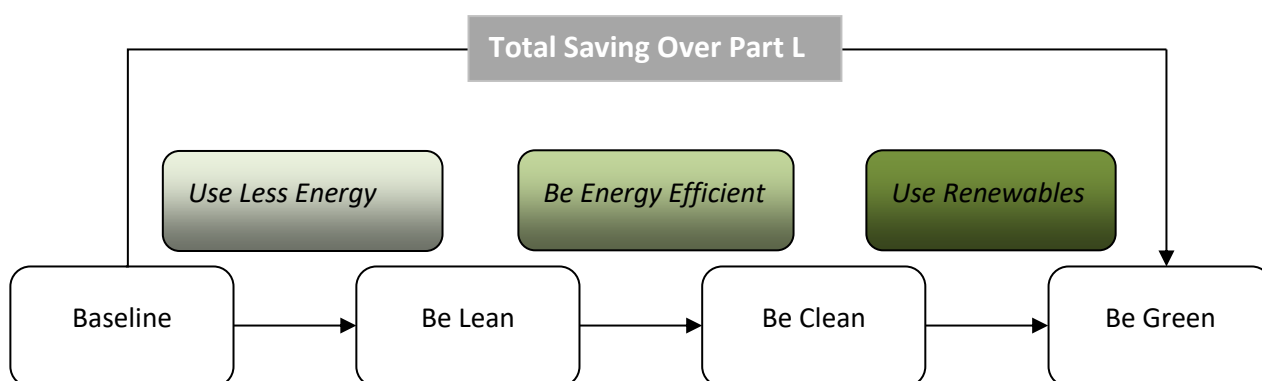
The approach for the development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

1. Enhanced building fabric to meet Building Regulation ADL2 2021
2. Enhanced air tightness
3. Highly efficient mechanical extract ventilation systems
4. Air Source Heat Pump units to serve the office/reception, staff and IT rooms
5. Efficient lighting strategy using LED fittings and intelligent controls
6. 160m² PV Array (approx. 32.2kWp) mounted on the roof to generate electricity for the building

For the purpose of the assessment, we have evaluated the development in ADL2 2021 (Simplified Building Energy Model (SBEM)) to provide an accurate estimate of predicted energy consumption/CO₂ emissions.

Summary

The development has been provided with energy savings through the use of passive improvement measures such as improved energy efficiency. This passive approach to compliance will complement the integrated approach to the sustainable energy objectives of the national and local policies.



The principles of a Be Lean, Be Clean, Be Green design philosophy have been applied, which results in an 2.34% CO₂ emissions improvement and a 3.79% primary energy improvement over Building Regulations Part L2 2021, as indicated in Table 1. The results have also been compared against the BREEAM 'Excellent' standard for BREEAM Issue Ene 1. 4 credits are the minimum requirement to achieve an 'Excellent' rating and the building currently achieves 5 credits. A full design specification that confirms inputs used within the SBEM calculations is provided within the Appendices of this report.

Table 1 - Proposed development emissions against Building Regulations Part L2 2021

	Total CO ₂ Emissions (kgCO ₂ /yr)	Total Primary Energy (kWh/yr)
Target Building Performance	5,801	61,613
Proposed Building Performance	5,665	59,279
Total Reduction	136	2,334
Percentage Improvement (above AD2 2021)	2.34%	3.79%

1. Introduction

This Energy Statement has been developed in support of the planning application for the proposed Commercial development at Old Hall Street, Middleton. The development consists of large storage units and a number of Commercial units which are to be built to provide shell and core only. Therefore, the development will be assessed under Building Regulations Approved Document Part L2 (2021) for non-dwellings. We have included for a typical fit-out specification for the Commercial Units to meet the minimum Part L2 standards and included within the appendices.

Supporting information is provided within this report for the proposed energy strategy to be considered on site in accordance with the following planning policies:

- National Planning Policy Framework (2025)
- Places for Everyone Joint Development Plan (2024)

Throughout this report, passive design techniques, energy efficient equipment and appropriate low carbon technologies will be appraised in line with the 'Be Lean, Be Clean, Be Green' philosophy of relevant planning documents and the Energy Hierarchy.

An assessment of CO₂ emissions will be made based on the calculation methodology dictated by the Simplified Building Energy Model (SBEM) and in line with the requirements of Places for Everyone Joint Development Plan (2024).

1.1. Location

The area of land for the proposed development at Old Hall Street is highlighted by the red line boundary shown in the image below.

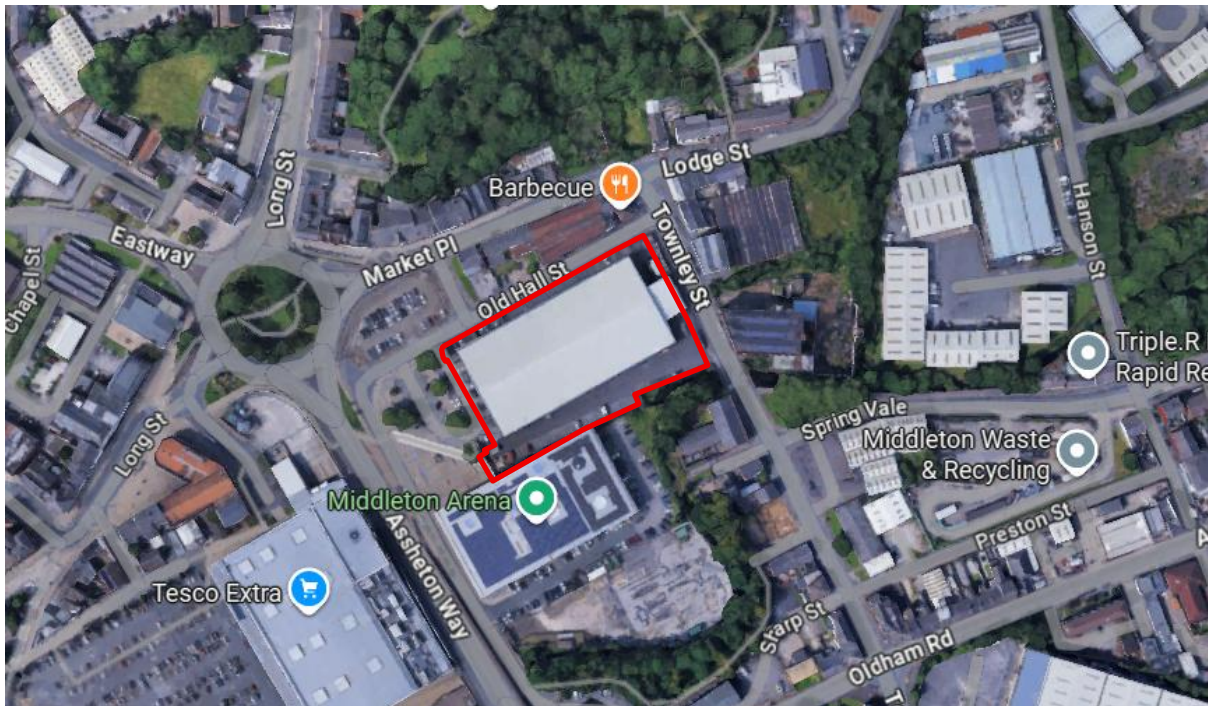


Figure 1 - Location and surrounding area of proposed development

The site will be accessed from Old Hall Street in Middleton. The surrounding area is predominantly urban, with Middleton Arena located to the south, an industrial estate to the north-east, and residential properties to the north and west.

