



Mai Construction

Proposed development at: Moss Lane East

Environmental Standards Statement

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Introduction

This report has been prepared on behalf of Mai Construction to demonstrate compliance with Planning Conditions for the site which states that:

1) As outlined within the City Council's Guide to Development in Manchester SPD/SPG, (chapter 4) and Core Strategy policies EN4 and EN6 an Environmental Standards Statement should be submitted with your application, which addresses sustainability ratings and the provision of renewable energy within the development (Please refer to Appendix A of the Core Strategy for guidance on preparing this statement).

This statement must address the guidance within Chapter 4 of the 'Guide to Development in Manchester and policies EN4 and EN6 of the Core Strategy for the City of Manchester, confirm the proposals for the provision of onsite renewable energy to provide 20% of final site energy demand and CO2 reduction.

In line with Planning Conditions, this site must incorporate a 20% carbon dioxide reduction through improving the buildings fabric and the proposal of renewable technology.

There are a total of 4 dwellings to be built on the site at Moss Lane East, which are subject to the Building Regulations Part L1a Conservation of Fuel and Power 2013. This regulation requires an assessment of the dwellings Carbon Dioxide emissions demonstrated in energy assessing software SAP 2012. SAP 2012 software outputs a property's:

- Carbon footprint (Dwelling Emission Rate (DER)) expressed in $\text{kg}/\text{CO}_2/\text{m}^2$
- Fabric Energy Efficiency (FEE) expressed in $\text{kWh}/\text{m}^2/\text{year}$

The DER & FEE levels are determined by a property's insulation level, it's heating system and controls, heat loss through thermal bridges and thermal mass.

The baseline for the carbon reduction is the Target Emission Rate (TER). The TER sets a dwelling target for each property based upon a notional building of the same type, size and shape and sets a minimum allowable standard of energy performance for that dwelling. The TER becomes the maximum permissible carbon emissions associated with the dwelling to comply with Building Regulations Part L1a.

The carbon dioxide reduction required for this site is 20%. This means that the sites total CO₂ emissions must be reduced by 20%.

The Site

The site contains 4 dwelling, all of which are end or mid terraced.



Figure 1: Site layout

20% Carbon Reduction Calculation

The following table identifies the Target Emission Rate (TER) for each plot and the total for the site based on house type composition and the orientation of plots.

Table 1: Target Emission Rates

Dwelling	TER
Plot 1	17.27
Plot 2	14.79
Plot 3	14.98
Plot 4	15.07
Total	62.11

The carbon footprint of the development for all dwellings based upon the TER of each plot is 62.11kgCO₂/m²/year. A 20% reduction would bring the actual carbon footprint of the development to 49.69kg/CO₂/m²year, meaning that a total of 12.42kg CO₂/m²/year would need to be saved by offset by low carbon strategies.

Strategy to achieve Carbon reduction

The carbon reduction requirements on this site will be met mainly through installing renewable technology, but will be further improved by the following:

- Fabric improvements which exceed the maximum U-value requirements of Part L
- Lower air permeability (air tightness)
- Energy efficient heating systems
- Advanced heating controls
- Low energy lighting
- Improved thermal bridge heat loss
- Renewable Technology

Building Fabric Improvements

Heat loss through the fabric of the building plays a large part in a dwelling's carbon footprint. A home which is poorly insulated will see an increase in the heat lost through the walls, floors and roofs. This will increase the carbon emissions due to fuel needed to keep the home at a comfortable living temperature.

