

Energy Statement

Land at Barnhill Street/Raby Street

Moss Side

Client - MSV Housing/Caddick
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1.0 Executive Summary

1.1 Executive Summary

This document is intended to summarise the proposed Barnhill Street/Raby Street development which aims to introduce 5 apartment blocks and 7 townhouses to the Moss Side area.

In conjunction with MCAU and Caddick Construction, MSV Housing aims to deliver 212 new homes to the local area, focusing on providing low energy bills and reduced carbon emissions, alongside ensuring thermal comfort for occupants.

TWC Consulting was appointed to produce an Energy Statement for the project, with the scope including :

- ⇒ Part L Performance ie, SAPs/EPCs
- ⇒ Performance against relevant standards, such as GMCA 'Places for Everyone'
- ⇒ Part O Compliance
- ⇒ Assess the viability of low carbon technologies based on the site parameters
- ⇒ Propose a HVAC strategy in line with client design aspirations and project team's objectives.

This document demonstrates that all blocks achieve Part L compliance, along with enhanced targets imposed by MSV Housing of minimum EPC B on all dwellings. The proposed SAP specification is detailed in Section 3.3, which is the design at the time of writing.

The proposed design follows a fabric first approach utilising fabric u-values matching the Future Homes Standard. This is then further enhanced by proposing an efficient M&E design that includes water heating via low carbon sources, and ventilation with heat recovery to maximise the energy efficiency of the HVAC.

Finally, in line with GMCA JP-S1, all blocks are fitted with a large PV array to serve tenants directly and reduce energy bills further.

This follows the 'Energy Hierarchy' approach, aligning with best practice in sustainability and demonstrating compliance with JP-S2.

Additionally, Section 6.0 shows performance against the 'Places for Everyone' targets set by GMCA, and provides a detailed breakdown of key metrics show further support and demonstrate the enhanced performance of the design, which is required on developments such as this one.

Several low carbon technologies are discussed in this report and each having their own set of pros and cons.

Systems such as biomass and wind turbines can be beneficial but are generally unsuitable for highly urbanised environments like central Manchester. Therefore, the two technologies taken forward were heat pumps (specifically air to water) and Solar Photovoltaics.

Overheating conditions were assessed and modelled in line with Part O guidance and compliance to CIBSE TM59 has been demonstrated to the client and design team. This reflects the findings of a noise assessment submitted in support of this application.

A full Part O Report has been issued to the design team and client to further detail the specific parameters around the calculations; this document intends only to confirm Part O modelling has taken place and provides only a high-level summary of the design.

Any changes post planning such as openings and/or window revisions will need re- modelling to confirm a pass is still achieved.

2.0 Project Overview

2.1 Site Area

The 'Land at Barnhill Street/Raby Street' development in Manchester is a proposed new build residential area to be constructed within the urban district of Moss Side.

The site is located approximately 2 miles South from Manchester City Centre.

The proposed development is to deliver 212 new dwellings which comprise of 5 blocks of 1,2,3 and 4 bedroom apartments, and 1 block of 3 storey townhouses containing 4 and 5 bedrooms.

The scheme falls under Manchester City Council and the Greater Manchester Combined Authority.



Google Maps image of the site and surrounding area of Moss Side Manchester.



MANCHESTER
CITY COUNCIL

GMCA GREATER
MANCHESTER
COMBINED
AUTHORITY

Local Planners to this scheme will be via Manchester City Council, and the Greater Manchester Combined Authority (GMCA).

2.0 Project Overview

2.2 Proposed Site & Boundary



Site Plan of Moss Side Block A -F



Google Maps image of the site and boundary line (red).

2.0 Project Overview

2.3 Client Brief

Acting upon instruction received from Caddick Construction Ltd, TWC Consulting Ltd were appointed to conduct a review of the development's sustainability objectives, and assess the potential for low carbon technologies. The study assessed a wide range of building-design options deemed suitable for the development of which a fabric first approach was judged to be the most appropriate strategy to achieve GMCA 'Places for Everyone' targets.

TWC were also involved in talks with the project team outside of GMCA policies regarding additional sustainability targets imposed by MSV Housing. One of which is to ensure all properties achieve minimum EPC B.

All project members, including MCAU (project architects) and CWC (M&E consultants), Azmouth Acoustics (Noise Consultants) and Caddick Construction (Main Contractor) have coordinated closely to ensure an integrated design.



2.0 Project Overview

2.4 Planning & Regulations

The UK Climate Change Act 2008, the Sustainable Buildings Act 2004, progressive changes to the Building Regulations, Planning Laws and other legislative provisions continue to push environmental improvements throughout the UK construction industry.

These progressive laws and regulations commit designers and developers to reduce demand for energy within residential dwellings, whilst at the same time lessening the impact of carbon emissions. At the forefront of this evolving process is the tightening of the Building Regulations and various Planning Laws which require high levels of energy efficiency, and encourage renewable energy generation.

This document specifically focuses on Approved Document L1 'Conservation of Fuel and Power' which relates to sustainability in new dwellings. Sustainability targets were raised in 2021 to help ensure the UK construction industry meets Net Zero 2050 commitments.

This development is also covered under the GMCA 'Places for Everyone Document.' This document is a strategic planning document produced by the Greater Manchester Combined Authority (GMCA). It's part of the long-term spatial development plan for Greater Manchester, aiming to guide where new homes, jobs, and infrastructure should be built across the region up to 2037.

Planning requirements regarding Part L are covered predominantly (but not exclusively) under JP-S1, JP-S2 and JP-S3.

This report has assessed the sustainable building design at the 'Land at Barnhill Street/Raby Street' development based on the 'Places for Everyone' document and Building Regulations Part L 2021.

It is confirmed the use of a fabric first approach will achieve the council's sustainability targets, with several low carbon energy systems assessed and potentially available for the design if required. The fabric-first approach is viable at this scheme and one that will contribute to the on-going delivery of sustainability dwellings within the local Moss Side community and the wider Manchester area.



Regions covered by the GMCA

3.0 Project Overview

3.1 Sustainable Approach

An efficient and cost effective way of achieving sustainable building-design is through the prudent selection of building materials that reduce energy demand during occupation. Sustainable building-design provides a whole-house approach that relates to the broader aspects of sustainability, which if implemented prior to the commencement of the construction phase can greatly assist with issues such as fuel poverty, rising energy bills and lowering carbon emissions.

Sustainable building-design is at its most effective when considered at the earliest stages of procurement. Factors such as site orientation, solar shading, solar gain, natural ventilation, increased u-values, high levels of thermal mass, dynamic thermal response, admittance factors, green roofs and low energy lighting all have positive impacts on developments, and each should be considered within the context of long-term sustainability and environmental objectives.

Building Regulations, Part L 2021 directs project teams to obtain the highest levels of sustainability in new-build developments using design and available technologies to reduce the amount of carbon dioxide emissions produced in occupation.

The targets set by Building Regulations can be achieved using innovative design specifications and/or a combination of low carbon/renewable technologies where required to achieve the necessary requirements. SAP software is used to confirm targets have been achieved based on the proposed design and specifications, which are highlighted on compliance printouts as a percentage figure over the target set by the Building Regulations.

The applicant should demonstrate how the proposal will achieve not just a Building Regulations pass, but additional targets covered by GMCA including:

- ⇒ Space Heating Demand Target of <15kWh/m2/yr for flats, and <20kWh/m2/yr for houses.
- ⇒ Energy Use Intensity Target of <35kWh/m2/yr.