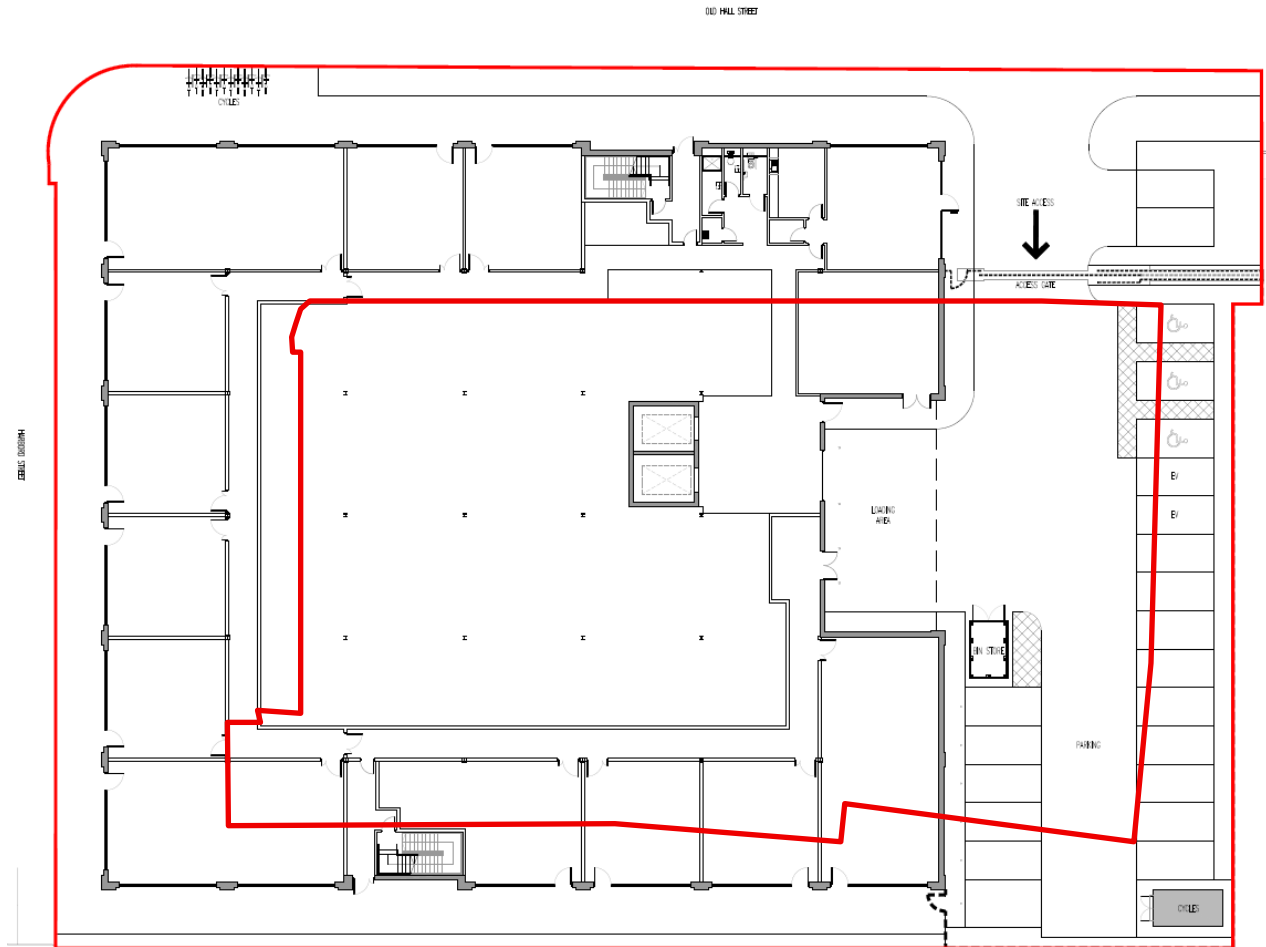
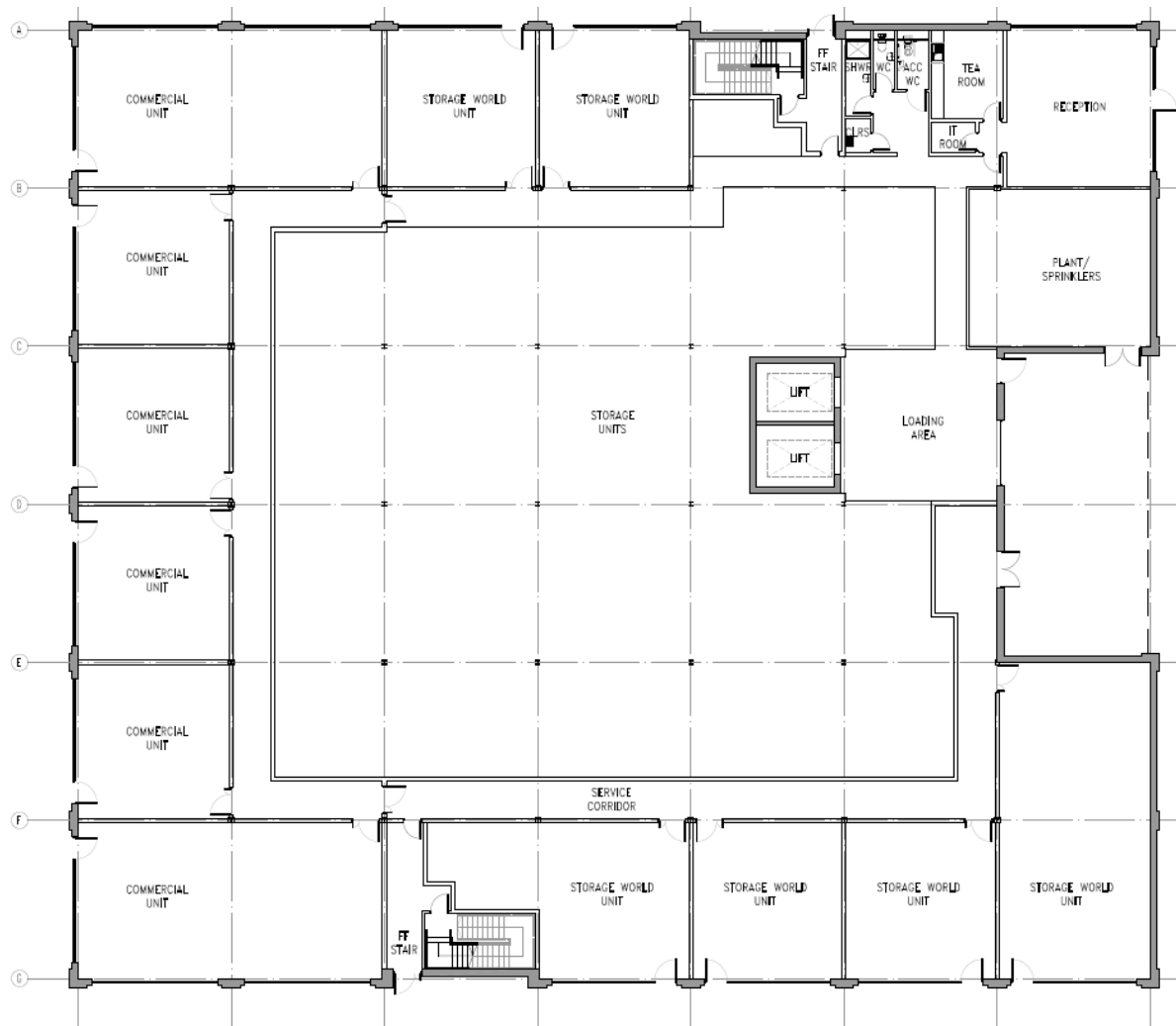


Figure 2 - Site Plan for Proposed development

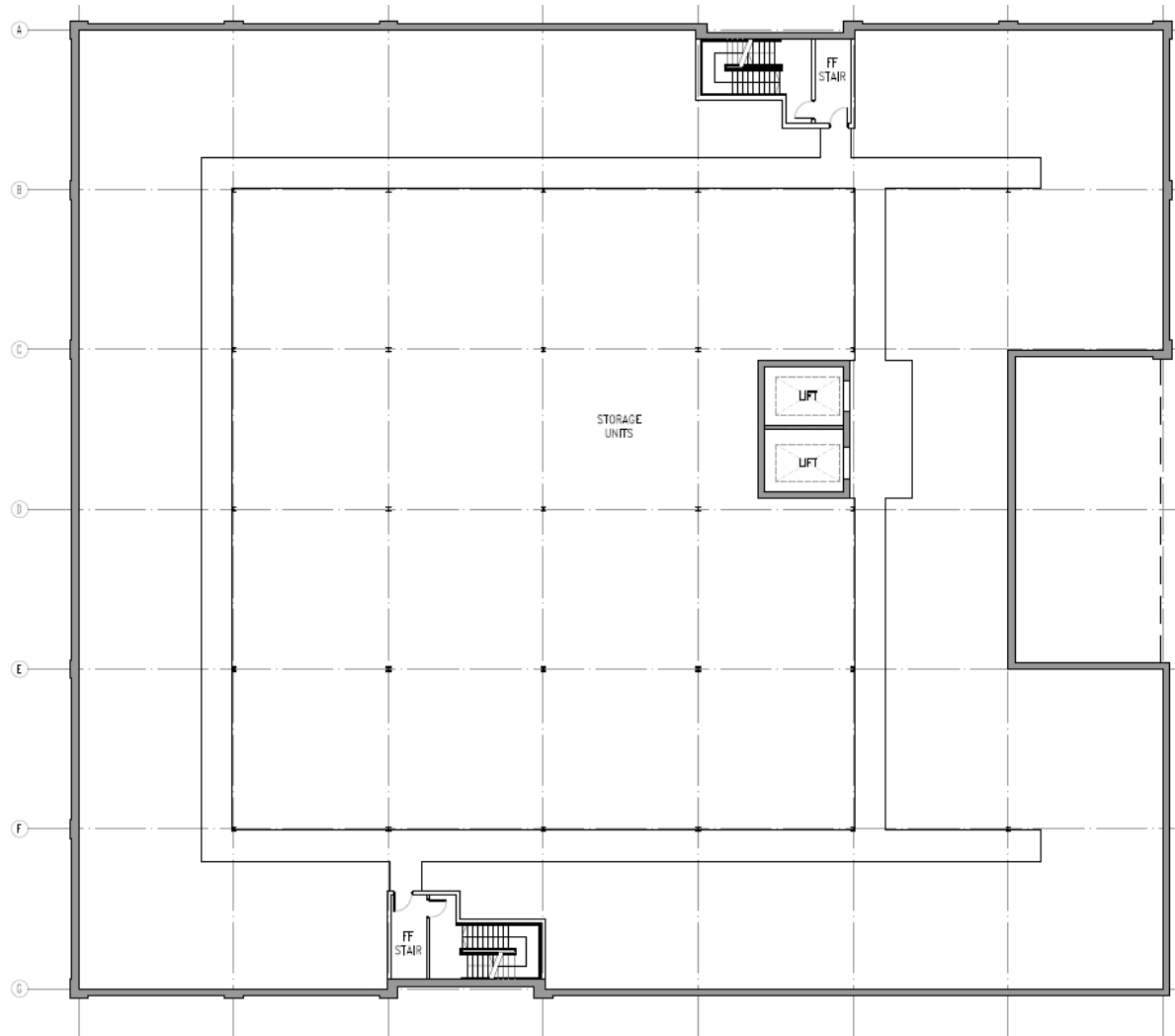
The proposed development is as shown within the red line boundary defined in figure 2 above.

