



ENERGY & ENVIRONMENTAL STANDARDS STATEMENT

Crabtree Lane, Openshaw

Ref: PBS/21/2284

Development: Development of 108 residential units

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0.0 Executive Summary

The development at Crabtree Lane Openshaw is for 108 No. residential units. As such Manchester City Council's minimum carbon reduction target for major residential development, a 15% reduction over 2010 Part L Building Regulations, applies.

Due to the lack of a nearby existing or proposed district heating network the intention is to make use of Microgeneration Technologies where required to achieve the target.

The estimated Target Emission Rates for the development have been calculated using SAP 2012 (Building Regulations 2010) and are given in Appendix I. The SAP 2012 calculations show that across the development using the "fabric first" approach outlined in this report, allied with solar PV will achieve a sitewide CO₂ reduction of at least 15% against Part L of Building Regulations 2010.

This sustainable development has been created through the implementation of many measures, including the following key points:

- Thermal performance of construction elements which exceeds Building Regulations in combination with renewable technologies to further reduce energy demand (i.e. photo voltaic roof panels) aspiring to achieve not less than 15% reduction in CO₂ emissions compared with Building Regulations 2010;
- Internal water use within all dwellings to be reduced to 105 litres per person per day through the provision of water saving fittings;
- Waste minimisation principles adopted both during construction and in the lifespan of the development through provision of recycling/composting facilities.
- Waste minimisation principles adopted both during construction and in the lifespan of the development through promotion of recycling/composting measures;
- Use of materials in the construction process which have a low environmental impact as determined by the BRE's Green Guide;
- Maximising the use of recycled and sustainably sources building materials.

In our view the incorporation of the above, and other recommendations made within this report, will satisfy the relevant requirements of the Local Planning Authority.

Part L 2021 of national building regulations took effect on 15 June 2022. However, as the accompanying Part L 2021 SAP software is not yet fully functional, complete calculations under the new legislation cannot be carried out until the full release, expected by 31st July 2022. Until then SAP 2012 remains the only option for calculation of regulated energy. Clients are advised to be aware that Part L compliance checks under the new regulations will be required and may lead to specification variations from those set out in this report.



Part 1 – ENERGY STATEMENT

1.1 Introduction

The developer proposes 108 new build residential units consisting of two, three, and four-bed houses, and one and two-bed apartments. The site occupies a plot of land off Crabtree Lane, Openshaw, Manchester. The surrounding environment is typically low-rise suburban mixed residential and commercial.

1.2 Policy framework

Development Management **Policy EN 4** of Manchester City Council's Core Strategy document sets requirements for 'Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development'.

"The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO₂ emissions, and rising fossil fuel prices, through the following actions:

- *All development must follow the principle of the Energy Hierarchy, being designed:*
 - *to reduce the need for energy through design features that provide passive heating, natural lighting and cooling*
 - *to reduce the need for energy through energy efficient features such as improved insulation and glazing*
 - *to meet residual energy requirements through the use of low or zero carbon energy generating technologies*
- *Wherever possible new development and retrofit projects, including energy generation plant, must be located and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies.*
- *Where possible new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings.*
- *Where appropriate new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing / potential decentralised energy schemes.*
- *The use of building materials with low embodied carbon in new development and refurbishment schemes.*



Policy EN 5 identifies “Strategic Areas for low and zero carbon decentralised energy infrastructure” however the proposed development site lies outside any of the defined boundaries of such areas and is not considered in this report.

An Energy Statement is required by the Local Authority in line with **Policy EN6** of the Manchester Core Strategy Development Plan which sets out carbon dioxide reduction targets and states the following:

“Applications for residential development of 10 or more units and all other development over 1,000 sq m will be expected as a minimum to meet the target shown in Tables 12.1 or 12.2, unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development.

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

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

Domestic CO₂ emissions reduction targets

Table 12.1

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



The site classification is assessed as Target Area 3, being low rise and low density fragmented mix of uses and not typifying any clustering of predominantly electrically heated development. As such this sets the target for CO₂ reduction at 15% beyond current Part L requirements.

The Energy Statement will assess the predicted CO₂ emissions for the development and propose a strategy for a 15% reduction from energy efficiency and renewable technology in line with the policy outlined above. The current Standard Assessment Procedure – SAP 2012 will be used to assess energy use and associated CO₂ emissions. Regulated energy as calculated in SAP includes all fixed consumption inherent in the building, i.e. fixed lighting, space heating, water- heating and ventilation.