By ensuring fabric of a dwelling is maximised, the running costs can reduce drastically as the heating systems need to be turned on less throughout winter months, making tenant bills lower.

	Major development	
	Major 10-149 homes	Large major +150 homes
Space heating demand (kWh/m ² _{GIA} /yr) <i>Minimise energy demand</i>	≤ 20 kWh/m ² _{GIA} /yr Houses	≤ 15 kWh/m ² _{GIA} /yr Flats
Energy Use Intensity (EUI) (kWh/m ² _{GIA} /yr) <i>Maximise energy efficiency</i>	≤ 35 kWh/m ² _{GIA} /yr Energy use intensity	Requirement for all TANZ homes
PV footprint area (% of ground floor space) <i>Use renewable energy</i>	≥ 40 % fp PVs installed	
Fossil fuel free (yes/ no) <i>Use low carbon energy</i>	Yes Fossil fuel free	
Building regulations Part O met without mechanical cooling (yes/no) <i>Reduce overheating risk</i>	Yes Cooling avoided	
Upfront embodied carbon (kgCO ₂ e/m ² _{GIA}) <i>Minimise embodied carbon</i>	≤ 500 kgCO ₂ e/m ² _{GIA} Houses	≤ 600 kgCO ₂ e/m ² _{GIA} Flats
Operational carbon offset contribution (£) <i>Offsets</i>	£ Offsets	Options for offsetting currently under development and to be adopted by each local authority

GMCA 'Places for Everyone' Metrics and Key Performance Indicators

3.0 Project Overview

3.2 ‘Fabric First Approach’

All construction materials have properties which define their thermal dynamics. These properties include thermal conductivity (i.e. the amount of heat energy that can flow through a material at a given temperature range), specific heat capacity (the amount of energy required to raise a material element by 1oC) and emissivity (the rate at which materials radiate/re-radiate energy). Thermal conductivity and specific heat capacity can be combined to form a single calculation known as thermal diffusivity (the rate at which a material can store heat comparative to the rate it can conduct heat, the greater the temperature range the greater the flow of heat).

Heavyweight materials such as concrete, stone, brick and block all have high thermal diffusivity values, in contrast to other materials such as fibreboard, timber, steel which have lower values. Decisions between construction form over aesthetics is challenging designers as the ability of the fabric to react to changing climatic conditions, whilst reducing carbon emissions dominate. Knowing the thermal diffusivity of materials will assist building designers in creating thermally efficient buildings as the demand for lowered energy usage intensifying.

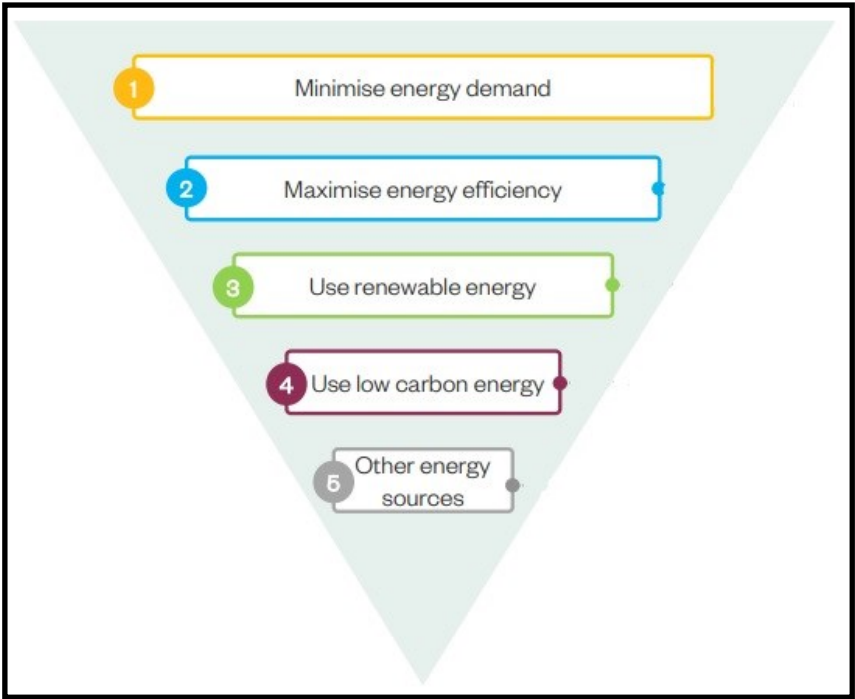
MSV Housing has taken an additional step towards lowering tenant bills and reducing their new-build carbon emissions by opting to target Future Home Standards U-Values.

While this is a target, this may be subject to change as the design progresses and additional members of the design team are brought on board ie. window suppliers, façade engineers etc.

At the time of writing, The FHS guidance is still under consultation, and there is only preliminary guidance at this stage. Therefore, the figures targeted in the design stage SAPs reflect this, but may not necessarily reflect the approved FHS figures once it comes into force in the near future.

Please note, FHS also dictates natural ventilation or dMev fans should be used for ventilation, but this may not be acceptable due to Part O.

Proposed Future Home Standards	
Wall U-Value	0.18W/m2k
Floor U-Value	0.13W/m2k
Roof U-Value	0.11W/m2k
Window U-Value	1.2W/m2k
Door U-Value	1.0Wm2k
Air Tightness	4m3



GMCA ‘Places for Everyone’ Energy Hierarchy

3.0 Project Overview

3.3 Construction Materials (Block A-E) *

Construction Element	Specification	
	Fabric	
External Wall	0.15W/m2k	As Per Stage 3 SAP, Concrete Frame
Party Wall	0.00W/m2k	As Per Stage 3 SAP
Unheated Corridor Wall	0.22W/m2k	As Per Stage 3 SAP
External Roof	0.11W/m2k	As Per Stage 3 SAP
Ground Floor	0.11W/m2k	As Per Stage 3 SAP
Doors	1.0W/m2k	As Per Stage 3 SAP
Windows **	1.0 - 1.3W/m2k	Double Glazed
Thermal Bridging	TBC	As Per Stage 3 SAP
Pressure Test	2 - 2.5m3	As Per Stage 3 SAP
M&E		
Ventilation	MVHR to all properties due to acoustic requirements under Part O and enhanced air tightness proposed.	
Lighting	75lm/W minimum efficacy for all lighting	
Main Heating System	Electric Panel Heaters	
Water Heating System	Air Source Water Cylinder (brand to be confirmed)	
Shower Source	Via Water Cylinder	
Renewables		
Solar Panels	Present in design, final schedule to be released at Stage 4. 40% of ground floor space for each block to be calculated and equated to a kWp of PV on roof space to comply with GMCA 'Places for Everyone'.	