1.2. Floor Plans



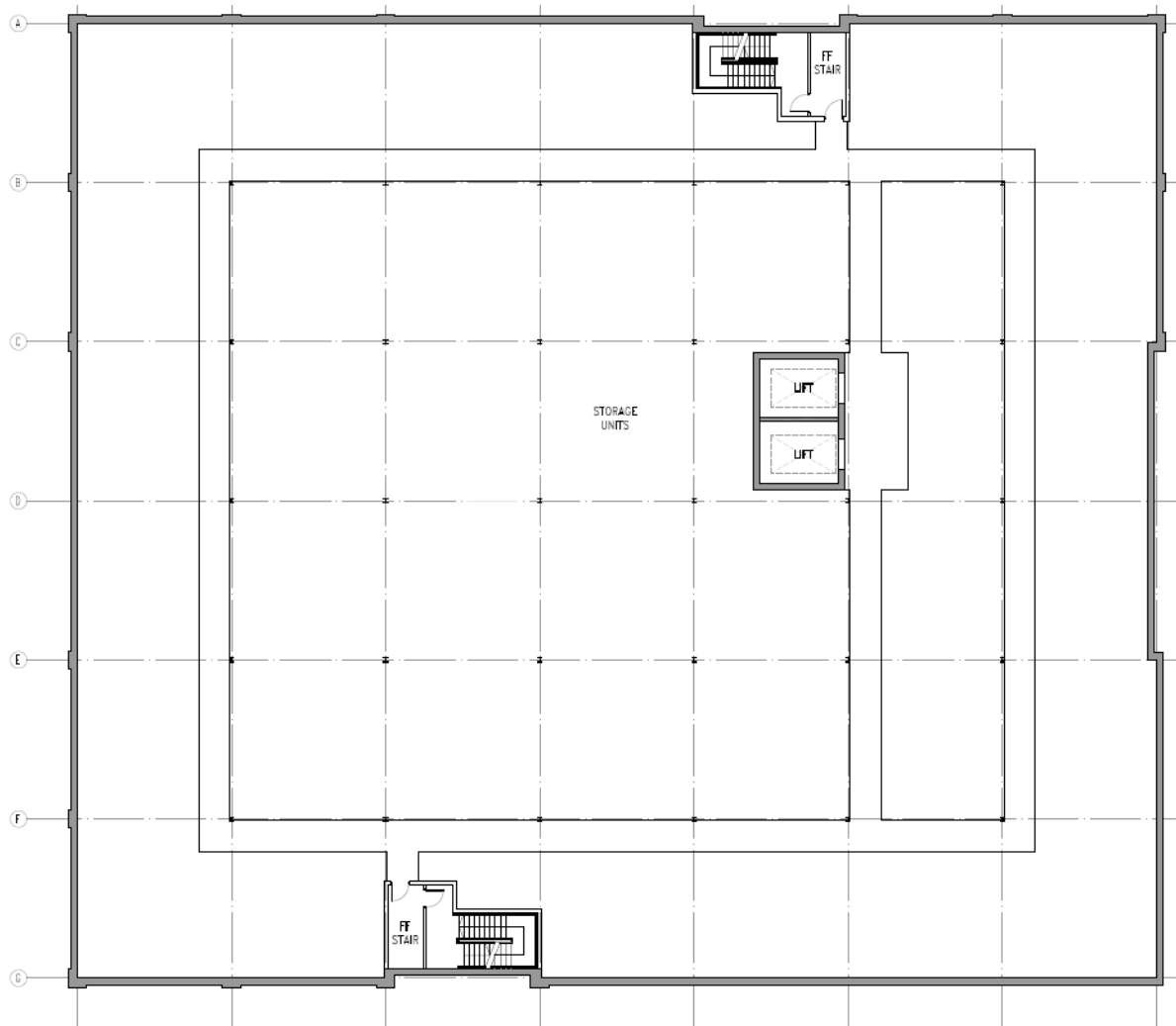
01 **Proposed Ground Floor Plan**
Scale 1:200 @ A1

Figure 3 – Ground Floor Plan



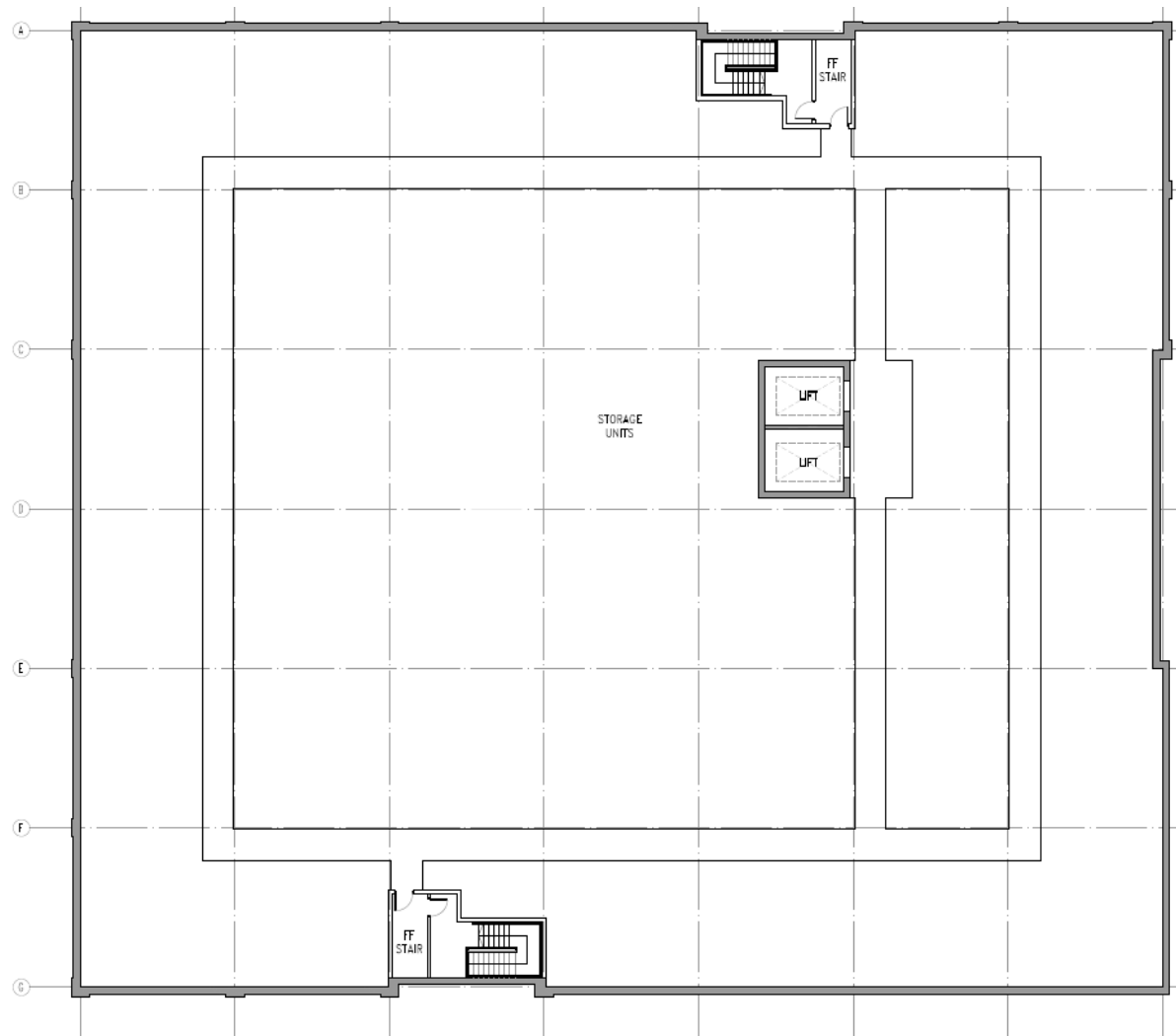
02 **Proposed First Floor Plan**
Scale 1:200 @ A1

Figure 4 – 1st Floor plan



03 **Proposed Second Floor Plan**
Scale 1:200 @ A1

Figure 5 – 2nd Floor Plan



04 **Proposed Third Floor Plan**
Scale 1:200 @ A1

Figure 6 – 3rd Floor Plan

2. Policy Drivers for Energy Efficiency and Renewable Energy

This section presents a range of planning policy that is applicable to the proposed development, at both a national and a local level.

2.1. National Policy

The National Planning Policy Framework was published in February 2025 and sets out the governments' planning policies for England and they should be applied. Table 2 sets out the relevant energy standards for new developments and provides an indication of the design response to be provided.

Table 2 – Key National Planning Policy Requirements and Design Responses

Section	Policy Requirements	Design Response
14. Meeting the challenge of climate change, flooding and coastal change	The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: Shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.	This development will follow the principles set out in Places for Everyone Joint Development Plan (2024), using a 'Be Lean, Be Clean, Be Green' approach in reducing operational carbon emissions. An overview of current decentralised energy schemes in Middleton and an assessment on the potential for future schemes in relation to this development is provided in Section 7 of this report. This energy statement appraises site specific information to determine the most appropriate approach to minimise energy consumption.

2.2. Local Policy

The adopted Places for Everyone Joint Development Plan 2022 to 2039 (March 2024) provides a set of guidelines for new development. All relevant energy policy within these documents is provided within this section together with a design response.