The approach as set out in this energy statement and in line with **Policies EN4 & EN6** is to follow the energy hierarchy and show how compliance with the targets can be achieved. The energy hierarchy will be applied as follows:

- Use less energy through an efficient building fabric
- Supply energy efficiently
- Use renewable energy generated on site



1.3 Calculation Process

Part L 2021 of national building regulations took effect on 15 June 2022. However, as the accompanying Part L 2021 SAP software is not yet fully functional, complete calculations under the new legislation cannot be carried out until the full release, expected by 31st July 2022. Until then SAP 2012 remains the only option for calculation of regulated energy. Clients are advised to be aware that Part L compliance checks under the new regulations will be required and may lead to specification variations from those set out in this report.

As SAP calculation software remains in abeyance SAP 2012 software must be used to calculate energy use. SAP considers various parameters to calculate the energy performance of a dwelling by calculating a building regulations Part L compliance threshold, the Target Emission Rate (TER) against which the as-designed Dwelling Emission Rate (DER) is measured. The calculation includes but is not limited to:

- Location
- Orientation
- Exposure
- Size
- Living area
- Building fabric construction
- Thermal bridging
- Solar gain
- Ventilation
- Air leakage
- Building services energy demand and heat gains
- Space heating design & water heating design
- Lighting

Each dwelling type has been fully modelled in SAP 2012. For apartments this includes both types simulated on ground mid and top floors to account for the different energy dynamics for each location within the block. The results given for each type are then multiplied across the total number and floor area of each to derive an estimated sitewide building regulation target emission rate and the rate of the proposed development based on the specification set out in this report.



1.4 Energy Efficiency Measures (Be Lean)

The core energy strategy for the proposed development is to produce a design that will positively influence the overall predicted energy supply and demand. The aim is to create dwellings which use less energy and for the energy supply to be clean and efficient and with enough generation by renewable technology to result in a 15% reduction in CO₂ over Part L targets.

Natural daylight

The windows will generate passive **solar gain** particularly on the south and south-eastern elevations of dwellings, thus reducing some of the requirement for heating. **'A'-rated windows** can provide a net energy input into dwellings. In addition to creating a pleasant living environment and reducing heating demand through solar gain the glazing characteristics will help to reduce the lighting load and therefore electricity consumption.

Building fabric

Fundamental to energy efficiency best practice is a **'fabric first' approach**. This is underpinned by the notion that it is much better to ensure less energy is needed in the first place so that, regardless of how energy is generated and supplied, a building requires less of it. This means that if less renewable technology is implemented e.g. due to development budgets and/or should future owners remove any technology, e.g. if it reaches the end of its serviceable life, then the latent energy demand will be lower than otherwise.

The **thermally efficient glazing** is to be specified with an overall **u-value of 1.3 Wm²K** combined for the frame and glass. This will provide a balance between maximising solar gain and light levels into the internal spaces whilst keeping heat loss down and retaining a reasonable range of product choice. The selected **windows are to be equivalent to BFRC 'A' rated**.

An **air permeability test target of 5.00** has been set and is 50% lower than the building regulations requirement but without being so low as to create unfavourable air quality conditions with the potential for mould growth and implications for respiratory health. Sufficient background ventilation should be provided in accordance with Part F of the Building Regulations to avoid the need for full mechanical input ventilation



systems which are a further source of energy consumption. **All units to be air tested** to ensure consistent results.

Insulation and resultant u-values are to be specified as better than current building regulations. Table 3.2a below sets out the proposed fabric standards in the context of the current building regulations standards.

Research has demonstrated that heat loss through cavity party walls is a much more significant issue than previously thought and was not accounted for in previous versions of SAP. It is now incorporated in the revised methodology of SAP 2012 and as such **all party walls are to be specified as fully filled and edge sealed** to avoid the loss of heat.

Analysis of heat loss goes further than basic elemental insulation and u-values, consideration should also be given to limiting the effects of thermal bridging. This is where heat loss occurs through 'junctions' in the construction which bridge the insulation layer. Standardised junction-detailing known as '**Accredited Construction Details**' and thermally **insulated lintels** have been adopted in order to limit thermal bridging and aid air tightness.