Construction Materials (Block F) *

Construction Element		Specification
Fabric		
External Wall	0.16W/m2k	As Per Stage 3 SAP, Timber Frame
Party Wall	0.00W/m2k	As Per Stage 3 SAP
Unheated Corridor Wall	N/A	N/A
External Roof	0.09W/m2k	As Per Stage 3 SAP
Ground Floor	0.11W/m2k	As Per Stage 3 SAP
Doors	1.0W/m2k	As Per Stage 3 SAP
Windows	1.0/m2k	Triple Glazed
Thermal Bridging	TBC	As Per Stage 3 SAP
Pressure Test	3m3	As Per Stage 3 SAP
M&E		
Ventilation	MVHR to all properties due to acoustic requirements under Part O and enhanced air tightness proposed	
Lighting	75lm/W minimum efficacy for all lighting	
Main Heating System	Electric Panel Heaters	
Water Heating System	Air Source Water Cylinder (brand to be confirmed)	
Shower Source	Via Water Cylinder	
Renewables		
Solar Panels	Present in design, final schedule to be released at Stage 4. 40% of ground floor space for each house to be calculated and equated to a kWp of PV on roof space to comply with GMCA 'Places for Everyone'.	

* Build ups and targets subject to change as design progresses. ** FHS windows of 1.2W/m2k is unrealistic for proposed double glazed units.

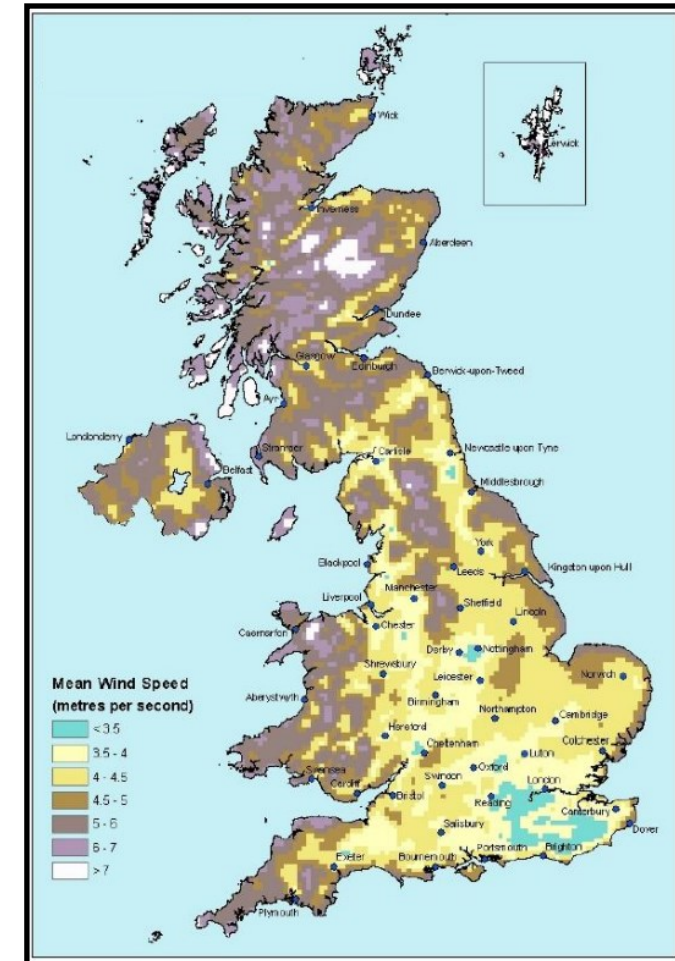
4.0 Project Overview

4.1 Wind Power

Two types of wind power were discussed briefly including large-scale wind turbines and small scale domestic (micro-generation) turbines. Both systems were considered unviable due to surrounding urban areas being unsuitable for a wind turbine and the predicted average wind speeds at the site (confirmed at 4.7m/s).

There are a number of disadvantages that come with a wind turbine in a central Manchester location.

- ⇒ Visual impact is difficult to define without conducting further feasibility studies;
- ⇒ The system is less durable than other renewable energy systems;
- ⇒ Energy is only generated when the wind strength is sufficient;
- ⇒ Payback (in some cases) cannot be guaranteed.
- ⇒ Planning consent could be problematic given the sites location and likely objections from local residents;
- ⇒ - Noise level assessments would be required;
- ⇒ A life cycle maintenance plan would have to be included within cost projections (i.e. the costs of maintaining the turbine(s) and/or associated moving parts over the life cycle of the system);
- ⇒ Life cycle costs can be relatively high (depending on the quality of the system);
- ⇒ Damage to local birds and wildlife have to be considered;



Wind data from UK.

4.0 Project Overview

4.2 Biomass

As calls for more sustainable fuel sources increases, the market for biomass “wood” has grown significantly during recent years with Scotland seeing a 300% increase in its use.

Biomass boilers are being installed throughout the UK, although in some urban locations there is still a reluctance to use them due to problems associated with pollution. Biomass systems can operate on a variety of fuel sources, which are governed by the specified boiler/plant. Power outputs range from small-scale systems at 4kW to large-scale district heating units in excess of 1250kW (i.e. de-centralised plant). There are several well-established manufacturers producing biomass boilers including Broag, Hoval and Baxi.

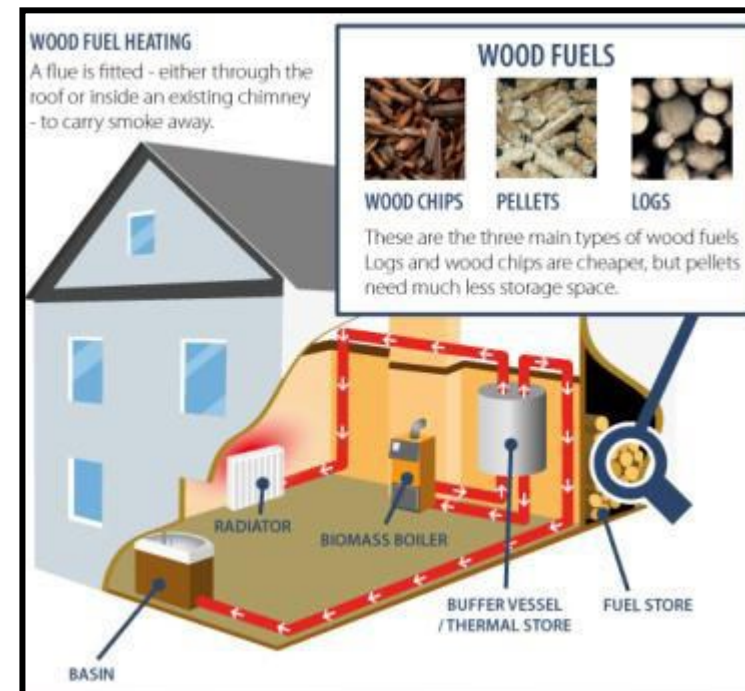
Capital costs can vary widely from approximately £1,500 per dwelling for wood stoves to approximately £8,000 per dwelling for a district heating network.

Advantages of biomass include:

- ⇒ Eligible for funding under the UK’s BUS scheme, launched in April 2022;
- ⇒ Fuel sources can be grown and supplied locally, which potentially further reduces ‘embodied carbon’ in comparison to standard gas boilers;

It is reasonable to state however that disadvantages outweigh the advantages in this case, with the below highlighting some of the areas of concern when dealing with a biomass system.

- ⇒ The supply of fuel can restrict the choice of system (i.e. chips or pellets);
- ⇒ Pollution needs consideration for waste gases and how this affects the local community ie. air quality;
- ⇒ Noise levels generated by the system need to be assessed and managed accordingly;
- ⇒ Maintenance requirements including cleaning, monitoring and running a biomass system can be relatively high;
- ⇒ Substantial storage space is required to accommodate the plant and fuel supplies;
- ⇒ While being able the fuel can be an advantage, the cost associated with transporting the fuel from source to the site can outweigh the benefits of using the system entirely, and make systems that rely on the grid ie. electricity and gas more favourable.



