PROPOSED RESIDENTIAL DEVELOPMENT
North Road, Glossop

ENERGY & SUSTAINABILITY REPORT

November 2014

Introduction

This Energy and Sustainability Report has been prepared by Award Energy Consultants on behalf of Taylor Wimpey UK Ltd ("Taylor Wimpey") in connection with the proposed residential development at North Road, Glossop.

This report considers the issues surrounding sustainable construction with regards to the proposed residential development. In particular, it considers and evaluates the measures incorporated into the design of the development to reduce the predicted energy usage and carbon emissions of the site.

Proposal

The performance of the building fabric, the efficiency of the building services and the management strategies of the occupants of a dwelling broadly determine the energy consumption and carbon emissions of a dwelling. Taylor Wimpey has appointed Award Energy to use SAP 2009 to analyse the potential carbon savings and energy needs reduction that can be achieved through an enhanced fabric specification. In addition, measures to ensure sustainability though-out the lifetime of the development have been evaluated and incorporated into the design process, as encouraged by the Energy Hierarchy detailed in the diagram below. Material selection, the protection of local environments and the health and wellbeing of future occupants are all issues requiring consideration. Addressing all of these issues in an integrated and intelligent manner will result in truly sustainable developments.

ENERGY HIERARCHY

1. **USE LESS ENERGY**
   Through design and construction; and a lower energy demand

2. **USE ENERGY EFFICIENTLY**
   Encourage occupants to reduce their energy use; increased energy efficiency

3. **USE RENEWABLE AND/OR LOW CARBON SOURCES**
   For heat and power; either on site or through a network

Method

In order to evaluate the proposed strategy it is important to determine firstly the base line. This is the level of carbon emissions and energy requirements against which any strategy must be judged using a selection of proposed typical 2010-designed house types and the standard specification that shows a compliance with the Building Regulations.

Award Energy have compared the specification that will achieve minimum compliance with Part L1a 2010 (i.e. DER=TER) with the intended enhanced specification that Taylor Wimpey will submit as part of the agreed details, as shown in Table 1. Within the enhanced specification, all heat loss elements have been insulated beyond regulation requirements and a 25% target reduction (below regulated U-values) to external walls and floors has been surpassed. A design air pressure test of 5 has also been specified and an efficient combi-boiler has been included with high specification heating controls. In addition, Taylor Wimpey commissioned thermal model results were used; thermal bridging is an important element within Part L1a 2010 and can be calculated by thermally modelling standard structural details.

Table 1

Element	Value required By 2010 regulations* (u-value)	Baseline specification to achieve DER=TER (u-value)	Enhanced specification (u-value)
Walls (w/m²k)	0.30	0.30	0.27
Roofs (w/m²k)	0.20	0.16	0.10
Floors (w/m²k)	0.25	0.19	0.14/0.15
Windows (w/m²k)	2.0	1.6	1.4
Doors (w/m²k)	2.0	1.6	1.3
Design air pressure test ($m^3/h/m^2$)	10	7	5
Thermal bridging	-	ACD	Taylor Wimpey linear thermal model results
Heating Efficiency	-	88%	90%

* For U-values: See Approved Document L1a 2010 Building regulations

Results of Carbon Reduction Calculations

Table 2 below shows the predicted carbon emissions for each house type. The baseline total predicted carbon emissions for the site are 239,234.73 $KgCO_2$/Year (with all properties meeting the minimum requirements of Part L1A 2010). The total predicted carbon emissions with Taylor Wimpey's enhanced specification are 206,076.74 $KgCO_2$/Year - a **13.80%** reduction in carbon emissions.

