



**Energy ratings, calculations and advice**

Knowle House, 4 Norfolk Park Road, Sheffield S2 3QE

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## Sustainable Design and Energy Statement

### New Housing Development – Cranford Drive, Hayes

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### Introduction

This Sustainability and Energy Statement has been prepared in support of a planning application for the construction of four new detached houses at Cranford Drive, Hayes.

The statement includes an energy strategy showing how selected energy efficiency measures have been considered and those which have been incorporated into the scheme. The following hierarchy has been followed:

- Be Lean - reduce energy demand and consumption
- Be Clean - increase energy efficiency
- Be Green - provide low carbon renewable energy sources

SAP calculations have been prepared for representative units based upon the construction specification set out within the report and the detailed planning drawings. These provide an accurate assessment of the carbon dioxide emissions arising from the new homes and their energy consumption.

### 1.0 Be Lean

It is proposed to enhance the fabric insulation standards of the new homes above the minimum required by the Building Regulations. The Dwelling Fabric Energy Efficiency (DFEE) of the new dwellings has been reduced below the requirements for the Target Fabric Energy Efficiency (TFEE) required by Part L 2022. This is shown in the table below.

	TFEE for New Houses KWh/M2/Year	DFEE for New Houses	% Reduction
Plots 1 to 4	52.00	47.00	9.6%



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### 1.1 Efficient Building Fabric

#### Building Envelope

The ground floors will be insulated with 200mm of Kingspan K3 insulation or equivalent.

The external walls will be built in traditional cavity wall construction with 100mm facing brick, 150mm fully-filled cavity and 100mm insulating blockwork internally. The cavity will be filled with 150mm Dritherm 32 insulation.

Flat Ceilings - 400mm of mineral wool insulation and sloping ceilings, dormer roofs and cheeks will be insulated with 100mm PIR insulation between joists and 77.5mm thermal plasterboard underneath (65mm PIR + 12.5mm plasterboard.)

Sloping Ceilings - 100mm PIR insulation between rafters and 75mm underneath.

Windows and glazed doors will be double glazed and have a U value of 1.4 and semi-glazed doors or solid doors will be UPVC or composite with a U value of 1.2.

Element	Part L Limiting U-Values	Proposed U-Values
	W/m <sup>2</sup> K	
Ground Floor	0.18	0.13
External Wall	0.26	0.18
Roof	0.16	0.11
Windows, Doors & Roof Windows	1.60	1.03



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### 1.2 Air Leakage

Large amounts of heat are lost in winter through air leakage from a building (also referred to as infiltration or air permeability) often through poor sealing of joints and openings in the building

The Building Regulations set a minimum standard for air permeability in new buildings of 10 m<sup>3</sup> of air per hour per m<sup>2</sup> of envelope area, at 50Pa. It is proposed to achieve a 50% improvement over Building Regulations and the buildings will target a permeability of 4 m<sup>3</sup>/hr/m<sup>2</sup>.

As a result of increasing thermal efficiency and air tightness, Building Regulations Approved Document F was also revised in 2022 to address the possibility of overheating and poor air quality. Windows will have trickle vents and be large enough to provide sufficient ventilation when opened.

### 1.3 Thermal Bridging

Improving the U-values for the main building fabric without accurately addressing the Thermal Bridging will not achieve the fabric energy efficiency and energy and CO<sub>2</sub> reduction targets set out in this strategy. All the thermal bridges have been calculated by a suitably qualified person and these details will be used to provide the performance standards required to achieve the high energy efficiency requirements of the project.



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## 2.0 Be Clean

### 2.1 Efficient Lighting and Controls

Throughout the scheme natural lighting will be optimised.

All light fittings will be of a dedicated energy efficient type.

External lighting will be fitted with time controls and light sensors to ensure illumination is restricted to required times. External lighting will be limited to a maximum output of 150W.

### 2.2 Reduction of Water Demand

The water efficiency measures incorporated into the scheme will ensure a water efficiency target of 110 litres per person per day will be achieved for all the houses. The use of slow flow showerheads and aerators in hot taps also reduces the energy consumption of the water heating system because it prevents hot water being wasted.