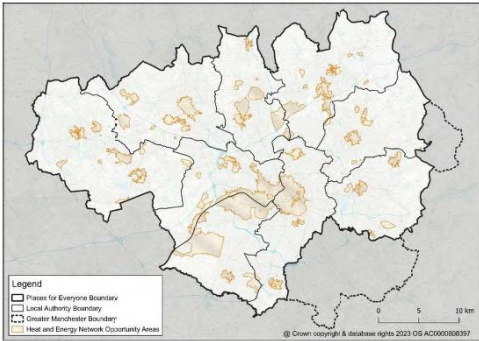
Table 3 – Key Local Planning Policy Requirements and Design Responses

Places for Everyone Joint Development Plan 2022 to 2039 (March 2024)		
Section	Policy Requirements	Design Response
Policy JP-S1: Sustainable Development	To help tackle climate change, development should aim to maximise its economic, social and environmental benefits simultaneously, minimise its adverse impacts, utilise sustainable construction techniques and actively seek opportunities to secure net gains across each of the different objectives. Carbon and Energy Within this, new development will have a critical role to play and all new homes and commercial/industrial buildings will need to achieve net zero carbon by 2028. The definition of net zero carbon development has been established by the UK Green Building Council. It is expected that development in the Plan area will apply a net zero carbon approach to operational emissions up until 2028, thereafter emissions in construction should be considered. Minimum carbon reduction targets will be set in line with the Future Homes Standard of 80% or until such a time this is superseded. To provide further confidence in decision making, supporting research²³ was commissioned to outline how the pathway to 2028 can be achieved for 'net zero in operation'²⁴ by setting out critical milestones and measures that would be expected when following the energy 'hierarchy' and adopting a fabric first approach. 5.17 Based on the evidence which has informed the 5 Year Environment Plan and achieving net zero carbon in new development, this has shown that there will need to be a significant increase in photovoltaic technology. Therefore, where planning applications for residential development are accompanied by an energy statement, the following	The proposed development will follow the principles of the Energy Hierarchy by adopting a passive fabric-first approach to design rather than adopting the use of renewable technologies. A full energy strategy is provided in Section 7 of this report, following an appraisal of a range of site-specific measures in line with the 'Be Lean, Be Clean, Be Green' approach. A fabric first approach to the development is a much-preferred

	best practice thresholds should be seen as the starting point in relation to reducing energy demand and onsite renewable energy generation. The thresholds set out in Table 5.1, for post 2025, are consistent with the GM Five Year Environment Plan. Table 5.1 Best Practice Thresholds for Reducing Energy Demand and Onsite Renewable Energy Generation within residential developments <table><tr><th>-</th><th>Space Heat Demand²⁵</th><th>Hot Water Energy Demand²⁶</th><th>Renewable Energy Generation Targets</th></tr><tr><td>2021 - 2025</td><td>Houses (30kWh/m2) Flats (25kWh/m2)</td><td>20% energy demand reduction in the total heat required for water heating</td><td>*Photovoltaic installation: 20% ground floorspace</td></tr><tr><td>2025 - onwards</td><td>Houses (20kWh/m2) Flats (15kWh/m2)</td><td>^20% energy demand reduction in the total heat required for water heating</td><td>*Photovoltaic installation: 40% ground floorspace</td></tr><tr><td>*Ground floorspace used as a proxy for available roof area.</td><td>-</td><td>-</td><td>-</td></tr><tr><td>^will need to be reviewed with Future Homes Standard 2025 to determine if savings already embedded.</td><td>-</td><td>-</td><td>-</td></tr></table> 5.19 By following the energy hierarchy, new development will need to achieve net zero carbon through the maximisation of on-site measures first. However, in circumstances where a development has demonstrated that the hierarchy has been followed and there are no reasonable alternatives to meet the minimum carbon reductions, then payment to offset remaining emissions will also be required. Such payments should be expected to fund other carbon saving programmes within Greater Manchester to help meet the 5 Year Environment Plan targets (such as energy efficiency retrofit and renewable energy installations).	-	Space Heat Demand ²⁵	Hot Water Energy Demand ²⁶	Renewable Energy Generation Targets	2021 - 2025	Houses (30kWh/m2) Flats (25kWh/m2)	20% energy demand reduction in the total heat required for water heating	*Photovoltaic installation: 20% ground floorspace	2025 - onwards	Houses (20kWh/m2) Flats (15kWh/m2)	^20% energy demand reduction in the total heat required for water heating	*Photovoltaic installation: 40% ground floorspace	*Ground floorspace used as a proxy for available roof area.	-	-	-	^will need to be reviewed with Future Homes Standard 2025 to determine if savings already embedded.	-	-	-	method with the use of Air Source Heat Pumps (ASHP) to provide heating and cooling to the building. A PV array is mounted on the roof to further reduce the energy consumption of the building. Further information can be found within section 8.
-	Space Heat Demand ²⁵	Hot Water Energy Demand ²⁶	Renewable Energy Generation Targets																			
2021 - 2025	Houses (30kWh/m2) Flats (25kWh/m2)	20% energy demand reduction in the total heat required for water heating	*Photovoltaic installation: 20% ground floorspace																			
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*Ground floorspace used as a proxy for available roof area.	-	-	-																			
^will need to be reviewed with Future Homes Standard 2025 to determine if savings already embedded.	-	-	-																			

Policy JP-S2: Carbon and Energy	The aim of delivering a carbon neutral Greater Manchester no later than 2038, with a dramatic reduction in greenhouse gas emissions, will be supported through a range of measures including: 1. Promoting the retrofitting of existing buildings with measures to improve energy efficiency and generate renewable and low carbon energy, heating and cooling; 2. Promoting the use of life cycle cost and carbon assessment tools to ensure the long-term impacts from development can be captured; 3. Taking a positive approach to renewable and low carbon energy schemes, particularly schemes that are led by, or meet the needs of local communities; 4. Increasing the range of nature-based solutions including carbon sequestration through the restoration of peat-based habitats, woodland management, tree-planting and natural flood management techniques; 5. An expectation that new development will, unless it can be demonstrated that it is not practicable or financially viable; a. Be net zero carbon which applies: • from adoption– to regulated operational carbon emissions; • from 2028 -to all emissions ‘in construction’. From 2025 development should also calculate and minimise carbon emissions from unregulated emissions alongside regulated emissions. Development proposals should set out how this has been achieved in an energy statement in accordance with the energy hierarchy, which in order of importance seeks to: i. Minimise energy demand; ii. Maximise energy efficiency; iii. Use renewable energy; iv. Use low carbon energy; and v. Utilise other energy sources. From 2025 any residual carbon emissions that cannot be fully mitigated on-site should be offset, in agreement with the relevant local planning authority through a financial contribution to a carbon offset fund. As an interim measure, development should be consistent with the 2022 Part L Building Regulations unless superseded by changes to building regulations and/or national or local planning policies. b. Incorporate adequate electric vehicle charging points, in line with Part S of the Building Regulations, unless superseded by relevant Local Plan	The scheme utilises low carbon technology with the use of ASHPs for heating and cooling to the building, and low energy lighting, and improved thermal elements to minimise energy demand and enhance energy performance in line with current Building Regulations.
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	policies, to future proof for the likely long-term demand, taking account of the potential maximum energy demand for the site; c. Where practicable, prioritise connection to a renewable energy/heating/cooling network in the first instance or a low carbon energy/heating/cooling network that is adaptable to non-fossil fuels at a later date; d. In residential developments, achieve energy demand reductions in terms of space heat demand; hot water energy demand and the delivery of on-site renewable energy generation, in accordance with Table 5.1. For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced. Include a detailed energy statement to demonstrate via site relevant evidence how the development has sought to maximize reductions in carbon emissions in line with relevant policy targets, including the minimisation of overheating risks and appropriate measures for post occupancy evaluation.	
Policy JP-S3: Heat and Energy Networks	The provision of decentralised energy infrastructure is critical to the delivery of our objectives for low carbon growth, carbon reductions and an increase in local energy generation. The following measures will help to achieve this: 1. Delivery of renewable and low carbon energy schemes will be supported with particular emphasis on the use of decentralised energy networks in areas identified as “Heat and Energy Network Opportunity Areas”. These 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 in city-region master planning; - Sufficient density of existing heat demand occurs; and - Significant future development is proposed at the strategic development locations. 2. Within the identified “Heat and Energy Network Opportunity Areas”, unless it can be demonstrated that there are more effective alternatives	Additionally, based on a review of available data, the site is not currently located within a designated Heat and Energy Network Opportunity Area, nor within 500m of an operational or planned district heat network. Due to the constrained, mixed-use nature of the existing building, and the relatively low and dispersed heat demand across

	for minimising carbon emissions 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: a. Connect to an existing or planned heat/energy network or be designed to enable future connection (where within 500m of such a network); and/or b. 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 so as to enable future expansion to adjoining buildings or assets as appropriate. Figure 5.1 Heat and Energy Network Opportunity Areas  Flood Risk and the Water Environment 5.39 Climate change and population and economic growth can put increasing pressure on the available potable water supply for homes and businesses. It is important that water is conserved and efficiently used as much as possible to help build resilience to periods of drought; avoid over abstraction; reduce carbon emissions from water treatment and disposal; and protect river and wetland habitats from degradation. All new homes have to meet mandatory national standard set out in Building Regulations (of 125 litres/person/day). Where there is a clear	individual units, the use of decentralised energy or site-wide heat networks has not been considered practicable or financially viable in this instance. Instead, the scheme will utilise ASHPs for heating and cooling, supported by improved insulation and building fabric upgrades, in full compliance with Part L2 of the Building Regulations (2021).
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	local need, the government's Housing Optional Technical Standards paragraph 013 and 014 set out that local authorities may also consider tighter water efficiency requirements for new homes (110 litres a day) to help manage water demand. This will be determined through the preparation of district local plans.	
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3. Methodology

The first step of the full energy strategy assessment has been to undertake a baseline energy assessment. The baseline energy assessment consists of calculating the total CO₂ emissions of the development to meet Building Regulations and then compare the proposed improvement measures against this baseline. Building Regulations Part L2 2021 (SBEM) applies to the proposed development and provides carbon emissions from regulated energy.