Table 2

Property Type	Carbon Emissions per plot ($KgCO_2$/Year) - Baseline specification	Carbon Emissions per plot ($KgCO_2$/Year) - Enhanced specification	% reduction in Carbon Emissions
Flat	1616.65	1509.42	6.63%
Mid-terrace	1062.34	949.04	10.66%
Semi-detached	1407.88	1197.95	14.91%
Detached	2079.49	1785.74	14.13%

Table 3

Property Type	No	Carbon Emissions ($KgCO_2$/Year) - Baseline specification	Carbon Emissions ($KgCO_2$/Year) - Enhanced specification	% reduction in Carbon Emissions
Flat	8	12933.20	12075.36	6.63%
Mid-terrace	15	15935.10	14235.60	10.66%
Semi-detached	80	112630.40	95836.00	14.91%
Detached	47	97736.03	83929.78	14.13%
TOTAL	**150**	**239234.73**	**206076.74**	**13.86%**

Results of Energy Demand Reduction Calculations

Table 2 below shows the predicted energy demand for each housetype. The baseline total predicted energy requirements for the site are 1,261,634.20KWh/Year (with all properties meeting the minimum requirements of Part L1A 2010). The total predicted energy demand with Taylor Wimpey's enhanced specification is 1,090,396.50KWh/Year - a **13.57%** reduction in site-wide energy requirements.

Table 2

Property Type	Energy Consumption per plot (KWh/yr) - Baseline specification	Energy Consumption per plot (KWh/yr) - Enhanced specification	% reduction in Energy Consumption
Flat	9130.79	8525.18	6.63%
Mid-Detached	5604.62	5020.98	10.41%
Semi-Terrace	7403.15	6321.73	14.61%
Detached	10899.29	9386.00	13.88%

Table 3

Property Type	No	Energy Consumption - Baseline specification (KWh/yr)	Energy Consumption - Enhanced specification (KWh/yr)	% reduction in Energy Consumption
Flat	8	73046.32	68201.44	6.63%
Mid-Detached	15	84069.30	75314.70	10.41%
Semi-Terrace	80	592252.00	505738.40	14.61%
Detached	47	512266.63	44114.20	13.88%
TOTAL	**150**	**1261634.20**	**1090396.50**	**13.57%**

Not only will the specification deliver the aspirations of the National Planning Policy Framework 2012 but it will also serve to last the lifetime of the development with no future maintenance issues. Fabric first is therefore the most practicable approach to carbon saving and energy demand reduction and in keeping with the Energy Hierarchy.

Additional Measures

Taylor Wimpey propose to incorporate the following additional measures into the 2010 designed dwellings in order to reduce carbon emissions and energy demand.

- Highly efficient space and hot water heating systems. These will be accompanied by thermostatic controls, zoned heating and override facilities to ensure that heating is optimally controlled to use the least amount of energy
- High levels of insulation across all thermal elements within the build
- Thermal blocks will be used on this development as they are made of a sustainable material which has a high recycled content and excellent insulation and acoustic absorption properties
- High levels of air tightness to be achieved within the construction of the dwelling to reduce unnecessary heat loss. As part of its design and build strategy, Taylor Wimpey is committed robust monitoring of the standard of construction on site and pre-completion air testing
- Addressing Thermal Bridging limits heat loss across junctions; Taylor Wimpey have looked at the standard details for thermal bridging and, in consultation with the Aircrete Products Association, the Concrete Block Association and the Energy Savings Trust, have modelled and proven enhancements from ACD standard details
- Party Wall u-values to be 0 w/m²k
- 100% dedicated low energy lighting
- Windows and doors will be 25% more efficient than minimum standards with the Building Regulations
- All external light fittings will be provided with energy efficient light bulbs with appropriate control systems for efficient usage
- The benefits of passive solar design are well documented and have been considered by the design team of Taylor Wimpey. Sufficient glazing will be provided to the principal living rooms of each dwelling to ensure sufficient natural lighting, thus reducing the energy consumed in artificially lighting the room. In addition, it is well known that developments which are orientated to ensure that the principal glazed elevations are within 30 degrees of due south are most effective at utilising solar gain, thus reducing energy consumption. Where practicable and feasible this has been incorporated into the site design
- Natural ventilation is the most energy efficient form of ventilating a space. To this end, the dwellings will be naturally ventilated via open-able windows and trickle vents.