4.0 Project Overview

4.4 Combined Heat & Power

CHP is the simultaneous generation of heat and power contained within the same energy system. Products range from small-scale domestic engines which run on simple gas turbines, to large-scale tri-generation systems which provide heating, cooling and power.

The heat produced during the generation cycle is recovered and then used as a source of heat-energy within the building. CHP systems can deliver efficiency levels up to 90% in contrast to separate systems which can range as low as 30% to 50%.

CHP systems are typically specified on large-scale projects where there is a constant and high demand for power (i.e. hospitals and large office buildings). While that statement is relevant to this development in Moss Side, and it is true CHP units are fast becoming a more viable option to designers, its inclusion to the M&E was discounted and deemed unviable due to the large initial capital cost, along with the plant design required.

Furthermore, CHP systems currently in SAP modelling software penalise CHP, and create an unfair reflection of their performance, leading to a lower SAP rating and higher space heating demand, which would have made the GMCA policies un-reachable.

While CHP does have a place in the growing solutions to a more energy efficient network, it is deemed not suitable for here and any disadvantages and advantages will therefore be discounted from this report unless requested specifically for a reason.



4.0 Project Overview

4.5 Solar Technologies

Solar thermal and Solar Photovoltaic (PV) are two roof mounted renewable systems that work via the energy from the Sun but in different ways. Due to PV being more popular, Solar Thermal can be mistaken for this technology too, however they are very different.

Solar thermal is a renewable heat energy system also known as “solar hot water”. Solar thermal systems produce heat via the absorption of the Sun’s shortwave radiation and external temperatures, which it then transfers to a heat carrying fluid, where-after it is used to deliver space heating and domestic hot water. The panels/collectors are located within close proximity to a thermal store (i.e. a hot water cylinder) to reduce heat losses within the pipework system. The stored heat is used to increase temperatures of incoming mains water before it reaches the boiler.

Advantages include:

- ⇒ The cost of installation is becoming increasingly competitive as the market reaches maturity.
- ⇒ Payback periods much lower than other technologies such as CHP and Biomass.

Alternatively, Solar PV works by panels producing electricity when stimulated by direct and diffuse daylight. The panels absorb light from which an electrical charge is generated. PV panels are usually located on roof areas and have wiring from within the panels fixed to an isolation switch, an inverter and a generation meter for use at source or export to the grid. The price of the panels, similarly to Solar Thermal, is declining as the market reaches maturity.

While costs are reduced, it is approximately £2500 per kWp of PV to install; but it is important to note this cost does come down the higher the kWp array ie. inverter only needs considering cost wise once.

Advantages of PV include:

- ⇒ PV provides a source of electricity to be used at the source, or sold to the grid via export meter.
- ⇒ PV arrays are simple in terms of M&E configuration and require very little maintenance.
- ⇒ Payback periods can be low depending on site parameters.

Both systems however come with similar disadvantages such as the below:

- ⇒ Roof mountings require increased structural loading and preliminary studies to be conducted.
- ⇒ Additional access routes and layouts to be presented to the roof area to allow maintenance if required.
- ⇒ kWp size limited based on design ie. risers, distance to meters, fire considerations etc.
- ⇒ Problematic on large scale apartment blocks that have multiple stories with one roof area, PV to meet demands becomes unviable due to area available.
- ⇒ Energy generation can be limited by panel orientation, overshadowing, efficiency of the panels etc.
- ⇒ Energy generation dependant on weather which can be temperamental in the UK. While PV is less affected as it works off sunlight rather than temperature, it is still a factor.
- ⇒ Neither technology works during hours of darkness, unlike systems such as heat pumps that work round the clock. This can lead to increased winter bills.

4.0 Project Overview

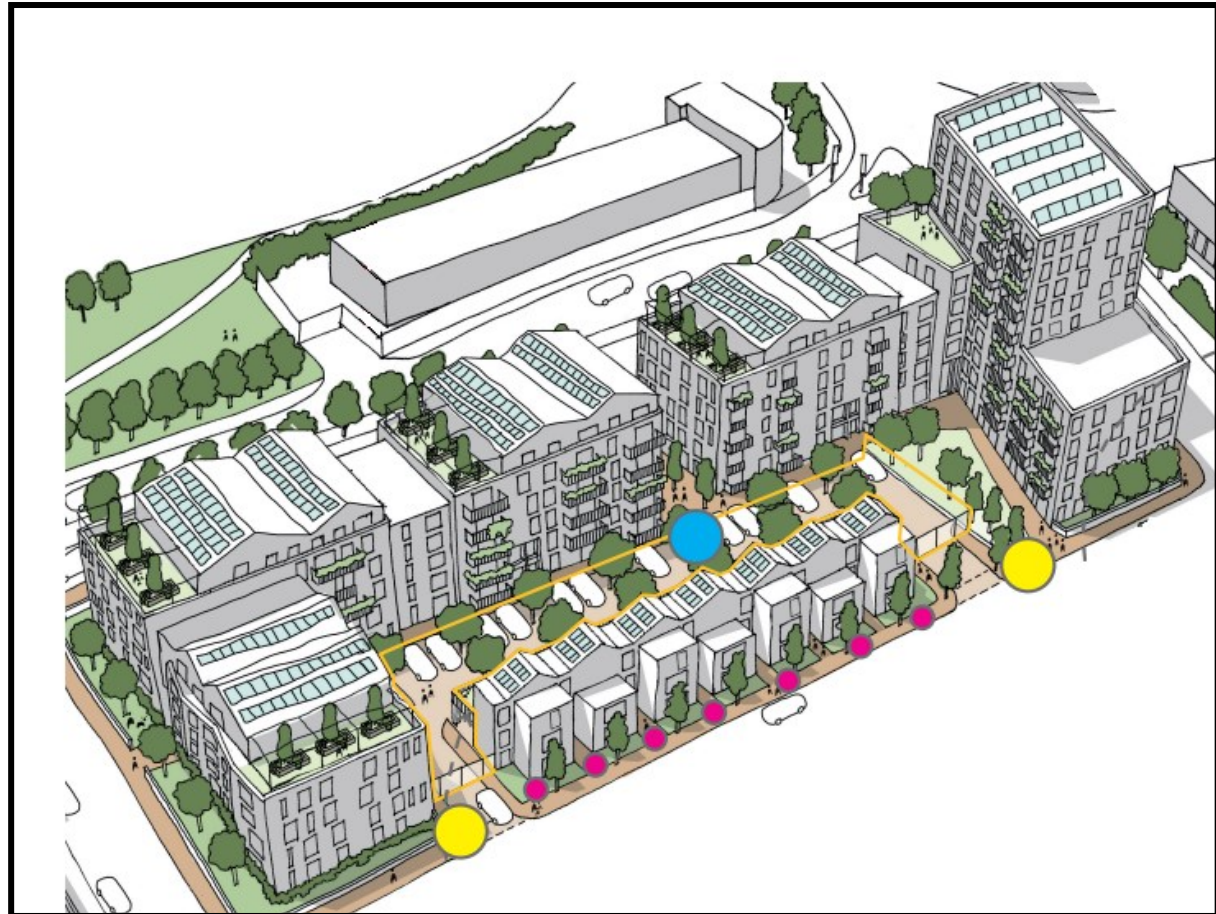
4.6 Solar Layouts at Moss Side

GMCA Places for Everyone states the equivalent of 40% of the Ground Floor Area must be installed on the roof as PV, unless deemed unviable.