The building can then be benchmarked/thermally modelled using the energy hierarchy:

1. Be Lean <i>A reduction in energy use as a result of passive design and energy efficiency</i>
Thermal performance of the new build envelope (U-values) Glazing design Airtight construction Efficient mechanical ventilation Variable speed fans and pumps Energy Efficient lighting
2. Be Clean <i>A focus on supplying energy to the development through efficient means</i>
Connect to low carbon heat networks Develop site wide heat network from single energy centre incl. potential CHP Provide energy efficient individual heating
3. Be Green <i>The installation of renewable technologies to meet energy demand where possible</i>
Consider the feasibility of renewable energy technologies Assess the integration of renewable technologies based on the above measures

The development must be provided with energy savings through the use of thermal improvements to fabric (a 'fabric first' approach), followed by other clean energy solutions (energy efficiency improvements, district heating, etc...) and finally the use of renewable energy technologies, where practical. This hierarchy complements the integrated approach to the sustainable energy objectives of the Places for Everyone Joint Development Plan (2024).

The planning policies require a full review of the technical and economic feasibility of the following renewable technologies:

- Biomass heating
- Biomass combined heat and power
- Solar hot water
- Solar photovoltaic
- Ground source heat pumps
- Air source heat pumps / exhaust air heat pumps
- Wind power

To achieve the targets set the development must achieve a balance between fabric, heating and cooling control, ventilation and air leakage improvements, the amount of zero or low carbon technology installed and the capital, life cycle and running costs, maintenance and operation, etc...

Feasible renewable energy technologies have been considered during the assessment to ensure the most suitable renewable energy is chosen for the demands of this scheme. The pros and cons of each technology with respect to this site are considered as part of this statement.

3.1. Sustainable Approach

Under the Places for Everyone framework, the GMCA provides a set of guidelines and design principles that all developments across Greater Manchester's nine boroughs are expected to follow. The Greater Manchester Combined Authority (GMCA) has established a policy to guide energy performance and sustainability in new developments. The policy requires developments to meet strict space heating and energy efficiency targets, including limiting energy consumption per square metre (e.g. ≤ 35 kWh/m²/yr for overall energy use) and ensuring adequate on-site renewable energy generation. Developments must integrate renewable technologies, such as photovoltaic (PV) systems covering a significant proportion of the internal ground-floor area and eliminate reliance on fossil-fuelled heating. Together, these measures aim to reduce carbon emissions, improve energy efficiency, and support the region's transition to net-zero energy use.

This development falls under Table 4 'Large Major' Development and therefore requires an 'Excellent' rating for the BREEAM Ene 01 issue. This requires that a minimum of 4 credits are achieved for BREEAM Ene 01 based on the SBEM calculations.

Table 4 – GMCA Targets for Building development

	Minor development		Major development	
	Small minor <100m ²	Minor 100-999m ²	Major 1,000-4,999m ²	Large major +5,000m ²
Space heating and cooling demand (kWh/m ² GIA/yr) <i>Minimise energy demand</i>				
Energy Use Intensity (EUI) (kWh/m ² GIA/yr) <i>Maximise energy efficiency</i>	<i>Not applicable</i>	 Outstanding from 2028	 Outstanding from 2028	
PV footprint area (% of ground floor footprint (fp)) <i>Use renewable energy</i>				
Fossil fuel free (yes/ no) <i>Use low carbon energy</i>				
TM52 met and passed (yes/no) <i>Reduce overheating risk</i>	<i>Not applicable</i>			
Upfront embodied carbon (kgCO ₂ e/m ² GIA) <i>Minimise embodied carbon</i>				
Offset contribution (£) <i>Offsets</i>	<i>Not applicable</i>	<i>Not applicable</i>	 Options for offsetting currently under development and to be adopted by each local authority.	

Below tables show the values for the proposed development in the categories outlined in the GMCA policy.

Table 5 – GMCA Space Heating Demand

Minimise Energy Demand	Form factor per building	≤ 2	2.57
	Average glazing ratio per façade: North	(% of façade) See 'Net Zero Design Guidance' for building type	8%
	South		10%
	East		0%
	West		11%
	Average external walls U-Value ($\text{W/m}^2\text{K}$)	≤ 0.15	0.26
	Wall thickness	> 400	385
	Average ground floor U-Value ($\text{W/m}^2\text{K}$)	≤ 0.10	0.15
	Average external roofs U-Value ($\text{W/m}^2\text{K}$)	≤ 0.10	0.18
	Average external doors U-Value ($\text{W/m}^2\text{K}$)	≤ 1.20	1.60
	Average windows U-Value ($\text{W/m}^2\text{K}$) (or double/triple glazed)	≤ 1 (triple)	1.60
	Air permeability rate ($\text{m}^3/\text{h}/\text{m}^2@50\text{Pa}$)	≤ 3	3
	Ventilation strategy (background only)	-	-

The table above demonstrates the scheme's clear commitment to minimising energy demand in line with GMCA Planning Policy. Where minor shortfalls against target metrics have occurred, the design team has responded proactively by reducing the proportions of glazing to the external façade, to compensate and even exceed the overall energy performance criteria.

A key policy aim is to limit form factor (<2) to reduce surface heat loss. The development only just exceeds this requirement, demonstrating the architect's intent to achieve compact, efficient building forms.

Though the use of glazing at $1.0\text{W/m}^2\text{k}$ and an air tightness of 3m^3 is stated as the ideal target under GMCA, this was discussed in detail, and it was agreed targeting only where needed was the best approach. To further support that the scheme has still aimed for a fabric first approach, it is requested consideration is given that the Building Regulations (2021) minimum for air testing is 8m^3 , with the 'notional building' at 5m^3 . Our initial design was for 3m^3 , far exceeding worst case of Building Regulations and further supporting the fabric first approach.

Table 6 – GMCA PV Footprint

Use		
Renewable	PV footprint area (% of ground floor space)	13.6%
Energy		

The development does not meet the local policy requirement to provide photovoltaic (PV) coverage equivalent to 40% of the ground floor Gross Internal Floor Area (GIFA).

The site achieves PV coverage equivalent to approximately 13.6% of the total conditioned ground floor area, based on the roof plan drawings provided. This has been achieved through a carefully coordinated roof design that prioritises solar efficiency, orientation, and available surface area from the outset.

The PV arrays are installed on the south-facing flat roof, maximising solar gain and overall system performance. Importantly, the roofscape has been consciously designed by the architect to optimise usable PV area, ensuring that renewable energy provision was embedded within the core design principles rather than applied as an afterthought.

The PV array across the whole development has a total installed capacity of 32.2 kWp, with a predicted annual electricity generation of approximately 22,000 kWh. Assuming an average electricity rate of approximately 30p/kWh (excluding standing charges), this level of generation could provide a notional annual electricity cost saving of approximately £6,600 across the development, while also contributing to a reduction in overall environmental impact.

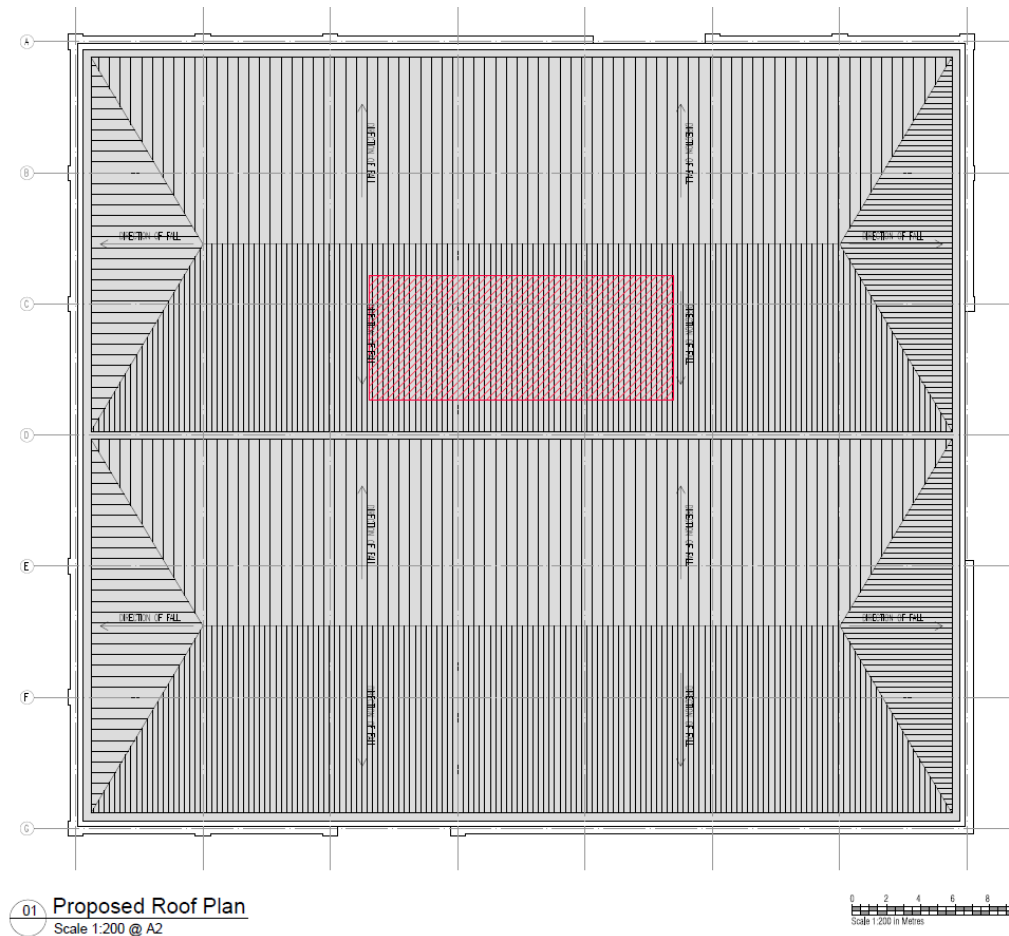


Figure 7 – Possible areas for PV

Wherever feasible, panels are oriented facing south to maximise solar gain. This orientation has been selected to ensure the most effective solar exposure and overall system performance.

