Sustainability Appraisal and Energy Statement

Prepared on behalf of Vision Architectural -
Proposed Residential Development, 372 Wilbraham Road, Manchester.

Contents

1 Introduction 4

2 Energy 4

2.1 Building Regulations Compliance 4

2.2 Methods of Compliance 4

3 Code for Sustainable Homes 5

3.1 The Key issues 5

3.1.1 Energy 5

3.1.2 Water 6

3.1.3 Materials 6

3.1.4 Surface Water Run-Off 6

3.1.5 Waste 7

4 Fabric Heat Loss 7

4.1 Limiting Heat Loss 7

4.2 Heat Loss Targets 7

5 Space Heating 8

5.1 Underfloor Heating 8

5.2 SEBBUK 'A' Rated Gas Boiler 8

5.3 Heat Pumps 8

5.3.1 Air source Heat Pumps 9

5.3.2 Ground Source Heat Pumps 9

6 Renewables 9

6.1 Biomass 9

6.2 Wind Turbines 10

6.3 Solar Thermal Panels 10

6.4 Photovoltaic Panels 10

7 Water Conservation 11

7.1 Water Efficient Fittings and Appliances 11
7.2 Water Recycling 11
7.2.1 Greywater Recycling 11
7.2.2 Rainwater Harvesting 11
7.2.3 Rainwater Butts 12
8 Summary 12
8.1 Recommendations 12
8.1.1 Part L1A Compliance 12
8.1.2 Code for Sustainable Homes and Renewable Technology 12
8.1.3 Surface Water Run off. 13

1 Introduction

This report aims to address the sustainability requirements of Manchester City Council with regards the proposed residential development at 372 Wilbraham Road, Manchester and how they may potentially be achieved. The development consists of the demolition of the existing dwelling and replacing it with a new dwelling.

As outlined within PPS1 and the City Council's Guide to Development in Manchester SPD/SPG an Environmental Standards Statement should be submitted with your application, which addresses sustainability ratings and the provision of renewable energy within the development. This should include a Code for Sustainable Homes pre-estimator reports.

2 Energy

2.1 Building Regulations Compliance

In order to comply with Building Regulations 2010, Approved Document L1A, each thermal element must be designed to achieve the required U-Value stated in Approved Document L1A – Table 2 and 3, which outlines the Limiting Fabric Parameters for both the basic thermal elements as well as the party walls.

Compliance with Building Regulations 2010 is demonstrated through the SAP Assessment, in which the Dwelling Emission Rate (DER) shall be calculated. This will outline the improvement of the Dwelling Emission Rate over the Target Emission Rate (represented as a percentage). This can then be used to calculate credit targets for Ene.1 of Code for Sustainable Homes.

2.2 Methods of Compliance

To meet the aims within Building Regulations 2010 and the Code for Sustainable Homes, the following can be incorporated into the design of the dwellings:

- Increasing insulation levels of external building elements beyond the minimum U-Values W/m^{2}K stated within Table 2 of Approved Document L1A. This would involve focusing on the floor, walls, roof and windows.

- Incorporating Zero Carbon (Renewable) Technology e.g. Solar/PV Panels or wind Turbines.
- Installing a heating system with Low Carbon credentials e.g. Heat Pumps.
- Incorporating a secondary heating system using sustainable fuel such as Wood fuel.
- Decreasing the thermal mass of the dwelling.
- Install 100% Low Energy Lighting.
- Reducing water consumption through the use of water recycling/harvesting and low flow fittings.
- Making the dwellings as air tight as possible.

3 Code for Sustainable Homes

The Code for Sustainable Homes is a Sustainability assessment which measures the efficiency of each dwelling across 9 categories, these being:

1. Energy
2. Water
3. Materials
4. Surface Water Run Off
5. Waste
6. Pollution
7. Health and Wellbeing
8. Management
9. Ecology

3.1 The Key issues

3.1.1 Energy

This section has a number of key issues which look at areas such as dwelling emission rate, fabric energy efficiency, energy display devices, drying space, energy labelled white goods, external lighting, low and zero carbon technology, cycle storage and home office. There are two mandatory issues the first of which is the Dwelling Emission Rate; There is no target requirement under CSH Level 3 for this, however, since there is a planning requirement for 10% of energy demand to be met by renewable technology, credits will be achieved in area

regardless. The second section is Fabric Energy Efficiency, again there is no target requirement, though the building elements will have to meet with the requirements of 2010 Part L Building Regulations as per Section 4.2 .