During DTMs and Design SAPs, this has been factored in and co-ordinated with the architect's roof plan markups.

Roof Area Equations			
Block Name	GF GIFA	40% GIFA	kWp Figure
Block A	797m ²	318m ²	73.5kWp
Block B	475m ²	190m ²	44.8kWp
Block C	430m ²	172m ²	40.4kWp
Block D	473m ²	189m ²	44.4kWp
Block E	345m ²	138m ²	32.4kWp
Block F (per plot)	38.8m ²	15.5m ²	3.2kWp

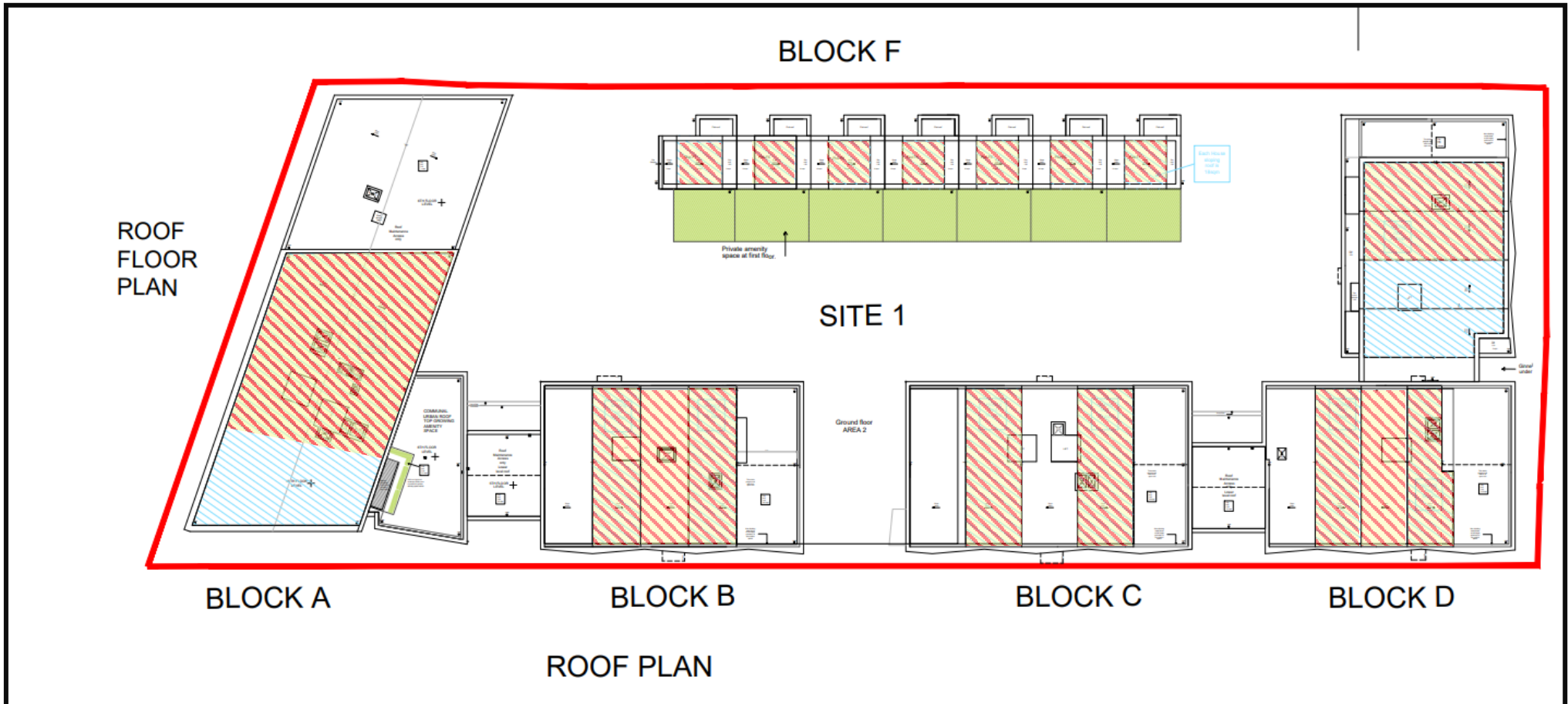
These figures are based on 400W high efficiency panels. Actual SAP input will vary plot by plot and distribution is to be discussed with MSV Housing as design progresses. The figures are very high level and TWC confirm these values have not been verified fully, and act as a high level indication. A specialist PV designer is required to verify kWp figures and loads, along with layout of panels.



A concept sketch produced by MCAU included in their Design & Access statement to give an artistic impression of how renewables will appear on site. Note all PV arrays are orientated as efficiently as possible, with Block B, C, D and F facing South; with A and E facing East.

4.0 Project Overview

4.6 Solar Layouts at Moss Side



 - Indicative 40% GIFA PV Area

4.0 Project Overview

4.7 Table of Comparison

Table of Comparison						
Advantage	Wind Power	Biomass	Heat Pumps	CHP	Solar Technology	Gas Boilers
Low CO2 Emissions						
Renewable Source						
Operating Costs						
Efficiency						
Scalability						
Grid Independence						
Energy Security						
Availability						
Maintenance						

5.0 Part O/Overheating

5.1 Building Regulations

As summers get warmer in the UK, increased pressure is put on buildings to be habitable and maintain comfort in warmer conditions.

In conjunction with the change to Approved Document L, the UK also released the first ever mandatory Approved Document related to overheating; aptly named Approved Document O.

This gives design considerations to counteract overheating, and design criteria that must be satisfied by design teams to demonstrate how excess heat is removed from a dwelling in line with CIBSE TM59 assessment methodology.

While ADO does follow TM59, there are some additional factors to consider, such as blinds being unacceptable to be considered in an overheating assessment, along with nearby tree foliage.

Design teams must demonstrate excess heat is removed by any of the following means:

- ⇒ Opening Windows
- ⇒ Ventilation Louvres
- ⇒ Mechanical Ventilation Systems
- ⇒ Mechanical Cooling Systems

Please note, under GMCA 'Places for Everyone' mechanical cooling is targeted as not being used, however this was found unachievable due to noise conditions at elevations facing Princess Road and Moss Lane East.

Part O also takes into account the impact of Noise, Pollution and Security on the development and how this would impact the behaviour of occupants in regards to windows opening.

These are discussed at Section 5.4 in greater detail, along with a imagery of the 3D model of the development in IES software.