Table 7 – GMCA Fossil fuel free

Use Low Carbon Energy	Fossil Fuel Free (yes/no)	Yes
	Heat Source – Where the system for generating space heating and hot water is a heat pump and it achieves a SCOP of 3.5 or higher (then a Low Carbon Heat Appraisal not required)	Electric

In accordance with planning policy and GMCA sustainability guidance, a low carbon energy appraisal has been undertaken as part of the design development process. The appraisal assessed a range of heating solutions, including electric, individual air source heat pumps (ASHPs), and communal heat networks, with each considered in relation to technical viability, site constraints, predicted energy demand, and carbon performance.

Air Source Heat Pumps have been included for the majority of conditioned areas. They will provide heating and cooling demand to the Reception office and staff kitchen/tea room and are proposed for the fit-out of the Commercial Units. The nature of the most probable use of the Commercial units will be energy-intensive so the need for cooling is likely. Therefore, the most energy efficient strategy is to provide split ASHPs which provide heating and cooling.

Reduce Overheating Risk	Has the Net Zero Design Guidance been followed for orientation, window areas and shading?	Yes
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The amount of glazing to the storage units has been restricted to ensure that internal spaces do not overheat.

Minimise Embodied Carbon	Confirmation that a summary of the efforts made to design a lean, low carbon structure and building design has been submitted.	Yes
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We acknowledge the growing importance of addressing upfront embodied carbon in the built environment, particularly in support of long-term net zero objectives. However, at this stage of the project, a formal embodied carbon assessment, particularly to a level of detail required for a comprehensive Embodied Carbon Plan, is not feasible.

The development is currently in the design for planning stage, and key information that would underpin a meaningful and accurate assessment, such as confirmed construction detailing, material specifications, and input from contractors or subcontractors is not yet available. Embodied carbon calculations rely heavily on specific material quantities and verified Environmental Product Declarations (EPDs), many of which are still inconsistent or unavailable across the supply chain. Given these limitations and attempted to quantify embodied carbon and preparing a robust and meaningful embodied carbon plan at this stage would involve a high degree of estimation and carry a significant margin of uncertainty, which may reduce its value as a decision-making or compliance tool.

That said, we are mindful of this issue and will review the viability of undertaking an embodied carbon appraisal at a more advanced stage, when the design is more technically resolved and the supply chain is better defined. This would allow any assessment to be more robust, transparent, and valuable in informing specification decisions, particularly during technical design or post-tender phase.

We trust this explanation demonstrates that the current timing is not conducive to meaningful embodied carbon analysis, however in the meantime, our design team continues to prioritise material efficiency, low-carbon construction principles, and long-term energy performance, in line with wider sustainability objectives for the project. We remain open to further dialogue with the planning authority on this matter as the project progresses.

4. Baseline Energy Assessment

Energy Counsel have based the analysis on current Building regulations ADL2 2021 (SBEM), taking into account solutions that must not only be energy efficient but also practical, reliable and user friendly.

Energy Counsel have carried out preliminary SBEM calculations for the development. Under Building Regulations Part L2 2021, developments must comply with both metrics set by the notional building shown below.

- Building Emissions Rate (BER) must be lower than or equal to the Target Emissions Rate (TER)
- Building Primary Energy Rate (BPER) must be lower than or equal to the Target Primary Energy Rate (TPER)

SBEM is the Governments Simplified Building Energy Model (SBEM) for calculating the energy consumption and CO₂ emissions of non-dwelling building areas. SBEM is a measure of energy and CO₂ consumption for heating, cooling, mechanical ventilation, hot water and lighting for a building.

To assess the baseline carbon emissions, we must make an estimation of the energy demands through Building Regulations in order to set a target upon which the actual development can be compared.

4.1. Predicted Baseline Energy Requirements

The predicted baseline CO₂ emission demands for the development:

Table 8 - Baseline building emissions

Our Ref	Building	Floor Area m ²	TER (Kg CO ₂ / yr/m ²)	TPER (kWh/yr/m ²)	Total Target Carbon Emissions (Kg CO ₂ /yr)	Total Target Primary Energy (kWh/yr)
Z71876	Old Hall Street	1,182	2.56	27.19	5,801	61,613

The baseline carbon emissions rate for the development is **5,801 KgCO₂/yr** and the baseline primary energy rate is **61,613 kWh/yr**.

5. Passive Design and Energy Efficiency

The approach of the development is to embed sustainability into the heart of the design from the outset of the project design process. The design will be developed with sustainable solutions, taking into account the relevant policies and strategies of the Places for Everyone Joint Development Plan (2024).

The development will seek to consider all aspects and principles of sustainable development, taking into account environmental, social and economic impacts.

5.1. Passive Design Measures

The philosophy for the site is to achieve as much of the necessary reduction in carbon emissions through the use of passive design techniques and energy efficient measures as possible, before resorting to the use of LZCs. This ensures that the highest standards of building fabric and energy efficiency are achieved, rather than offsetting a poorer performance with LZC contributions.

This will be undertaken through a fabric first energy efficient design approach with high levels of thermal efficiency and a reduction in energy demand through efficient lighting design

5.2. Energy Efficient Systems

Options have been reviewed for improving the energy efficiency of the development by installing energy efficient heating and cooling systems.

Low energy mechanical extract ventilation systems to serve the toilets and Commercial Units in line with the requirements of Building Regulations Part F (2021).

6. District & Communal Heating Networks

This section outlines how consideration of energy supplied efficiently from a district heating network can be provided to the building in line with the Energy Hierarchy.

6.1. Decentralised Heating Networks

The energy policy reaffirms the view that energy generated by centralised power stations and transmitted through the national grid is highly inefficient and wasteful.

One of priorities for reducing CO₂ emissions is to reduce reliance on centralised power stations. This means increasing the use of local, low-carbon energy supplies through de-centralised energy systems.

De-centralised plant generally means any heating and hot water and/or electricity generation provided on a district wide (DHN) or site wide (CHN) basis. DHN and CHN can typically include combined heat and power equipment (CHP). CHP is an engine which, when running, generates electricity and heats water which can then be distributed around a development.

Benefits of district heating networks can include:

- Provision of low carbon / lower cost heat to domestic and commercial customers
- Diversification of the energy mix
- Reductions in region-wide carbon emissions
- Targeting and reduction of fuel poverty
- Potential long term revenue streams for local authorities
- Alignment with regeneration programmes
- Driving the growth of the low carbon services sector

There are currently no existing district heating networks within proximity to the site, and the development of a decentralised system would not be feasible for a project of this scale. With the closest being St Mary's Estate and Oldham Sports Centre just over 4 mile east.

7. Renewable Energy Technologies

Energy Counsel have reviewed options for the use of on-site renewable energy/Low or Zero Carbon Technology (LZT) in line with the policy aspirations of the Places for Everyone Joint Development Plan (2024).

This renewable energy statement/strategy reviews the technical and economic feasibility of the following technologies –

- Solar Photo-voltaic
- Solar Hot Water
- Ground Source Heat Pumps
- Air Source Heat Pumps / Exhaust Air Heat Pumps
- Micro Wind Power
- Biomass

7.1. Photovoltaics (PV)

Photovoltaic panels convert sunlight into electricity to run lights and appliances. Photovoltaic panels use cells to convert light into electricity. A PV cell normally consists of 1 or 2 layers of a semi conducting material such as silicon. When light shines on a cell it generates energy causing electricity to flow, the higher the light intensity is, the more electricity flows.

The amount of energy PV cells generate is referred to as Kilowatt Peak (KWp). PV arrays now come in a variety of shapes and colours, ranging from grey 'solar tiles' that look like roof tiles to panels and transparent cells that you can use on conservatories and glass to provide shading as well as generating electricity. Solar panels are not light and the roof must be strong enough to take their weight, especially if the panel is placed on top of existing tiles. For flat roofs the panels can be mounted on A-frames to give the optimum angle.

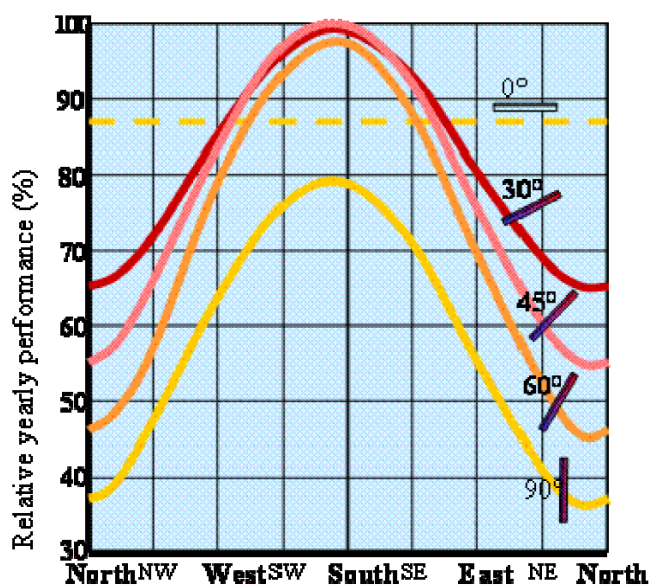


Figure 8 - Performance of photovoltaic panel orientation

The optimum panel inclination for solar collection is 35° , oriented due south; however panels that are inclined between 35° and 45° and oriented south of west or east are generally suitable. If solar collectors are oriented away from due south then a larger surface area will be required to generate a set amount of energy. The effect of non-optimal orientation is illustrated by the graph to the right:

The cost to install PV is typically £1,000 - £1,500 per kWp for 'on-roof' panel systems.

