Energy & Sustainability Statement

Miller Homes Limited

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Former Manchester College, Moss Hey Drive, Northenden

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1.0 Introduction

1.1 Context

This Statement was prepared by Energy & Design Ltd on behalf of Miller Homes Limited to support a planning application for the proposed 224 dwelling development at Former Manchester College, Moss Hey Drive, Northenden.

This energy and sustainability statement shows that the requirement will be met to comply with policy EN6 as follows:

Domestic CO_2 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

1.2. Description of Development

The Former Manchester College, Moss Hey Drive, Northenden proposes 224 plots. These plots comprise of a range of detached, semi-detached & terraced housing.

The current site is shown below.



1.3. Project Brief

The development is being designed to achieve a reduction of 15% from the Target Emission Rate (TER) as set out in Part L of the Building Regulations (2013).

For the purpose of this energy statement, we will be splitting the site into two separate parts.

The first part will be 94 plots, and these will be built to L1a2013 standards and a minimum CO_2, kg/year emissions reduction of 15%, these will be plots 97-101, 104-110 & 143-224.

The remaining 130 Plots will be designed to comply with SAP 10 L12021 * and achieve a minimum CO_2, kg/year emissions reduction of 31% on L1a2013.

2.0 Methodology

2.1 Assessment Methodology (94 Plots to L1a2013)

Energy & Design Ltd have modelled each plot using SAP 2012 methodology to calculate the energy demand of the 70 dwellings.

This will allow us to show compliance in two steps.

1) Baseline Energy Demand – this will be calculated and given in Total CO_2 emissions ($kgCO_2$/year). SAP uses the Target Emission Rate (TER = CO_2 kilograms, per M_2 of total useful floor area, per year) to create the baseline for compliance with the approved document Part L1a2013. This is then multiplied by the total useful floor area to give the overall CO_2 emissions.
2) Improved Fabric with Low and Zero Carbon (LZC) technologies – various fabrics & technologies will be looked at to get the reduction of CO_2 emissions (kgCO2/year) of 15% in total.

2.2 Assessment Methodology (130 Plots to L12021*)

Energy & Design Ltd have assumed each of the 133 plots using SAP 10 methodology will achieve 31% reduction by default by complying with the proposed L12020 Approved Document.

3.0 Baseline Energy Demand

3.1 The Development Baseline (94 Plots to L1a2013)

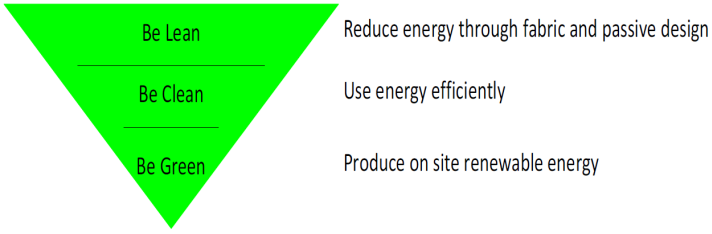
It is essential to determine the base line to evaluate the proposed energy strategy. In this case, it is the Target Emission Rate for CO_2 emissions per year.

The proposed dwellings have been modelled in SAP L1a2013, and the total maximum CO_2 emissions permitted to comply with L1a2013 and the baseline energy demand are shown below:

Target Emission Rate: Compliant with AD L 2013	
Total CO_2 emissions – $kgCO_2$/year	170,042

4.0 CO_2 Reduction Strategy - Fabric First Approach

4.1 Energy Hierarchy



The proposed dwellings have been designed in accordance with the 'energy hierarchy', which aims to reduce energy demand through passive design measures and a fabric first approach before utilising low carbon energy and the production of on-site renewable energy.

Most importantly to the delivery of low carbon and energy efficient buildings is the 'Fabric First' principle which recognises the most effective way of minimising carbon emissions is to reduce the demand for heat and power through a well-insulated, energy efficient building fabric and services.