5.0 Part O/Overheating

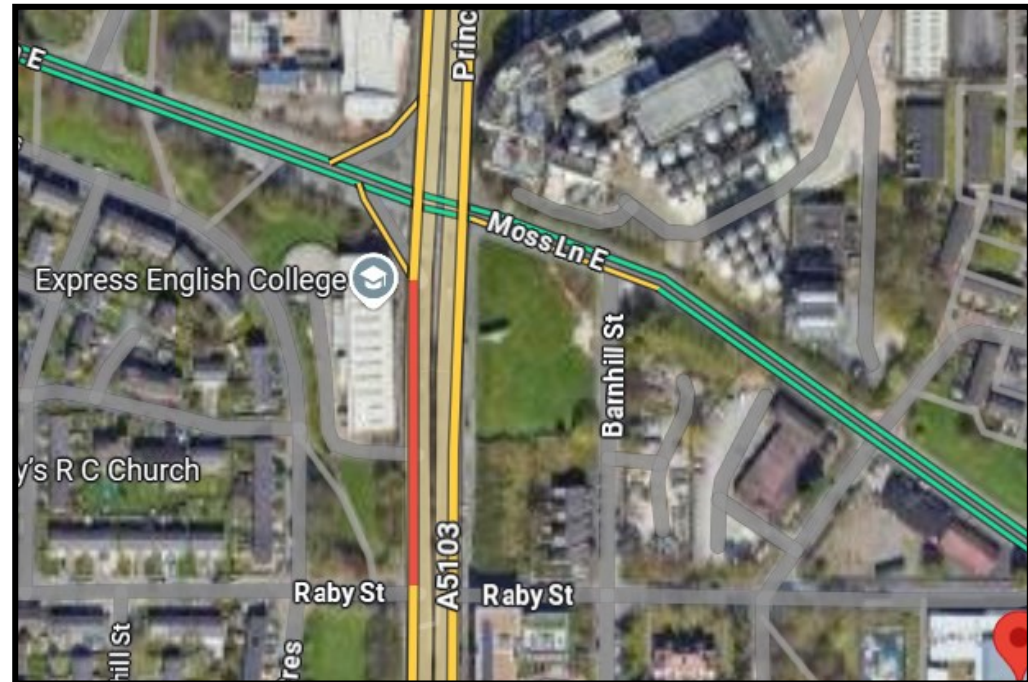
5.2 Local Area

The development sits on the intersection between Moss Lane East (B521) and Princess Road (A5103). Other sources of noise in the immediate area include Heineken Brewery and the West Indian Sports and Social Club. A noise assessment has been prepared in support of the application to assess the noise landscape likely to affect the development through the day and night and the results have been considered in the context of Part O.

As with any development, Part O assumes that ground floor windows are not opened at night for security reasons.

In terms of air quality and pollution, a review of the Air Quality Assessment produced by Redmore Environmental indicated that air quality as a result of traffic generated by the development were not predicted to be significant at any sensitive location in the vicinity of the site.

These three factors are discussed extensively in Part O and help form the Overheating strategy on a site by site basis, given local conditions and requirements.



Google Maps image of the site and the average traffic in the area.

5.0 Part O/Overheating

5.3 Acoustic Survey

A noise assessment on the premises of the development has been undertaken by Azymouth Acoustics and circulated to the design team in May 2025.

This gives quantifiable figures related to the discussed noise levels and whether these exceed ADO criteria for an openable window during 'sleeping hours' which is 11pm-7am.

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

- ⇒ 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).
- ⇒ 55dB LAFmax, more than 10 times a night (between 11pm and 7am).

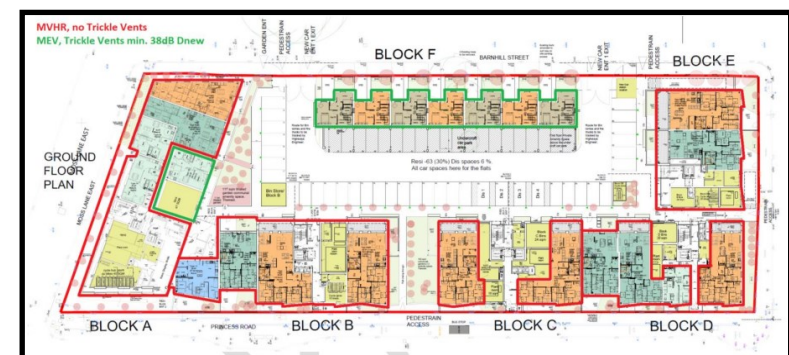
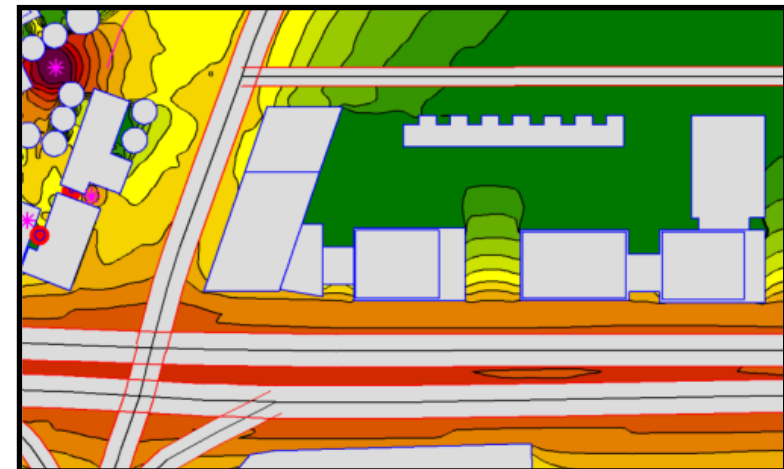
In light of the Azymouth Acoustics assessment it is considered that it is appropriate to model bedroom windows being closed at night. This introduces a requirement for mechanical ventilation. Therefore, all plots will be fitted with MVHR units to comply with Part O criteria during sleeping hours for bedroom areas.

As discussed in previous sections, noise during the daytime is also measured to exceed that of thresholds recommended by ProPG and AVO documents on elevations directly facing Moss Lane East and Princess Road.

This means under guidance, the windows should be modelled as closed during the daytime for elevations affected. Given that Princess Road elevations are facing West, this poses a risk of overheating to these plots during summer months.

Therefore, after multiple studies into the best solution, such as acoustic grilles, high flow rates from the MVHR, and a cooling unit, it was deemed the most acceptable solution from all parties that a cooling unit is added to these plots to deal with overheating.

Other elevations away from Moss Lane East and Princess Road are below threshold for daytime and so only standard MVHR units are required as windows and balconies will provide their required options for cooling.



Top image shows a visual of Azymouth Acoustics results (night time), Bottom Image shows Overheating strategy for site.

5.0 Part O/Overheating

5.4 Methodology

Based on the information discussed, TWC have created a 3D model to accurately calculate the predicted internal temperature levels at the Moss Side development, and the performance in respect to Part O criteria.

Opening Restrictions

Any windows that are shown as top hung are modelled to reflect a restricted window opening to comply with Building Regulations surrounding falling from height ie. Part O and Part K. These are modelled to a ten degree opening maximum (equivalent of 100mm restrictor).

Daytime Openings

The overheating model produced assumes all windows and patios (if applicable) in a dwelling to be open during 'daytime hours' which is 8am-10pm, if they are not located on the West/North elevation of the site. This also coincides with the occupancy profile of the living/kitchen zones in the modelling software.

Once it reaches 10pm on the model, all windows and patios are then closed and occupancy in the bedroom areas begins.

Due to the inclusion of private amenity areas for apartments located on the ground floor, these are also assumed to be open too.

Entrance doors to a plot if easily accessible (such as ground floors outside the private gardens) or in a communal corridor on upper floors are modelled as closed permanently and give no input to the design model.