Photovoltaic panels have been installed to the building to ensure that carbon emission reductions are provided in line with the Places for Everyone Joint Development Plan (2024).



Figure 9 - Photovoltaic array on a pitched roof

7.2. Solar Thermal HW Panels

Solar panel heating uses the radiant energy from the sun to heat hot water, most commonly for domestic hot water needs. There are two types of collectors used for solar water heating – flat plate collectors and evacuated tubes collectors. The systems function successfully in all parts of the UK, as they can work in diffuse light conditions. The collector should be mounted on a 10-60 degrees pitch facing south, although other variations can be used, south is the most efficient.

The cost of installing the system is dependent on the distance between the solar collector and the hot water storage and therefore costs vary. The closer the collectors are to the hot water storage, the less pipe work is required. Annual maintenance checks are recommended. The solar collectors are connected to a condensing boiler via a HW cylinder with twin coil.

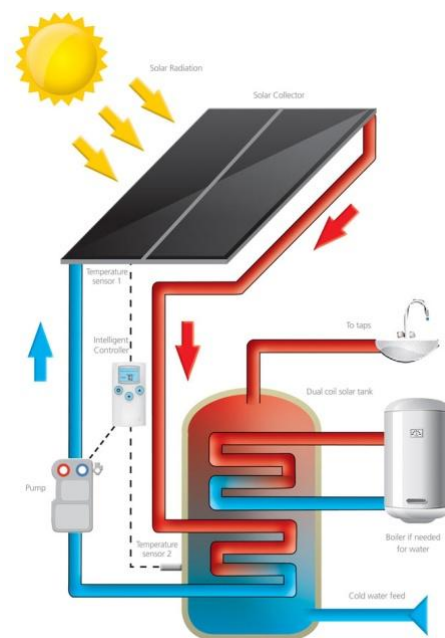


Figure 10 - The principles of a solar thermal system

A typical installation in the UK has a panel size of 3-5m² which is used in conjunction with a HW storage tank of 180-300litres, of which a minimum of 90-150 litres must be dedicated to solar hot water storage.

They are a 'simple' and guaranteed technology which will act as a pre-heat for the Hot Water and Heating usage. Payback between capital cost and energy saving can normally be achieved within 12 – 20 years, subject to usage and building type.

The use of solar thermal panels work best in conjunction with small, individual systems for buildings with high domestic hot water demand. The orientation of the development is fine for the utilisation of solar water heating to provide domestic hot water, however solar PV panels are a preferred methodology to reduce the energy consumption of the building. Carbon savings of approximately 4-5% are achievable with this technology. The building would likely to require sufficient hot water storage to deem solar thermal a feasible technology for this site, however there is very low demand for hot water in this building type. For the reasons aforementioned this is not an appropriate option for this scheme.

7.3. Ground Source Heat Pump (GSHP)

GSHPs have been developed specifically for the housing market and are now considered to be an

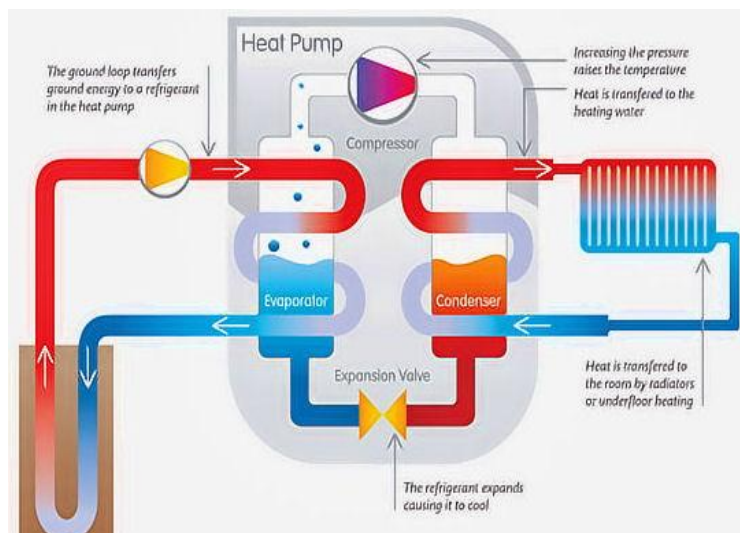


Figure 11 - Principles of a GSHP system

established reliable technology. The GSHP would be sized to cater for the heating and domestic hot water requirements. Typically, they are more suited to apartments as a centralised system would be installed with multiple bore holes to a depth of up to 125 metres depending on the ground conditions. GSHPs use a heat exchanger to extract heat from the earth.

The efficiency of ground source heat pumps is measured by Co-efficient of Performance (CoP), this is the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Average CoP is around 2-4 although some systems may produce a greater rate of

efficiency. This means that for every unit of electricity used to pump the heat, 2-4 units of heat are produced, making it an efficient way of heating a building. If grid electricity is used for the compressor and pump, then there is the opportunity to consider a range of energy suppliers to benefit from the lowest running costs, for example by choosing an economy 10 or economy 7 tariff.

Due to the relatively small scale of this development, GSHPs are not considered an appropriate design solution.

7.4. Air Source Heat Pump (ASHP)

Air source heat pumps (ASHP) and exhaust air heat pumps (EAHP) work in a similar way to GSHP. Air source heat pumps can be fitted on the external façade or on flat roofs. An air source heat pump uses small amounts of electricity to take in large quantities of air and extract heat / coolth. The efficiency of ASHP is measured by Coefficient of Performance (CoP); this is the ratio of units of heat output for each unit of electricity used to drive the system. Average CoP is around 2-4 although some systems may produce a greater rate of efficiency.

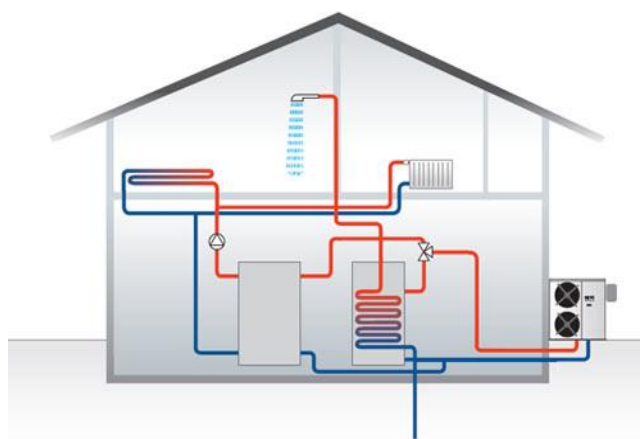


Figure 12 - Principles of an ASHP system

Due to the requirement for cooling to a building of this type ASHP's are considered the most appropriate technology for this scheme and can be utilised for heating and cooling throughout the Reception and Commercial Unit areas of the building. The introduction of this technology ensures that carbon emissions reductions can be provided in line with Places for Everyone Joint Development Plan (2024).

7.5. Micro Wind Power

Wind power is one of the cleanest and safest methods of generating electricity. However, wind power is unfeasible due to the fact the development is in an urban area and local wind conditions would not be sufficient to provide enough power. Most small wind turbines generate Direct Current (DC)

electricity. Systems that are not connected to the national grid require battery storage and an inverter to convert DC electricity into Alternating Current (AC) which is mains electricity. There are two types of wind turbine available:

- Roof mounted – These are mounted on the roof of buildings
- Mast mounted – Which are free standing

Important issues to consider when using wind turbines are:

- Wind speed increases with height so it's best to have the turbine high on a mast or tower.
- Generally speaking the ideal site is a smooth top hill with a flat, clear exposure, free from excessive turbulence and obstructions such as large trees, dwellings or other buildings.
- Small scale wind power is particularly suitable for remote off grid locations where conventional methods of supply are expensive or impractical.
- Where the local annual average wind speed is 6 m/s or more.
- Where there are no significant nearby obstacles such as buildings, trees or hills that are likely to reduce the wind speed or increase turbulence



Figure 13 - Mounted wind turbine

As this development is in an urban area there will be obstacles which reduce wind speed. The average wind speed in this area is 4.3 m/s at a height of 10 metres, which is less than the 6 m/s required. Therefore, micro wind is not a viable technology for this development.

7.6. Biomass

Biomass is a generic name for any fuel produced from organic sources and falls into mainly two categories:

- Woody biomass- forest products, untreated wood products, energy crops and wood pellets
- Non-wood biomass – liquid biofuels (such as biodiesel, bioethanol) or animal waste industrial municipal products and high energy crops such as rape seed, sugar cane and maize.

For domestic properties the fuel used is normally wood pellets, wood chips or wood logs. For larger applications, biomass boilers replace conventional fossil fuel boilers and come with an automated feed by screw drives from hoppers.

Biomass systems require more cleaning than gas or oil boilers and they must be capable of being taken out of service for cooling and cleaning whilst maintaining the building heating supply particularly in communal heating systems. Centralised gas boilers are therefore still required to support the biomass boiler, which would be the lead boiler. The size of the dedicated plant rooms is substantial. Fuel availability, delivery and storage are also important issues to consider.

Air quality issues are also an important factor when looking to install biomass. The cost of the fuel depends on the type, delivery distances and whether it is obtained as simple waste product or from another organisation. The cost of wood pellets is currently a little more expensive than mains gas, and woodchip is approx. 30% cheaper, however prices are fluctuating rapidly in the bio-fuel market at the present time creating uncertainty over their take up.