### 2.3 Heating and Hot Water

It is proposed that high efficiency gas combi boilers should be used to provide space heating and hot water for the properties. These are band A boilers of 90% efficiency and avoid the loss of heat from an external hot water tank, which can be considerable.

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## 3.0 Be Green

Part L 2022 building regulations have CO2 targets which are very strict. These can be achieved by an air source heat pump which has an efficiency of more than 100%. Part L 2022 also has a Dwelling Primary Emission Rate (DPER) CO2 figure to allow for the source of the energy to be indicated in the SAP calculation. The DPER is better for electricity, which includes generation from solar, wind and nuclear power. In this case gas boilers have been used so some solar PV is necessary to achieve compliance.

### 3.1 Energy Reduction Due to Solar PV

The table below shows the energy reduction and CO2 reduction achieved by the solar PV.

	TPER KgCO2/M2/Year	DPER No Solar	DPER Solar PV	% Reduction	TER	DER No Solar	DER Solar PV	% Reduction
Plots 1 to 4	73.12	87.74	65.95	25%	73.12	16.22	12.48	23%

### 3.2 Physical Arrangement of Solar PV

The houses have solar PV panels on more than one roof slope in order to increase the amount of available space. The table below shows the physical arrangement of solar panels on each building.

	Solar PV KW peak	Direction
Plots 1 to 4	2.82	East
	2.82	West

## 4.0 Climate change adaption and Water resources

### Surface Water Management

Consideration has been given to the use of grey water recycling. However, customer's resistance to the appearance of the recycled water and the cost of the systems does not currently make them a viable option. They have therefore not been included in the proposals.



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### Water efficiency measures

In excess of 20% of the UK's water is used domestically with over 50% of this used for flushing WCs and washing (source: Environment Agency). The majority of this comes from drinking quality standard or potable water.

The water efficiency measures included will ensure that the water use target of 110 litres per person per day is achieved.

Water efficient devices will be fully evaluated, and installed, wherever possible. The specification of such devices will be considered at detailed design stage and each will be subject to an evaluation based on technical performance, cost and market appeal, together with compliance with the water use regulations.

The following devices will be incorporated within the houses:

- water efficient taps, toilets and showers;
- flow restrictors to manage water pressures to achieve optimum levels and
- water meters.

Below is a typical specification, which would achieve the 110 Litres per person per day target.

Schedule of Appliance Water Consumption		
Appliance	Flow rate or capacity	Total Litres
WC	6/36 litres dual flush	17.64
Basin	2.0 litres/min.	4.74
Shower	9.0 litres/min	39.33
Bath	175 litres	19.25
Sink	5.0 litres/min	12.56
Washing Machine	6.75 litres/kg	14.18
Dishwasher	1.25 litres/places	4.50
		112.20
	Normalisation Factor	0.91
External water use		5.00
		107.10

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## 5.0 Materials and Waste

The BRE Green Guide to Specification is a simple guide for design professionals. The guide provides environmental impact, cost and replacement interval information for a wide range of commonly used building specifications over a notional 60-year building life. The construction specification will prioritise materials within ratings A+, A or B.

Preference will be given to the use of local materials & suppliers where viable to reduce the transport distances and to support the local economy. A full evaluation of these suppliers will be undertaken at the next stage of design.

In addition, timber would be sourced, where practical, certified by PEFC or an equivalent approved certification body and all site timber used within the construction process would be recycled.

All insulation materials will have a zero ozone depleting potential.

### Construction waste

Targets will be set to promote resource efficiency in accordance with guidance from WRAP, Envirowise, BRE and DEFRA.

The overarching principle of waste management is that waste should be treated or disposed of within the region where it is produced.

Construction operations generate waste materials as a result of general handling losses and surpluses. These wastes can be reduced through appropriate selection of the construction method, good site management practices and spotting opportunities to avoid creating unnecessary waste.

The Construction Strategy will explore these issues, some of which are set out below:

- Proper handling and storage of all materials to avoid damage.
- Efficient purchasing arrangements to minimise over ordering.
- Segregation of construction waste to maximise potential for reuse/recycling.
- Suppliers who collect and reuse/recycle packaging materials.