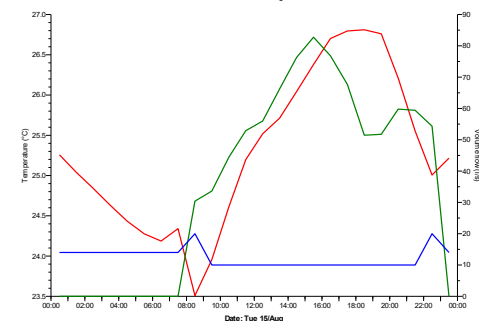
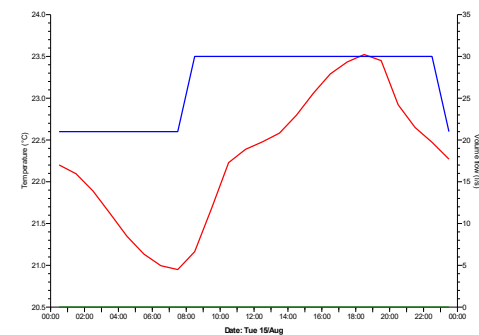
Plots to the North and West are modelled as closed, with Part O compliance met via MVHR and cooling units.

Evening Openings

Once 'sleeping hours' begins ie. 11pm-8am, windows and patios are assumed closed throughout the site on all zones due to noise levels exceeding the threshold of Part O, as demonstrated by Azymouth Acoustics. Supply air to counteract rising temperatures is supplied via MVHR ventilation units, which will be calibrated to meet the demands required under Part O modelling. CWC Consulting, acting as Mechanical Engineers have been provided with a full schedule of flow rates for all relevant zones across Block A-F, along with this being present in the Part O report issued by TWC.

Top image to the right shows zone labelled 'C001 Bedroom 1' which requires high amounts of **mechanical ventilation** due to solar gain being higher due to west elevation

and additional windows closed during day and night (bedroom faces Princess Road) which results in Ol/s of **external flow air** via windows. There is also a cooling unit present (not shown in graph) to keep the **operative temperature** as low as possible to comply with TM59's Mech Vent Criteria. Below image shows bedroom on East elevation, facing the inner courtyard where windows can be open and therefore there is a lower amount of **mechanical ventilation** present and also an **external air flow** via the openable windows.



6.0 Conclusion

6.1 Relation to GMCA Policy

Minimise Energy Demand	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
	Space Heating (kWh/m ² /yr)	< 15 (Flats) < 20 (Houses)	14.09	14.44	15.00	13.97	14.8	16.69
	Calculation Methodology Used	Predictive Energy Modelling	SAP 10	SAP 10	SAP 10	SAP 10	SAP 10	SAP 10
	Form Factor Per Building	< 2	0.87	1.04	0.99	1.02	1.15	2.73
	Avg. Ext. Wall U-Value	< 0.15W/m ² k	0.15W/m ² k	0.15W/m ² k	0.15W/m ² k	0.15W/m ² k	0.15W/m ² k	0.16W/m ² k
	Avg. Window U-Value	< 1.0W/m ² k	1.3W/m ² k	1.0W/m ² k	1.3W/m ² k	1.3W/m ² k	1.0W/m ² k	1.0W/m ² k
	Air Permeability Rate	1m ³	2m ³	2.5m ³	2m ³	2.5m ³	2m ³	3m ³

The table above demonstrates the scheme's clear commitment to minimising energy demand in line with GMCA Planning Policy. A highly efficient fabric-first approach has been consistently applied, resulting in the majority of blocks meeting or outperforming the GMCA Space Heating targets, with values as low as 13.97 kWh/m²/yr—well within the target range for both flats and houses. Where minor shortfalls against target metrics have occurred, the design team has responded proactively introducing triple glazing and an improved air tightness, 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. Blocks A to E all comfortably meet this requirement, demonstrating the architect's intent to achieve compact, efficient building forms. While form factor was not achieved in Block F, it should be viewed as an expected design difference due to the nature of apartments in comparison to houses. While apartments have party roofs and floors, houses do not, so initially start with higher exposed heat loss perimeters. The scheme was also about providing social housing to the Moss Side area and the dwellings where intended to maximise usable land area available, and therefore are all 3 storey properties. While this could have reduced to 2 storeys and potentially (but not guaranteed) reduced form factor closer to the original target of 2; it could be argued the design would then exclude the suitability of the housing to larger families. There are very few four bed dwellings in the scheme, so having larger house units (4 bed and 5 bed) the scheme also caters to a larger demographic of audience, from users with requirements of 1 bed dwellings up to 5 bed. It is also important to note despite this, Block F Still complies with GMCA policy, and achieves a Space Heating Demand of 16.69kWh/m²/yr.

Though the use of glazing at 1.0W/m²k and an air tightness of 1m³ is stated as the ideal target under GMCA, this was discussed in detail and it was agreed targeting only where needed was best approach due to the strict acoustic requirements on the development. Making these two lower site wide would have put further strain on the overheating assessment that was already a critical part of the design due to a variety of factors such as acoustics, orientation etc. and therefore was not targeted site wide. 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 8m³, with the 'notional SAP dwelling' at 5m³. Our initial design was for 3m³, and this has been enhanced where needed to 2m³ at lowest; far exceeding worst case of Building Regulations and further supporting the fabric first approach.

6.0 Conclusion

6.1 Relation to GMCA Policy

Maximise Energy Efficiency	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
	Energy Use (kwh/m2/yr)	< 35kWh/m2/yr	33.79	34.90	35.00	34.5	34.5	34.9
	Calculation Methodology Used	Predictive Energy Modelling	SAP 10	SAP 10	SAP 10	SAP 10	SAP 10	SAP 10

As part of the wider sustainability strategy, the development was assessed against a total energy use intensity (EUI) target of 35 kWh/m²/yr, in line with GMCA and local planning policy requirements. This target was comfortably met across all blocks, reflecting the scheme's strong performance in minimising operational energy demand.

The outcome is a result of a balanced, fabric-first design approach combined with appropriate mechanical and electrical (M&E) specifications and on-site renewable energy generation, supporting both energy efficiency and compliance with local low-carbon planning goals. Key to this performance are three integrated factors:

- ⇒ High Fabric Efficiency: The development employs a robust thermal envelope, with low U-values and strong airtightness, significantly reducing space heating demand and allowing smaller, more efficient systems to be used without compromising occupant comfort or energy performance.
- ⇒ Targeted Low-Carbon Technologies: Given the very low predicted space heating loads, the selected approach uses simple, responsive electric heating solutions that are well matched to actual performance requirements, avoiding unnecessary system complexity or oversizing. Meanwhile, domestic hot water demand, which accounts for a larger share of energy use, is met using air source heat pumps with a seasonal coefficient of performance (SCOP) of 3.6, ensuring highly efficient year-round operation.
- ⇒ Renewable Energy Integration: In addition to efficient building design, the scheme incorporates renewable energy generation on site to further reduce net energy consumption and support local carbon reduction objectives, contributing positively to the development's overall energy and environmental credentials.

Together, these strategies result in a development that not only meets but exceeds the expectations of modern energy policy: delivering low operational energy use, high thermal comfort, and long-term affordability for occupants, all within a design that is fully aligned with planning principles.