The building fabric will use materials that exceed the maximum u-value limits as stipulated in table 2 of the Building Regulations Part L1a, April 2013: Conservation of Fuel and Power in New Dwellings; as shown in the table below:

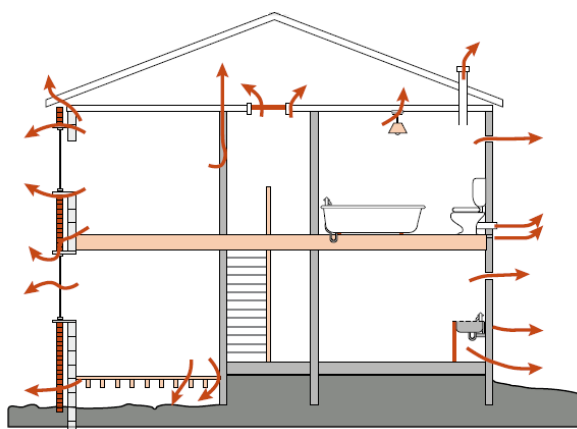
Table 2: Percentage Fabric Improvement

Element	Maximum U Value in Part L1A 2013	Proposed U-Value Figure	% Improvement
Ground Floor	0.25	0.11	56.00%
External Wall	0.30	0.26	13.33%
Party Wall	0.20	0.00	100.00%
Plane Roofs	0.20	0.11	45.00%
Sloped Roofs	0.20	0.18	10.00%
Flat Roofs	0.20	0.13	35.00%
Windows	2.00	1.50	25.00%
Doors	2.00	1.60	20.00%
Air Tightness	10.00	5.00	50.00%

As shown above, Mai Construction have far surpassed the maximum u value required to meet the building regulations. This will ensure that the heat is not lost unnecessarily, creating a more comfortable home environment and this will also result in a reduction in carbon emissions.

Fabric Air tightness

Good fabric air tightness will limit the heat loss from the dwellings, reducing the demand for space heating. Subsequently this will lower the energy demand for the building.



For the houses at Moss Lane East; a design air permeability figure of $5.0\text{m}^3/\text{hm}^2$ or below needs to be achieved in the SAP calculations.

Figure 2: Air tightness diagram

Low Energy Lighting

Dedicated low energy lighting using energy saving light bulbs reduces the electricity needed for lighting by up to 80%. This produces less carbon dioxide from energy consumption. The houses on site will be fitted with 100% dedicated low energy lighting. Guidance from Approved Document Part L1a 2013 suggests a minimum of 75%. Therefore, making all light fittings within the dwelling energy efficient will primarily reduce significant amounts of carbon and is an improvement over the current Building Regulations.

Time and temperature zone control

Time and temperature zone controls divide the dwelling into two separate heating zones that are independently programmed (e.g. ground floor and first floor may be timed separately) according to occupation so that only the parts of the dwelling that are used are heated. This helps to save on fuel bills and carbon emissions as certain areas of the house are not heated unnecessarily.

All dwellings on this site will be provided with the function to separately zone their heating system.

Limiting thermal bridge heat loss

Thermal bridging occurs at junctions and is the heat loss associated between the internal and external environments. Examples include sill, jamb and lintel details around openings and junctions within the fabric such as corners and intermediate floors. These linear junctions can be measured, and a psi value (measure of heat loss)

is applied to the length. With dwellings becoming more fabric efficient and with better u values and air tightness, the need to limit heat loss at thermal junctions is imperative, as a significant temperature change between elements can be detrimental to the building's functionality

Mai Construction build to Accredited Construction Details (ACD), which is a 'good practice' guidance document aiming to limit the effect of thermal bridging through continuity of insulation and effective sealing at junctions.

Photovoltaic Technology

PV systems capture the sun's energy using Photovoltaic cells. The cells convert the sunlight into electricity that can be used to run household appliances and for lighting. PV cells do not need direct sunlight to work and so can still generate some electricity even on a cloudy day or where facing a more northerly elevation.

The use of PV systems will allow each dwelling to generate its own electricity and therefore reduce the load on the national grid. This will reduce the carbon emissions and energy bills for the home owner

PV proposal for the site

To ensure compliance with Planning condition 1 and with Part L 2013 a minimum of 1.0 kWp of PV will be installed to each plot in the south orientation.

The overall carbon reduction calculation is shown in Appendix B.

Evaluation of Carbon Reduction

Through the installation of a PV Panels and low carbon strategies on the site, a carbon reduction of 17.99kg/CO₂/m²/year will be achieved. This represents a total saving of **28.96%** across the site.