Reducing the primary energy demand of a building using an efficient fabric and services is widely regarded as best practice and is promoted by the Zero Carbon Hub so this should be the first and most important step to reducing carbon emissions.

This 'fabric first' approach has several benefits including:

- Little to no reliance on an occupier's behaviour to deliver carbon reductions. Achieving carbon savings from renewable energy technologies requires education, awareness and often, behavioural changes from occupants.
- Virtually no maintenance and/or replacement costs to maintain carbon reductions through improved fabric; and
- Carbon savings delivered are 'locked-in' for the lifetime of the building (60 years or more) rather than the much shorter lifespan (around 25 years) of a renewable energy technology.

4.2 Efficiency Measures (94 Plots to L1a2013)

The proposed design will aim to reduce thermal energy demand by targeting improved insulation levels, air leakage and fabric u-values in line with current Building Regulations requirements.

The following measures to reduce energy use and carbon emissions have been included in the design of the new dwellings:

- Design of new homes to optimise natural daylight in all the habitable spaces with suitable window sizes relative to living spaces and bedrooms;
- Design and layout to promote passive solar gains, maximise natural daylight, sunlight and ventilation, with the majority of homes orientated to the South;
- Development which balances minimising the direct adverse impact of shading from other buildings and landscape features and improving access to passive solar gains;
- High performance glazing with appropriate window u-values and g-values to reduce heat loss and optimise positive solar gain while reducing the potential for overheating.
- 100% low energy lighting.
- Bespoke individual PSI values - these have been calculated and used, this assists in Fabric Energy Efficiency by designing out the cold bridges which may occur, if using the Approved details.
- TMP – the TMP (Thermal Mass Perimeter) has now been calculated rather than using default figures, this now gives a more accurate reflection of the actual as built dwelling, closing the gap between design and as built performance.
- Boilers – The Baxi Assure range of boilers has been used, these can give improvements of approx. 5% over other manufacturers L1a2013 compliant boilers.

4.3 Proposed Fabric First Specification (94 Plots to L1a2013)

The following is the values of the proposed fabric.

Element	Limiting Average Values - Part L1a 2013	Proposed Average Values
Ground Floor U-Value (W/m^2K)	0.25	0.19
External Wall U-Value (W/m^2K)	0.30	0.27
Party Wall U-Value (W/m^2K)	0.20	0.00 (fully filled & sealed)
Roof - Insulated at ceiling U-Value (W/m^2K)	0.20	0.09
Roof - Insulated at Slope U-Value (W/m^2K)	0.20	0.13
Window U-Value (W/m^2K)	2.00	1.30
Door U-Value (W/m^2K)	2.00	1.50
Design Air Permeability $m^3/h.m^2$ at 50 Pa	10.00	4.50

4.4 Efficiency Measures (130 Plots to L12021*)

The proposed design will aim to reduce thermal energy demand by targeting improved insulation levels and air leakage and fabric u-values in line with current Building Regulations requirements.

The following measures to reduce energy use and carbon emissions have been included in the design of the new dwellings:

- Design of new homes to optimise natural daylight in all the habitable spaces with suitable window sizes relative to living spaces and bedrooms;
- Design and layout to promote passive solar gains, maximise natural daylight, sunlight and ventilation, with the majority of homes orientated to the South;
- Development which balances minimising the direct adverse impact of shading from other buildings and landscape features and improving access to passive solar gains;
- High performance glazing with appropriate window u-values and g-values to reduce heat loss and optimise positive solar gain while reducing the potential for overheating.
- 100% low energy lighting.
- Bespoke individual PSI values - these have been calculated and used, this assists in Fabric Energy Efficiency by designing out the cold bridges which may occur, if using the Approved details.
- TMP – the TMP (Thermal Mass Perimeter) has now been calculated rather than using default figures, this now gives a more accurate reflection of the actual as built dwelling, closing the gap between design and as built performance.
- Boilers – The Baxi Assure range of boilers has been used, these can give improvements of approx. 5% over other manufacturers L1a2013 compliant boilers.
- Ground floor Insulation - 125mm PIR floor insulation.
- Cavity width - 125mm cavity post filled with insulation.
- Roof insulation – 600mm of loft roll insulation will be put into suitable house types.