3.1.2 Water

Indoor water use is a mandatory element for CSH level 3; the requirement is to achieve less than 110 l/p/day. In order to achieve this, the dwelling will need to use fittings with flow reduction and water efficient appliances.

External water use is a credited issue which looks at the installation of a rainwater butt for irrigation.

3.1.3 Materials

This is a mandatory element and will also be credited in order to achieve the required Code level. There are 3 issues we will be looking within this section, which will be as follows:

- Environmental Impact of Materials
  - To specify materials with lower environmental impacts over their life-cycle
- Responsible Sourcing of Materials – Basic Building Elements
  - To promote the specification of responsibly sourced materials
- Responsible Sourcing of Materials – Finishing Elements
  - To promote the specification of responsibly sourced materials

3.1.4 Surface Water Run-Off

For the mandatory element in this category you need to show that the peak rate and volume of run-off is no worse post-development as it was pre-development. SUD'S (Sustainable Urban Drainage Systems) may well be applicable. A suitably qualified Hydrologists report will be required by the CSH and will able to identify the requirements in this area.

3.1.5 Waste

This is a mandatory issue and is focused on the storage of non-recyclable and recyclable household waste and composting facilities.

4 Fabric Heat Loss

4.1 Limiting Heat Loss

Limiting the heat loss of thermal elements is one of the most effective methods of improving the energy efficiency of a building. Limiting heat loss means that less energy is required (in the form of fuel) to reheat the dwelling when heat is lost. This method of energy efficiency is very simple to incorporate at design stage and offers a profound contribution towards lowering the Dwelling Emission Rate.

This is achieved by minimising the Thermal Conductivity W/m^{2}K of the building fabric. The simplest and most cost effective method of doing this is by increasing the levels of insulation in the floor, walls and roof. The installation of thermally efficient windows is also a good way of achieving the required standards e.g. Triple Glazed Low Energy Glazing.

4.2 Heat Loss Targets

- The following table shows both the Thermal Conductivity W/m^{2}K targets specified within Building Regulations 2010

Thermal Element	Building Regulations 2010
	Minimum U-Values W/m^{2}K
Ground Floor	0.25 W/m^{2}K
External Walls	0.30 W/m^{2}K
Roof (Rafters)	0.20 W/m^{2}K
Glazing	2.0 W/m^{2}K
Air Permeability	10.0 m^3.h.m^2

5 Space Heating

5.1 Underfloor Heating

Underfloor heating provides a means by which heat can be efficiently distributed throughout the dwelling. The system consists of a series of coiled pipes laid under the floor of each room (usually within the screed); this distributes the heat over a much larger surface area and improves heat transfer through conduction, convection and radiation. This not only heats the space faster but means that the water within the pipes can be heated to lower temperatures than that of radiators, due to this heat emitter's greater surface area exposure.

5.2 SEBBUK 'A' Rated Gas Boiler

SEDBUK is a database which provides an unbiased comparison of boilers under the governments Energy Efficiency Best Practice Programme. They calculate the average annual efficiency based on typical domestic conditions, making assumptions regarding usage patterns and climate. They use laboratory testing and the exact specification for that make and model, which can be applied to most gas and oil domestic boilers and used in within SAP assessments with efficiency bands running from 'A' to 'G'. This is the most cost effective and straightforward method of space heating and as there are many types readily available for purchase, this is usually the most popular choice for domestic dwellings.

5.3 Heat Pumps

Heat Pumps are an energy efficient low carbon method of heating a building and perform well in comparison to most efficient gas boilers albeit at a much higher initial cost. However this initial cost should be offset through the efficiency of the system over time.

Heat pumps do still have some impact on the environment as they need electricity to run which has a reasonably high emission factor, but the heat they extract from the ground, air, or water is being naturally renewed on an ongoing basis.

5.3.1 Air source Heat Pumps

Air Source Heat Pumps absorb heat from the outside air. This can then be used to provide heat to underfloor heating systems or warm air convectors and domestic hot water in the dwelling. Standard panel radiators can be used though the efficiency of the heat pump can be greatly reduced.

5.3.2 Ground Source Heat Pumps

Ground Source Heat Pumps use pipes buried in the garden to extract heat from the ground. This can then be used to provide heat to underfloor heating systems or warm air convectors and domestic hot water in the dwelling. Standard panel radiators can be used though the efficiency of the heat pump can be greatly reduced.