Material Selection

Significant amounts of energy and natural resources are consumed in the production, transportation and disposal of building materials. Two issues are of significant importance in the specification of building materials; the environmental impact of materials and the responsible sourcing of materials. Taylor Wimpey is dedicated to taking pro-active measures to address these issues and commit to obtaining responsible sourcing certification for at least 90% of the building elements of each dwelling.

Waste

Taylor Wimpey has national policies to promote the reduction and effective management of construction related waste. Robust procedures are in place to share materials such as soil and aggregate between sites and to sort waste on and off site in order to divert waste from landfill.

The re-use and recycling of wooden pallets is encouraged to reduce the amount of wood waste sent to landfill and Taylor Wimpey work closely with suppliers to minimise and recycle packaging.

All construction activities will be carried out in order to minimise dust, fumes, discharges and any other form of pollution on site, in line with best practice policies.

Pollution

The dwellings will be constructed with insulating materials that have a Global Warming Potential of less than 5.

All dwellings will be heated by highly efficient gas boilers, with those that have NOx emissions of less than 40 mg/kWh being considered.

Health and Wellbeing

In achieving increased levels of energy efficiency, it is important that designers do not lose sight of the fact that they are building homes that people can live in and not just occupy. This is an integral part of sustainability, and a hugely important consideration if the population (and the market place) is to tolerate the sustainability agenda. While it is quite difficult to measure or even quantify health and wellbeing, the following measures are a sample of the efforts made by Taylor Wimpey to address this issue:

- Each of the principal living rooms has sufficient glazing to allow natural light to penetrate into the rooms. Numerous studies have shown this to be beneficial to the general health and happiness of occupants.
- All houses will have access to a private garden and garden areas will be fully accessible for disabled occupants, where possible.
- The development has access to local facilities on foot and bicycle.

Water Efficiency

Approved Document G (2010) restricts new build dwellings to a maximum consumption of 125 litres per person per day. It is proposed that eco-sanitary ware and restricted flow rates will be introduced into the design of each development to obtain the appropriate level of water efficiency.

The following table has been extracted from the Water Efficiency Calculator, demonstrating that a higher level of efficiency than that required by the Building Regulations will be achieved.

Water Consumption

Installation Type	Unit of Measurement	Capacity/Flow Rate	Use Factor	Fixed Use	Litres Per Person per day
WC (Dual Flush)	Full Flush (litres)	6	1.46	0.00	8.76
	Part Flush (litres)	4	2.96	0.00	11.84
Taps (excluding kitchen tap)	Flow rate (litres/minute)	6	1.58	1.58	11.06
Baths (where shower present)	Capacity to overflow (litres)	195	0.11	0.00	21.45
Showers (where bath present)	Flow rate (litres/minute)	10	4.37	0.00	43.7
Kitchen sink tap	Flow rate (litres/minute)	3.8	0.44	10.36	12.03
Washing Machine	Litres/kg dry load	8.17	2.1	0.00	17.16
Dishwasher	Litres/place setting	1.25	3.60	0.00	4.50
	TOTAL				130.50

Total Internal Water Consumption	130.50
Normalisation Factor (x 0.91)	118.75
External Use	5.00
Part G Water Consumption	**123.75**

In addition, water use on site during construction will be monitored as part of nationally agreed strategies to reduce water consumption prior to completion.

Conclusion

This report demonstrates that the proposed enhanced fabric specification reduces carbon emissions on the site by a total of **13.86%** and reduces energy demand by **13.57%**. In addition, sustainable measures are proposed that are in line with the National Planning Policy Framework 2012, which emphasises sustainable development, energy efficiency and reduction in emissions. The proposed strategy places a great importance on the efficiency of a property's thermal envelope and internal building services in line with the Energy Hierarchy.

Taylor Wimpey's energy strategy for the proposed development at North Road, Glossop therefore ensures that each dwelling on the development benefits from built-in energy reduction measures and that the development meets the needs of the present without compromising the ability of future generations to meet their needs.

CAVEAT