Fig 3.2a – Comparative building fabric specification

	Proposed	Compliance	Improvement
Roof	0.07	0.20	65%
Walls	0.17	0.30	43%
Floors	0.12	0.25	52%
Party Wall	0.00	0.20	100%
Windows	1.30	2.00	35%
Air Permeability	5.00	10.00	50%

Lighting, appliances & usage

The proposed residential development will make use of **low energy LED lighting**. In line with BRE and former Code for Sustainable Homes best practice **100%** of the lighting is to be comprised of energy efficient fittings. This will apply to both internal and external lighting. Any security lighting will have appropriate wattage, **sensors and controls** to ensure efficient operation.



1.5 Energy Supply (Be Clean)

Heating & hot water system & controls

Individual boilers are to be specified and will be gas fired **condensing boilers** that are **SEDBUK 'A' rated** with **low NOx emissions (class 5)** with a target of 40mg/kWh dry NOx emissions max and a SEDBUK 2009 **efficiency of at least 89%** (note this is more than 91% under SEDBUK 2005). These boilers have high combustion efficiencies and some of the highest overall energy efficiencies available.

These will be complemented with intelligent controls to produce an efficient and responsive heating system design that minimises gas consumption and works in tandem with an efficient building fabric.

Delayed start thermostats will retard boiler activation depending on internal measured temperatures.



1.6 Renewable Technology (Be Green)

All unit types have been modelled in SAP 2012 software incorporating specification elements detailed within this report, the client's brief and our recommendations.

The SAP calculation indicates a Part L baseline target sitewide total annual CO₂ emission rate (the sum of all individual TERs) of **148,138 kg CO₂**, and so to meet the requirement for a 15% reduction, a saving through energy efficient design and on-site renewable generation of **22,221 kg CO₂** is required. The calculations demonstrate that the proposed fabric and services specifications as outlined above would reduce sitewide CO₂ emissions by approximately **5,479kg** (3.7%) per annum beyond Part L targets. The remaining **16,741kg** reduction would need to come from enough grid electricity being offset by on-site energy generation. A PV system on site totalling **37.4kWp** (kilo-watt peak) if fitted on south facing roofs at approximately 30 degrees would produce sufficient kWh per year to achieve this based on SAP 2012 calculations. The panels will be distributed on selected plots which most closely match these parameters in order to optimise solar yield.

Specific system parameters will be determined at design stage, for the purpose of this analysis the following parameters have been assumed based on typical specifications: 125 no. approx. 300-watt panels with dimensions of 1650 x 991 x 40 mm. Further analysis at detailed design stage should be conducted in order to refine the estimate of the system size and site distribution required to meet the planning condition and development requirements.

Solar PV represents a well proven, reliable technology requiring minimal maintenance operating in a passive system from the perspective of the end user. The site in question offers favourable orientation for solar panels with mostly southern elevations and units with minimal over-shading.

1.7 Conclusion

In conclusion, the proposed fabric-first and energy efficient services design approach along with a solar photo voltaic system of approximately 37.4kWp will achieve the 15% reduction in CO₂ emissions over Part L 2013 targets as required by the local authority in line with Policies EN4 and EN6 of the Local Plan.

It is advised that anyone considering installing renewable technology should consult a dedicated specialist installer who is accredited to the Micro-generation Certification Scheme (MCS) and who can provide detailed system feasibility design and costing analysis to assess suitability.



Part 2 – SUSTAINABILITY STATEMENT

2.1 Introduction

This Sustainability Statement has been prepared by PB Sustainability Limited, an energy performance and sustainability consultancy. The report and its associated Appendices describe the suggested sustainable design and construction measures which may be included in the proposals for the development of the site to meet the requirements of the Local Planning Authority.

Code for Sustainable Homes is the national standard for the sustainable design and construction. It aims to reduce our carbon emissions and create properties that are more sustainable. The Code is not a set of regulations and goes further than Building Regulations. The Code measures sustainability against nine categories of sustainable design, rating each property as a complete package. It covers:

- Energy/CO₂;
- Water;
- Materials;
- Surface Water Run-off (flooding and flood prevention);
- Waste;
- Pollution;
- Health and Well-being;
- Management ;
- Ecology.

The assessment uses a one to six-star rating system to communicate the overall sustainability performance of a new home against these nine categories.

The Code sets minimum standards for energy and water use at each level. Energy forms a significant proportion of the overall CSH assessment and the energy requirements for the proposed development are set out in the Energy Assessment in Part 1 of this report.

It is not the developers' intention to achieve certification under the CSH scheme.