4.3 Proposed Fabric First Specification (130 Plots to L12021*)

The following is the values of the proposed fabric.

Element	Limiting Average Values - Part L1a 2013	Proposed Average Values
Ground Floor U-Value (W/m^2K)	0.25	0.15
External Wall U-Value (W/m^2K)	0.30	0.21
Party Wall U-Value (W/m^2K)	0.20	0.00 (fully filled & sealed)
Roof - Insulated at ceiling U-Value (W/m^2K)	0.20	0.07
Roof - Insulated at Slope U-Value (W/m^2K)	0.20	0.13
Window U-Value (W/m^2K)	2.00	1.30
Door U-Value (W/m^2K)	2.00	1.50
Design Air Permeability $m^3/h.m^2$ at 50 Pa	10.00	5.0

5.0 Low and Zero Carbon (LZC) technologies

5.1 Technologies

The following technologies will be assessed for the appropriateness in the development.

- Combined Heat and Power (CHP)
- Air Source Heat Pumps (ASHP)
- Ground Source Heat Pumps (GSHP)
- Wind Power
- Biomass Technology
- Solar Hot Water (SHW) Technology
- Photovoltaic (PV) Technology
- Flue Gas Heat Recovery System (FGHRS)
- Waste Water Heat Recovery System (WWHRS)

5.2 Combined Heat and Power (CHP)

District Heating Networks (DHN) comprise a centralised heat generator, typically a gas fired Combined Heat and Power (CHP) engine. CHP systems generate electricity and waste heat which can be fed into a network of insulated pipes which deliver low carbon heat to buildings to provide heating and hot water via individual heat transfer units.

DHNs and CHP are suited to development with high thermal demand, typically provided by sufficient density or a large anchor load, i.e., high-density flats, leisure centres and industrial process with different heat demand profiles.

There are no DHN's around the proposed development.

For a development of highly insulated, low density and high efficiency homes such as those proposed limits the heating demand of development and therefore the feasibility and viability of the installation of CHP and district heating.

For these reasons, CHP & DHN are considered **not suitable** for this development.

5.3 Air Source Heat Pump (ASHP)

ASHP technology extracts heat from the external air and condenses this energy to heat a smaller space within a dwelling or non-domestic building. A pump circulates a refrigerant through a coil to absorb energy from the air. This refrigerant is then compressed to raise its temperature, which can then be used for space heating and domestic hot water.

Advantages

- Mature technology
- Can assist in cooling
- Approx. 250% efficient using electricity

Disadvantages

- Hot water cylinder required
- Either oversized radiators or underfloor heating is required
- Currently CO2 carbon factors for electricity are high compared to a gas system
- Can be noisy

Conclusion

Due to the benefits gained from this technology, appropriate plots are **suitable for this development.**

5.4 Ground Source Heat Pump (GSHP)

GSHP technology exploits seasonal temperature differences between the ground and air. Fluid is pumped through pipes laid in the ground, taking up heat extracted by the heat pump and released at a higher temperature to drive a space heating system. The pipework is placed either horizontally or vertically in the ground.

Advantages

- More efficient than ASHP
- Mature technology
- Can assist in cooling
- Approx. 320% efficient using electricity

Disadvantages

- Costly to install
- Hot water cylinder required
- Either oversized radiators or underfloor heating is required
- Currently CO2 carbon factors for electricity are high compared to a gas system
- Can be noisy

Conclusion

Due to the cost and the potential of high CO2 emissions, GSHP has been deemed **not suitable for this development.**

5.5 Wind Power

Wind turbines are available in various sizes from large rotors able to supply whole communities, small roof or wall-mounted units for individual dwellings.