6.0 Conclusion

6.1 Relation to GMCA Policy

Use Renewable Energy	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
	PV Footprint Area (% GF Space)	> 40%	40%	40%	40%	40%	40%	>40%
	Predicted Panel Wattage	--	400 W	400 W	400 W	400 W	400 W	400 W
	Predicted kWp Total	--	73.5kWp	44.8kWp	40.4kWp	44.4kWp	32.4kWp	22.4kWp
	Predicted Energy Generation	--	73,500kWh/yr	44,800kWh/yr	40.4kWh/yr	44,400kWh/yr	29,160kWh/yr	22,400kWh/yr
	Orientation & Pitch	--	15 deg, South	15 deg, South	15 deg, South	15 deg, South	15 deg, East/West	15 deg, South
	Overshading		N/A	N/A	N/A	N/A	N/A	N/A

The development meets the local policy requirement to provide photovoltaic (PV) coverage equivalent to 40% of the ground floor Gross Internal Floor Area (GIFA) across the site. This has been achieved through a carefully coordinated roof design that prioritises solar efficiency, orientation, and available surface area from the outset.

Almost all PV arrays are installed on south-facing pitched roofs, maximising solar gain and system performance. One exception is a west-facing array, which still provides strong generation potential in the afternoon peak and was selected due to site-specific constraints. Importantly, the overall roofscape has been consciously designed by the architect to optimise usable PV area, ensuring that renewable energy delivery was embedded in the core design principles and not applied as an afterthought.

The largest single array on the development is rated at 73.5 kWp on Block A, with a predicted annual generation of approximately 73,500 kWh per year. This equates to a significant offset in energy demand for individual apartments, as tenants will directly benefit from the array.

Assuming average domestic electricity rates of ~30p/kWh (standing charges excluded), this level of generation could represent a notional annual saving of approximately £22,000 per year across Block A across tenants. This not only reduces environmental impact but also delivers a direct and ongoing benefit to residents through lower bills and improved energy resilience.

6.0 Conclusion

6.1 Relation to GMCA Policy

Use Low Carbon Energy	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
	Heat Source	Electric	Electric	Electric	Electric	Electric	Electric	Electric
	Low Carbon Appraisal Complete	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Heat Network Suitability	--	No	No	No	No	No	No
	Exemption Requested	--	No	No	No	No	No	No
	SCOP of Space Heating	> 3.5	1.0	1.0	1.0	1.0	1.0	1.0
	SCOP of Water Heating	> 3.5	3.36	3.36	3.36	3.36	3.36	3.36

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.

Given the scheme's strong passive design credentials and very low predicted space heating demand, the most suitable solution for the apartment typologies is the use of high-efficiency electric panel heating. These systems are simple, compact, and responsive; offering effective comfort heating without the capital, maintenance, or spatial requirements associated with larger ASHP or centralised systems. While direct electric heating systems inherently have a Seasonal Coefficient of Performance (SCOP) of 1.0, their use here is justified by the exceptionally low heat demand achieved through high fabric performance, keeping space heating loads minimal and manageable.

To ensure that the largest energy load, domestic hot water (DHW) is addressed via low-carbon means, each unit is provided with an integrated air source heat pump water cylinder, with a targeted SCOP of 3.36. This significantly improves the overall carbon and energy profile of the system and addresses the highest cost component of tenants' energy bills. The combined strategy ensures a targeted and efficient response to actual performance needs, rather than oversizing or over-specifying systems unnecessarily.

With respect to a communal heat network, a site-specific feasibility review concluded that this approach is not appropriate for this scheme, for the following reasons:

- ⇒ No heat network connection area: Based on available public data and GMCA mapping, the site location (Moss Side, Manchester) is not within a designated heat network development zone.
- ⇒ Roof space constraints: Roofs have been maximised for solar PV installation in order to meet a 40% GIFA coverage policy requirement. This significantly limits space for large-scale communal plant such as central ASHPs or thermal stores.
- ⇒ SAP 10 modelling limitations: Communal heating systems are misrepresented in SAP 10, often resulting in inflated distribution losses and under-represented performance, making it more difficult to meet space heating and energy demand targets under that methodology.

6.0 Conclusion

6.1 Relation to GMCA Policy

	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
Overheating	Part O Met Without Cooling?	Yes	No	No	No	No	Yes	Yes
	DSY2 and DSY3 complete?	Yes	No	No	No	No	No	No

The development has been assessed against the requirements of Approved Document O (ADO) – Overheating, with detailed dynamic thermal modelling undertaken using the IES VE software suite. The modelling was carried out in accordance with CIBSE TM59 and utilising the DSY1 weather file for the Manchester region, in line with ADO compliance criteria.

Due to the site’s urban location and proximity to potential noise sources, an acoustic assessment by Azymouth Acoustics identified external noise levels could exceed threshold levels during daytime hours on certain elevations. To safeguard internal acoustic conditions and maintain suitable living environments, the strategy requires that windows remain closed during the day on apartments facing Moss Lane East and Princess Road, where both traffic noise and solar exposure are most significant during the summer period.

This constraint significantly reduced the opportunity for reliance on passive ventilation in those affected units, to address overheating risk. Despite extensive design-based mitigation measures, including optimised glazing, solar control, and layout strategies, compliance with Part O using natural ventilation alone was not achievable in these specific apartments. Consequently, mechanical cooling was introduced only in these dwellings. In all other areas of the development, where acoustic thresholds are not exceeded, natural ventilation (opening windows) is sufficient to serve as the primary overheating mitigation. This approach ensures Part O compliance without cooling for the majority of the scheme, with targeted intervention only where necessary.

As part of the design development process, the architect also explored the use of acoustic grilles to enable background ventilation while maintaining acceptable noise levels. However, following acoustic modelling and spatial coordination studies, it was determined that the required grille assemblies could not be accommodated within the available external façade zones without compromising architectural or performance requirements. This solution was therefore ruled out as unviable.

Given the extent of mitigation measures required to achieve Design Summer Year 1 (DSY1) compliance on affected façades, and the additional performance challenges posed by the constrained site conditions, weather files Design Summer Year 2 and Design Summer Year 3 were not modelled (data modelled from the years containing the most intense heat events, and the longest heat events respectively). These future climate scenarios are not currently required for regulatory compliance under Approved Document O, and achieving them would not have been feasible without substantial redesign or compromise on acoustic, energy, or planning priorities. In this context, DSY1 compliance represents a balanced, policy-compliant outcome that delivers occupant safety, comfort, and resilience within the real-world limitations of the site.

6.0 Conclusion

6.1 Relation to GMCA Policy

Minimise Embodied Carbon	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
	Upfront Embodied Carbon	< 500-600	N/A	N/A	N/A	N/A	N/A	N/A

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, but in the meantime, 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.

6.0 Conclusion

6.1 Relation to GMCA Policy

Carbon Offset	Target	Target Values	Block A	Block B	Block C	Block D	Block E	Block F
	Offset Contribution (£)	--	N/A	N/A	N/A	N/A	N/A	N/A

We acknowledge the intent of emerging policy to secure financial contributions towards carbon offsetting where onsite reductions are not sufficient to meet defined local targets. At present, no specific offset contribution value or methodology has been adopted by the local authority, and it is understood that options for offsetting are still under development and will be formalised in due course.

In the meantime, this development has been designed with a strong emphasis on on-site carbon reduction measures, including high fabric efficiency, significant integration of rooftop solar PV (in excess of 40% of ground floor GIFA), and the use of low-carbon mechanical and electrical systems tailored to the scheme’s performance needs. As such, the scheme already delivers a very low regulated energy demand and associated emissions.

We remain open to further engagement on the topic of offsetting once a formal framework is in place, and will review any reasonable contribution or calculation methodology if and when it becomes applicable during the planning or post-planning stages.