2.2 Sustainability review

The following list is a summary of the relevant aspect of sustainable development to be included in the design proposals. Each item is discussed in more detail subsequently in this report:

- Aspiring to exceed 2010 Building Regulations carbon emission toward the levels required under local planning policy;
- Specifying low water use sanitary features to meet a target for internal potable water consumption of less than 105 litres per person per day;
- Implementing a Site Waste Management Plan to include procedures for the minimisation of waste production according to defined groups, and the diversion of not less than 50% of recyclable construction waste away from landfill;
- Practical consideration of Secured by Design principles throughout the development to help promote a low-crime environment;
- Promoting a Considerate Constructors Scheme and endeavouring to achieve not less than a best practice score as a means of demonstrating exceptional construction practice;
- Use of 'A' or 'A+' rated elements for the building envelope within residential and non-residential units in accordance with the BRE Green Guide.
- The Applicant has appointed or will appoint an ecologist to assess base line information to ensure that wildlife life is not adversely put at risk as a result of the development. Appropriate measures will be taken prior to construction commencing to ensure that no birds are injured or killed as a result of the development.
- A flood risk assessment has been or will be commissioned to ensure adequate consideration of site flood risk and drainage options



2.3 Energy

An Energy Assessment for the proposed development has been prepared and is included at Part 1 of this report. This document outlines how the developer may improve the energy efficiency of the buildings via construction methods which incorporate improved insulation standards and reduced air permeability and how other energy related items such as lighting and home working could be considered.

The final strategy will enable the proposed development to exceed 2010 Building Regulations CO₂ emission targets by not less than 15%.

As part of considering the applicability of renewable/low carbon technologies and enhanced insulation standards, the developer may choose to examine further measures within the detailed design of all plots to reduce the energy load and provide cost-saving benefits to the end user. Additional measures to consider include:

- Construction of the thermal envelope (walls, roofs, floors, windows and doors) which meet or exceed the requirements of current Building Regulations;
- Installation of roof mounted photovoltaic (PV) panels to plots 8 to 10 and 15 to 21
- Use of high efficiency electric space and water heating systems
- 100% low energy lighting throughout the development;
- Using low energy external lighting with daylight cut-off devices;
- Where fitted, installing energy efficient white goods which meet or improve on the following specification: fridges or fridge-freezers = A+ rated; washing machines and dishwashers = A rated; tumble dryers and washer dryers = A rated;
- Providing comprehensive advice to new occupants on energy efficiency and the installed renewable/low carbon technologies via a Home User Guide;
- The inclusion of facilities to establish a home office in each dwelling offers the potential for further CO₂ emission reductions by reducing the need for commuting.



2.4 Water Resources

Reducing Water Demand

By aspiring to the Code for Sustainable Homes (CSH) Level 4 standard water use by the occupants will be minimised through the specification of water saving sanitary features. The CSH mandatory target for water consumption of 105 litres will be achieved for all dwellings. This represents a 40% reduction in terms of typical water consumption behaviour and a 16% improvement on the 125 litres per person per day requirement set by Part G of current Building Regulations.

The following devices will be incorporated within each dwelling to assist in achieving this requirement:

- Water efficient taps determined through the use of water restrictors;
- Water efficient and dual flush toilets;
- Shower flow rates no more than 8 litres/minute;
- Bath capacity to overflow limited to 210 litres.

Information on ways to reduce water use will be included as part of the Home User Guide which all residents will be given on occupation of their dwelling.



2.5 Waste minimisation and recycling

Construction Waste

Construction operations generate waste materials as a result of general handling losses and surpluses. These wastes can be reduced through the appropriate selection of construction methods, good site waste management practices and spotting opportunities to avoid creating unnecessary waste. In accordance with regulatory requirements the Main Contractor will need to prepare a Site Waste Management Plan (SWMP) at the appropriate stage of development, this plan should include a commitment to divert not less than 85% of non-hazardous construction waste away from landfill. Implementing the SWMP could result in various benefits for the development, which include:

- Better control of risks relating to the materials and waste on the site, 'Good housekeeping' of waste improves site safety;
- Demonstrating compliance with the legislative framework;
- Demonstrating to clients how waste is managed and minimised and how associated costs are controlled.

The Main Contractor should also develop the proposed scheme in accordance with the principles of Considerate Constructors Scheme. Part of this accreditation includes waste management measures and re use of materials and recycling.