Advantages

- Generation of clean energy

Disadvantages

- Costly to install
- Maintenance costs
- Can be noisy (hum of generator)

Conclusion

The http://www.renew-reuse-recycle.com/ predictor suggest that the wind speed is 4.5m/s at 10 meters above ground. This is below the minimum of 5m/s for a technical viability.

Wind speed at 10m above ground level (m/s)		
4.6	4.5	4.5
4.7	**4.5**	4.5
4.7	4.7	4.6

Wind power has been deemed **not suitable for this development.**

5.6 Biomass Technology

Biomass boilers work on the principle that the combustion of wood chip or pellets can create heat for space heating and hot water.

Advantages

- Considerable reduction in CO_2 emissions

Disadvantages

- Can be costly to run compared to a gas boiler
- Space for a plant room to store fuel and plant
- Regular maintenance may be required
- A local source of fuel (reduce transport emissions)

Conclusion

Due to the cost and the requirement of space for plant and fuel storage, Biomass has been deemed **not suitable for this development.**

5.7 Solar Hot Water (SHW) Technology

Solar thermal technology harnesses solar energy to generate heated water.

Advantages

- Mature Technology
- Approx. 50% of hot water demand can be met
- Low maintenance

Disadvantages

- Not always aesthetically pleasing
- The benefit of installation is limited to the water heating demand
- A Large hot water cylinder is required
- If system oversized can contribute to overheating
- Access for maintenance
- Not as many installers as previously
- Benefits not as good as similar technologies

Conclusion

Due to the amount of disadvantages, SHW has been deemed **not suitable for this development.**

5.8 Photovoltaic (PV) Technology

Photovoltaic (PV) technology involves the conversion of the sun's energy into electricity.

Advantages

- Mature Technology
- Low maintenance
- Easily integrated

Disadvantages

- Not always aesthetically pleasing
- Poor design can lead to lower-than-expected yields
- Access for maintenance

Conclusion

Due to the benefits gained from this technology, for appropriate plots with suitable roof orientations, PV has been deemed **suitable for this development.**

5.9 Flue Gas Heat Recovery System (FGHRS)

Flue Gas Heat Recovery (FGHRS) technology helps improve the efficiency of your heating system by recovering heat from flue gases.

Advantages

- Helps improve the efficiency of your heating system by recovering heat from flue gases.
- Use less gas for the same temperature.
- Fit and forget technology, very little maintenance required.

Disadvantages

- Not always aesthetically pleasing.
- Access for maintenance

Conclusion

Due to the benefits gained from this technology, for appropriate plots, FGHRS has been deemed **suitable for this development.**

5.10 Waste Water Heat Recovery System (WWHRS)

Waste Water Heat Recovery System (WWHRS) technology uses the residual heat from the waste shower water to preheat the incoming cold feed that refills the system. Therefore, less energy is used to heat that water to the required temperature.

Advantages

- Helps improve the efficiency of your heating system by technology that uses the residual heat from the waste shower water to preheat the incoming cold feed that refills the system.
- Use less gas for the same temperature.
- Fit and forget technology, very little maintenance required.

Disadvantages

- Access for maintenance

Conclusion

Due to the benefits gained from this technology, for appropriate plots, WWHRS has been deemed **suitable for this development.**

5.11 Conclusion

The following technologies have been deemed suitable for this development.

- Photovoltaic (PV) Technology
- Flue Gas Heat Recovery System (FGHRS)
- Waste Water Heat Recovery System (WWHRS)
- Air Source Heat Pump (ASHP)

5.12 Proposed fabric & LZC Results (94 Plots to L1a2013)

To achieve the required 15% reduction in $kgCO_2$/year, it has been calculated that the following is required:

Masonry plots only

- 0.68KWp of PV in an unshaded position at 45 degrees per plot
  Or
- ASHP with 0.68KWp of PV in an unshaded position at 45 degrees per plot

Timber frame plots only.