PV alone equates to **24.31%** of this carbon reduction. Without PV installed, and just implementing the low carbon strategies, the site achieves a 4.65% reduction

A full breakdown of the improvements can be found in Appendix B of this report.

Appendix A – SAP Specification

Ground Floor:	50mm Screed 150mm Foam Board Insulation (K=0.022) 100mm Aglite Beam and Block Floor <u>U-Value = 0.11-0.12W/m²K</u>
Exposed floor Over Entrance:	22mm Chipboard flooring 200mm Mineral wool Insulation (K=0.044) between intermediate floor joists 22mm External plywood finish <u>U-Value = 0.22W/m²K</u>
Brick walls:	100mm Brick outer leaf 100mm Full fill insulation (K=0.032) 100mm Aglite block 12.5mm Plasterboard on dabs with skim <u>U-Value = 0.26W/m²K</u>
Cement board Clad:	Cement board cladding 100mm Aglite block 100mm Full fill insulation (K=0.032) 100mm Aglite block 12.5mm Plasterboard on dabs with skim <u>U-Value = 0.24W/m²K</u>
Party Wall:	Fully filled party walls with effective edge sealing at all exposed edges and in line with insulating layers in abutting elements <u>U-Value = 0.00W/m²K</u>
Sloped roof:	100mm Foam Board Insulation between rafters (K=0.022) 37.5mm Foam Board Insulation over rafters (K=0.022) 12.5mm Plasterboard with skim <u>U-Value = 0.18W/m²K</u>
Plane roof:	200mm Mineral wool Insulation between joists (K=0.044) 200mm Mineral wool Insulation over joists (K=0.044) 12.5mm Plasterboard with skim <u>U-Value = 0.11W/m²K</u>

Flat roof:	18mm External Plywood Finish 150mm Foam Board Insulation (K=0.022) Cavity between flat roof joists 12.5mm Plasterboard with skim <u>U-Value = 0.13W/m²K</u>
Doors:	Manufacturers U-Value to achieve. <u>1.6W/m²K</u>
Window/ Rooflights:	Manufacturers U-Value to achieve. <u>1.5W/m²K</u> Double-glazed, argon filled (low-E, En = 0.05, soft coat) 16mm or more.
Ventilation:	Background ventilators including trickle vents along with intermittent extract fans fitted in moisture producing areas such as bathrooms and kitchens
Air pressure testing:	All Plots designed to achieve a maximum of 5.0m³hm²
Heating system:	Vaillant Ecotec Exclusive 843 combi boiler to be installed.to each plot. <i>If an alternate boiler is to be specified, please check with the technical office to mitigate the risk of a compliance fail.</i> Underfloor heating and Radiators throughout
Heating controls:	Time and temperature zone control
Water Heating:	From main heating
Renewables:	1.0 kWp PV solar panels installed to each plot in the south orientation. MCS certificate to be provided at as built stage Size to be confirmed by developer
Low energy lighting:	100% Low energy lighting
Thermal bridging:	Calculated in SAP 2012 Appendix K based on the use of Accredited Construction Details and Plasmor calculated Psi values. Bespoke PSI values are all calculated in accordance to BR497 and by someone with the appropriate experience and expertise.

See Thermal bridging checklist for details.

Additional information:

Cavity closures to be;

Thermabate Cavity Closers or equivalent used throughout

Keystone standard lintels used throughout (Psi value = 0.23) or equivalent

Appendix B – Carbon Reduction Figures

Dwelling	DER with all stated Improvements	TER
Plot 1	16.92	17.27
Plot 2	13.87	14.79
Plot 3	14.12	14.98
Plot 4	14.31	15.07
Total	44.12	62.11

Total Percentage Improvement with No PV – 4.65%

Dwelling	DER with all stated Improvements	TER
Plot 1	13.05	17.27
Plot 2	10.13	14.79
Plot 3	10.38	14.98
Plot 4	10.56	15.07
Total	44.12	62.11

Total Percentage Improvement with PV – 28.96%