In addition, the following good practice techniques should be considered as appropriate:

- Development and implementation of a Site Waste Management Plan;
- Toolbox talks to staff to raise awareness of waste and to provide training on waste management practices;
- Waste segregation (space permitting);
- Segregation of all inert waste materials and concrete for reuse on site;
- Segregation of metals and timber for off-site reprocessing;
- Packaging waste targeted at the fit-out phase (when amount increases);
- Segregation of timber during the structural phase if there is local recycling infrastructure;
- Identifying local waste companies/ processors that may offer a rebate for segregated skips;
- Minimising the number of waste streams in the mixed waste skip;
- Appointing a waste management contractor(s) committed to recovering a broad range of materials.

The Main Contractor should endeavour to ensure that at least 10% of the total value of materials is derived from recycled content.



2.6 Materials

The choice of construction materials affects the level of embodied energy being used by the development and has a wide impact on the environment. Embodied energy is the energy consumed in the processes associated with the construction of the building. Where practicable the following practices should be adopted to assist in reducing levels of embodied energy being used.

- Where feasible, the development will use materials that are locally sourced. In doing this the project will be supporting the local economy and will be minimising transportation of materials to the Application Site;
- Where feasible materials will be selected which are from sustainable sources. The Building Research Establishment (BRE) has created a Guide which rates construction materials according to sustainability criteria and where possible materials will have the highest sustainability rating, 'A+' or 'A'. Such materials have lower environmental impacts compared with 'B' and 'C' rated materials. Where an A+ or A rated material is not feasible the next level of B should be selected;
- The use of recycled materials should be carefully considered from a sustainability perspective and where they can be incorporated in the development, this should be determined at the detailed design stage.
- All insulation materials specified should have an Ozone Depleting Potential (ODP) of Zero and Global Warming Potential (GWP) of less than 5. Achieving this assists in obtaining credits under the Code for Sustainable Homes.



2.7 Conclusion

This Sustainability Assessment sets out a potential approach to the creation of a sustainable development. As a result of the abolition of 'The Code for Sustainable Homes' (CSH) there is no intention to achieve certification under the CSH scheme.

This report is provided in support of this application which outlines what is embedded within the scheme and how it would have met criteria set out within CSH (Level 3/4).

This sustainable development has been created through the implementation of many measures, including the following key points:

- Thermal performance of construction elements which exceeds Building Regulations in combination with renewable technologies to further reduce energy demand (i.e. photo voltaic roof panels) aspiring to achieve not less than 15% reduction in CO₂ emissions compared with Building Regulations 2010;
- Internal water use within all dwellings to be reduced to 105 litres per person per day through the provision of water saving fittings;
- Waste minimisation principles adopted both during construction and in the lifespan of the development through provision of recycling/composting facilities.
- Waste minimisation principles adopted both during construction and in the lifespan of the development through promotion of recycling/composting measures;
- Use of materials in the construction process which have a low environmental impact as determined by the BRE's Green Guide;

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Appendix II – SAP data output for Energy Statement calculations

Dwelling Type	Unit Floor Area	No. On Site	SAP TER	SAP DER	Unit TER	Unit DER	All units TER	All units DER
			kgCO ₂ /m ² /yr	kgCO ₂ /m ² /yr	kgCO ₂ /yr	kgCO ₂ /yr	kgCO ₂ /yr	kgCO ₂ /yr
2B3P Aspect House	77	13	18.85	18.1	1451.45	1393.7	18868.85	18118.1
2B3P House	70	21	19.23	18.45	1346.1	1291.5	28268.1	27121.5
3B4P House	87	32	18.4	17.44	1600.8	1517.28	51225.6	48552.96
4B5P House	107	6	17.63	16.93	1886.41	1811.51	11318.46	10869.06
1B2P Apt GF	50	8	21.09	20.39	1054.5	1019.5	8436	8156
1B2P Apt FF	50	8	18.4	18.6	920	930	7360	7440
1B2P Apt SF	50	8	22.61	22.24	1130.5	1112	9044	8896
2B3P Apt GF	61	4	18.6	18.23	1134.6	1112.03	4538.4	4448.12
2B3P Apt FF	61	4	17.61	17.49	1074.21	1066.89	4296.84	4267.56
2B3P Apt SF	61	4	19.6	19.63	1195.6	1197.43	4782.4	4789.72
Total		108					148138.65	142659.02
15% required CO ₂ reduction							22220.7975	kgCO₂/year
CO ₂ Reduction from fabric first approaches							5479.63	kgCO₂/year
Residual CO ₂ reduction required from renewable generation							16741.1675	kgCO₂/year
Total annual kWh of energy generation required							32256.58478	kWh/year