6 Renewables

As there is a requirement to meet 10% of the demand for energy via a renewable source, one of the following renewable energy technologies will have to be installed. By installing renewable technologies, CSH credits can be awarded which will make achieving Code Level 3 less onerous. It is advisable to carry out a detailed Feasibility Study in order to identify the likely energy demand of the development and the most effective way of meeting the 10% renewable target.

Renewable technologies can provide energy in the form of heat or electricity with minimal or Zero Carbon emissions. The following details a summary of various forms of renewable energy.

6.1 Biomass

This method uses residue and waste from agricultural, forest, urban and industrial environments to produce heat and electricity by means of direct combustion, gasification, combined heat and power (CHP), anaerobic and aerobic digestion. This type of energy production has a limited long term contribution to green house gasses due to the fact that the Carbon embodied within Biomass fuels is part of the natural Carbon cycle. This is not the case with fossil fuels which permanently add additional Carbon to the atmosphere when

burned for fuel, thus increasing the Carbon Footprint. Biomass is best utilised on large compact developments, such as an apartment block and can be situated relatively close to the plant room which keeps any heat losses to a minimum and provides easy access for delivery of fuel.

6.2 Wind Turbines

Wind turbines provide a way of producing cost effective electricity, albeit sporadically. However they are not very practical for use in residential areas due to the proximity of local buildings, which reduces the likelihood of the turbines receiving sufficient non turbulent wind. There are also potential issues with noise pollution and thus may not be acceptable to the local authority when meeting planning conditions.

6.3 Solar Thermal Panels

Solar thermal panels provide a method of harnessing the heat of the sun to generate energy for hot water within a dwelling. Depending on how much space is available on each site, up to 100% of hot water demand can be provided by solar thermal panels during the summer however backup in the form of gas or electricity is advisable for the winter months. There are currently two types of panel which are readily available, these are evacuated tube and flat plate collectors. A hot water cylinder is also required as a 'store' for the heat energy collected during the day.

6.4 Photovoltaic Panels

Photovoltaic panels (PV) provide a way of producing electricity from the suns radiated energy. There are currently 4 types PV panel available on the market these being; Hybrid, Mono-Crystalline, Poly-Crystalline and Thin Film. Hybrid and Mono-Crystalline are the most efficient and also the most expensive, however as there is limited area of roof available that is South facing one of these options is usually utilised. Depending on the area of roof available and the conditions, 100% of electricity could be supplied by means of PV during daylight hours.

7 Water Conservation

Both indoor and outdoor water conservation can be implemented on this project, however only the indoor measures are likely to be needed to meet the requirements of CSH level 3.

7.1 Water Efficient Fittings and Appliances

This includes the incorporation of the following:

- Flow Restrictors in Tap and Shower Heads
- Low Flush WC's
- Low Volume Baths
- 'A' Rated Washing Machines and Dishwashers that use less water.

7.2 Water Recycling

7.2.1 Greywater Recycling

Greywater recycling uses waste water from outlets within the home and recycles it for use elsewhere, thus reducing water consumption. Generally water is collected from baths/showers and bathroom taps and used to flush toilets within the dwelling.

7.2.2 Rainwater Harvesting

Rainwater Harvesting is a system which collects and stores rainwater for use across a development. This is usually via a large storage tank or some other form of surface water system. This water is then used for outlets such as washing machines around the home.

7.2.3 Rainwater Butts

These storage casks are fitted externally to the property and collect water for irrigation/watering use externally. They are low cost to install and achieve CSH credits.

8 Summary

8.1 Recommendations

Since the requirements for this development are to satisfy Code for Sustainable Homes level 3 we will need to incorporate the use of Low and Zero Carbon Technology. The information within this statement is to serve as a guideline towards reducing the Carbon emissions of the development.

8.1.1 Part L1A Compliance

The requirements of Part L1A can be easily achieved by adopting the following methods to reduce CO_2 emissions:

- Install 100% Low Energy Lighting
- Install insulation to achieve the target U-Values W/m^2K as stated in section 4.2.
- Install Double Glazed Windows throughout.
- Make the dwelling as air tight as possible.

8.1.2 Code for Sustainable Homes and Renewable Technology

It is recommended that a full CSH pre assessment and Renewable Technologies Feasibility Study are carried out however the following can be observed:

- There is a need for flow restrictors and water efficient appliances in order to achieve the 110 l/p/day that is needed for CSH level 3.
- Consider Photovoltaic's or Solar Thermal Panels.
- Consider use of heat pumps in conjunction with underfloor heating

8.1.3 Surface Water Run-off

A report from a suitably qualified hydrologist will be required to identify the Surface Water run-off measures need and to satisfy the CSH requirements in this area.