Figure 14 - Biomass boiler and hopper

Biomass CHP is still relatively new to the UK market and is more suitable to large developments where energy demand does not require significant modulation. There are technical issues with small scale Biomass CHP and until these can be resolved and proven the take up of these systems in the UK and Europe has been slow.

Overall carbon savings of 40%+ are achievable with biomass technology. Biomass is more suited to a communal heating system; there is insufficient space to accommodate the equipment and fuel storage to facilitate a biomass boiler. Furthermore, there are noise and air quality issues associated with this type of technology. For this reason biomass is discounted.

8. Energy Assessment of Proposed Scheme

The proposed development has adopted the principles of the 'Be Lean, Be Clean, Be Green' approach.

The most practical and economically feasible solution for the development is a good quality thermally insulated fabric, airtight envelope, passive improvements supported by efficient ventilation system.

Table 9 - Proposed emissions from the development

Our Ref	Building	Floor Area m ²	BER (Kg CO ₂ / yr/m ²)	BPER (kWh/yr/m ²)	Total Target Carbon Emissions (Kg CO ₂ /yr)	Total Target Primary Energy (kWh/yr)
Z71876	Old Hall Street	1,182	2.50	26.16	5,665	59,279

The carbon emissions for the new building is predicted to emit **5,665** KgCO₂/yr. This is a total carbon reduction of **136** KgCO₂/yr from the baseline emissions of **5,801** KgCO₂/yr this equates to a **2.34%** carbon reduction.

The primary energy rate is **59,279** kWh/yr. This is a primary energy reduction of **2,334** kWh/yr from the baseline primary energy rate of **61,613** kWh/yr. This equates to a **3.79%** primary energy reduction.

The development proposal meets local policy including energy efficient lighting, efficient ventilation, improved thermal bridging, low air leakage and photovoltaic panel array.

9. BREEAM Issue Ene 01

The building has been assessed against issue Ene 01 of the latest version of the BREEAM guidance, version 7. This BREEAM Issue reviews three different aspects of the energy and carbon performance for regulated energy uses of the building, utilising the SBEM calculation.

BREEAM uses the following three metrics to determine the overall energy performance improvement:

- Demand – the building's demand for heating and cooling per unit floor area (kWh/m² per year)
- Primary energy – energy consumption measured in primary energy per unit floor area (kWh/m² per year)
- Carbon emissions – carbon emissions arising from energy use per unit floor area (kgCO₂e/m² per year)

The percentage improvement in energy performance, compared to the baseline building, is used to determine the EPR (Energy Performance Ratio) for each metric. 9 credits are available and a minimum of 4 credits is required to meet the minimum standard for an 'Excellent' rating. The BRE calculator tool has been completed based on the SBEM calculation for the building and 5 credits have been achieved, as per the screenshot from the BREEAM Platform below:

Energy Performance Ratio (EPR) weighted metric scores

EPR_{dem} weighted

0.107

EPR_{pe} weighted

0.082

EPR_{co₂} weighted

0.322

Overall score

Overall building energy performance ratio (EPR_{nc})

0.512

Has the asset been
assessed using the
methodology prescribed

5/9

Credits

0/3

Exemplary credits

Excellent

Minimum standards

BREEAM

10. Conclusion

Following the 'Be Lean, Be Clean, Be Green' hierarchy, the proposed design solutions are predicted to:

- 1) Reduce the total carbon emissions by 2.34% compared to new building regulations ADL 2021.
- 2) The photovoltaic panels are the renewables/ low carbon technology included. Their contribution to the overall energy reduction under the 'be green' energy hierarchy is approx. 35%.
- 3) Reduce the total primary energy by 3.79% compared to new building regulations ADL 2021.
- 4) Exceed the Excellent standard for BREEAM Issue Ene 01 by achieving 5 credits.

The approach for the development at Old Hall Street, Middleton is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

- 1) Enhanced building fabric to meet Building Regulation ADL2 2021
- 2) Enhanced air tightness
- 3) Highly efficient mechanical extract ventilation systems
- 4) Air Source Heat Pump units to serve the office/reception, staff and IT rooms
- 5) Efficient lighting strategy using LED fittings and intelligent controls
- 6) 160m² PV Array (approx. 32.2kWp) mounted on the roof to generate electricity for the building

10.1. Low/ Zero Carbon Technologies (LZT) Review

- Solar Thermal Hot Water is not a viable option due to the limited domestic hot water demand for this building type.
- Biomass has been discounted as it poses problems in terms of air quality, delivery of fuel, storage and transportation for deliveries, etc...
- Micro-wind turbines do not work on this type of development due to problems with wind turbulence and mounting of the units. The wind speeds in the area are not conducive to provide sufficient wind power electricity generation.
- GSHPs are not viable for site because of spatial and financial costs. There is no room to accommodate a GSHP vertical bore and associated communal plant room, ground conditions are unknown, and systems are very costly.
- ASHP units are viable for heating and cooling on this development due to their high COPs providing carbon and energy savings, in addition to the future proofing of the building moving away from fossil fuels.

A more detailed overview of LZT technologies is provided in the appendices of this report.

Table 10 - Proposed development emissions against Building Regulations Part L2 2021

	Total CO₂ Emissions (kgCO₂/yr)	Total Primary Energy (kWh/yr)
Target Building Performance	5,801	61,613
Proposed Building Performance	5,665	59,279
Total Reduction	136	2,334
Percentage Improvement (above AD2 2021)	2.34%	3.79%

11. Appendices

11.1. LZT Feasibility Table

Technology	Technical Feasibility	Carbon Savings	Estimated Costs	Financial Viability
Solar photovoltaics	The flat roof could support a rooftop array to ensure energy consumption is reduced sufficiently if sought.	A 32.2kWp system could save around 1,980 kg of CO ₂ per year.	Average cost for such a system is around £30K.	Current potential income generation is around £6,600 per year.
Wind	Average wind speeds on the site according to the <u>NOABL</u> Wind Speed Database are 4.3 m/s. To be technically feasible a minimum of 6m/s is required, therefore this site is not considered feasible.	N/A	N/A	N/A
Micro Hydro	There is no capacity for micro hydro on this site since there are no local water courses available.	N/A	N/A	N/A
District Heating	There are currently no existing or planned district heating networks to facilitate connection at this stage.	N/A	N/A	N/A
Solar Hot Water	This technology has been discounted as the hot water demand is not sufficient.	N/A	N/A	N/A
Air Source Heat Pumps (ASHP)	ASHPs can provide heating and cooling to meet the demand of this type of commercial building.	A heating and cooling systems where required could save 1,495 kgCO ₂ per year.	Average cost for Localised heating and cooling split units is £104K.	N/A
Biomass	Air quality issues preclude the feasibility of this option.	N/A	N/A	N/A

11.2. Specification for New Build Assessments (ADL2 2021 - SBEM)

Item	Brief Description	Notes	Confirm
	The following information is required for the design submission (as per requirements of approved doc L2).	Please note submission is now in two stages. A) Design , B) As installed	
1. General Information			
1.1	Building Regulations Part L2 2021 apply.		
1.2	Electric Power Correction Factor < 0.90	Default – No PFC	
2. Floor Construction Details			
2.1	Ground floor is to achieve the U-value stated opposite.	U-Value = 0.15 W/m ² K	
2.2	Exposed floor to achieve the U-Value stated opposite	U-Value = 0.15 W/m ² K	
3. Wall Construction Details			
3.1	Main external walls are to achieve the U-value stated opposite.	U-Value = 0.26 W/m ² K	
4. Roof Construction Details			
4.1	Flat Roofs are to achieve the U-value indicated opposite.	U-Value = 0.18 W/m ² K	
5. Openings			
5.1	All double-glazed windows to achieve the U-Value stated	U-value = 1.60 W/m ² K g-value = 0.50	
5.2	Personnel doors to achieve the U-Value stated opposite	U-Value = 1.60 W/m ² K.	
5.3	Vehicle access doors to achieve the U-Value stated opposite	U-Value = 1.30 W/m ² K.	
6. Ventilation			
6.1	Design stage SBEM calculation assumes an air permeability of 3m ³ /m ² /hr at 50pa will be achieved.		
6.2	Extract fans to toilets.	SFP = 0.30 W/l/s	
6.3	Natural Ventilation assumed to all other areas.		
7. Space Heating			
7.1	ASHP Split units to provide heating and cooling to the reception office, Staff Tea room and IT room.	SCOP = 4.0, SEER = 5.0	
7.2	Direct Electric heating panels to provide heating to toilet areas.		
7.3	Tenant Fit-out: ASHP Split units to provide heating and cooling to all Commercial Units.	SCOP = 4.0, SEER = 5.0	
8. Water Heating			
8.1	Domestic Hot water is provided by direct electric water heaters.	Storage Capacity = 50 Litres Thermal Loss = 0.05kWh/litre/24h	
8.2	Tenant Fit-out: Domestic Hot water is provided by direct electric water heaters.	Storage Capacity = 50 Litres / unit Thermal Loss = 0.05kWh/litre/24h	
9. Renewables			
9.1	PV arrays are provided on the flat roof of the building, orientated S/SE. Each Commercial unit will require a separate PV system sized to achieve Part L2 compliance.	160m of PV in total (approx. 32.2kWp)	
10. Lighting and lighting controls			

10.1	Light fittings to all areas will have a minimum luminous efficacy of 110 Lumens/Watt.		
10.2	Presence Detection controls will be applied to all circulation and toilet areas.		
10.3	Light fitting energy use is metered but the system does NOT warn of out of range values.		
11. Other			
11.1	Building Regulations Part L 2021 apply. Please confirm that all fixed building services are in accordance with the minimum standards set out in sections 5 and 6 of Building Regulations Part L 2021 Volume 2.		

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