- 0.68KWp of PV in an unshaded position at 45 degrees per plot
- WWHRS

The total site demand is shown below after incorporating the improved fabric and PV or improved Fabric, WWHRS, and PV or improved Fabric, PV and ASHP.

Target & Design Emission Rate: Compliant with AD L 2013		
Target Total CO_2 emissions – $kgCO_2$/year	170,042	
Design Total CO_2 emissions – $kgCO_2$/year	128,804	
Total achieved reduction	**41,238**	**24.25%**

The proposed specification may change but will achieve a minimum of 15% reduction in carbon emissions (kg CO_2/year) using L1a2013 methodology.

5.13 Proposed fabric & LZC Results (130 Plots to L12021*)

Photovoltaics (PV) or ASHP has been chosen as the preferred technology for this development.

To achieve the required 31% reduction in kgCO_2/year, it has been calculated that the following is required:

- PV in an unshaded position at 45 degrees is required per plot (figure to be determined)
  Or
- ASHP and PV in an unshaded position at 45 degrees is required per plot (figure to be determined)

After incorporating the improved fabric, PV or fabric, PV and ASHP, the total site demand will have a minimum 31.00% saving according to the proposed AD L12020 compared with AD L1a2013

The proposed specification may change but will achieve a minimum of 15% reduction in carbon emissions (kg CO_2/year) using the L1a2013 methodology.

6.0 Conclusion

6.1 Carbon Reduction (94 Plots to L1a2013)

Using enhanced fabric specifications, WWHRS and / or PV or ASHP, it is shown that the required 15% reduction from the Target Emission Rate (TER) as set out in Part L of the Building Regulations (2013) has been met by achieving a **reduction of 24.25% carbon emissions ($kgCO_2$/year) using L1a2013.**

6.2 Carbon Reduction (130 Plots to L12021*)

Using enhanced fabric specifications and PV or enhanced fabric, ASHP, and PV, the target to meet L12021 should be met by achieving a reduction of 31% in **carbon emissions ($kgCO_2$/year) compared to L1a2013.**

6.3 Carbon Reduction (all 224 Plots)

Using the above proposals, we expect the site to achieve an average reduction of **28.16% in carbon emissions ($kgCO_2$/year) using L1a2013.**

**** L12021 regulations compliance are deemed to give a 31% reduction in carbon over L1a2013 compliance**.*

Appendix A – Site Layout showing which technology is used in each plot.

DRAWING LEGEND: -

- Denotes plots to be built in timber frame to Part L 2013 Building Regulations (21 plots in total)

- Denotes plots to be built to traditional build to Part L 2013 Building Regulations (73 plots in total)

- Denotes plots to be built to traditional build to Part L 2022 Building Regulations (130 plots in total)

PV Plots
WWHRS & PV Plots
ASHP & PV Plots

Rev.	Description	Drawn	Date
H	Plots 223 & 224 Revised to all bi Part L 2013 zone	APM	11.01.24
G	Plot 101 Revised to all bi Part L 2013 zone	APM	05.01.24
F	Plot 101-103 added to Part L 2022 zone	APM	15.08.23
E	Plot 101 added to Part L 2013 zone	APM	29.03.23
D	Plots 97-100, 102 & 103 added to Part L 2013 zone	APM	22.03.23
C	Plots 104-110 added to Part L 2013 zone	APM	28.02.23
B	Plots 170-178 added to Part L 2013 zone	APM	23.02.23
A	Area ireducing plots 141-142 amended.	JL	05.01.22

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Project Title
Former Manchester College
Moss Hey Drive
Northenden

Drawing Title
Construction Type Methodology

Scale	Drawn By	Checked By	Authorised By
1:500	MH		
	Date 08.12.21	Date	Date

Job No. | Drawing No. 2131 / CTM / 01 | Revision H

Original Sheet Size A3 Do Not Scale From This Drawing

Scaled @ 1:500

0 10m 20m 50m