AWARD
ENERGY CONSULTANTS

## PROPOSED RESIDENTIAL DEVELOPMENT

# Green Road, Dodworth

# ENERGY REPORT

NEWETT
HOMES

**May 2022**

# Introduction

This Energy Report has been prepared by Award Energy Consultants in connection with the planning application for a residential development of 51 new build dwellings at Green Road, Dodworth.

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 demand, carbon emissions and water usage of the site as per Barnsley Metropolitan Borough Council's development policies.

# Policy Context

The following documents were considered:

**Building Regulations 2013 -** as newly constructed buildings, Part L1a is of particular note. Part L sets minimum standards for fabric and energy efficiency for new buildings. Due to the upcoming changes in Part L which will come into force in June 2022, the dwellings are anticipated to result in carbon reductions at least 31% over Part L 2013 with a betterment in Primary Energy of approximately 35% over Part L1a 2013. However, the software used to calculate these metrics is only available in Beta version and should not be relied on for compliance, therefore this Report is founded in Part L1a 2013 which are the Regulations in force at the time of writing

**National Planning Policy Framework 2021** - strengthens the emphasis on sustainable development and requires new developments to secure the highest viable resource and energy efficiency and reduction in emissions by considering Governments and other national standards.

**Barnsley Metropolitan Borough Council's Policy CC2: Sustainable Design and Construction** - developments will be expected to minimise resource and energy consumption through the inclusion of sustainable design and construction features,

**Barnsley Metropolitan Borough Council's Policy RE1: Low Carbon and Renewable Energy** - All developments will be expected to seek to incorporate initially appropriate design measures, and thereafter decentralised, renewable or low carbon energy sources in order to reduce carbon dioxide emissions and should at least achieve the appropriate carbon compliance targets as defined in the Building Regulations

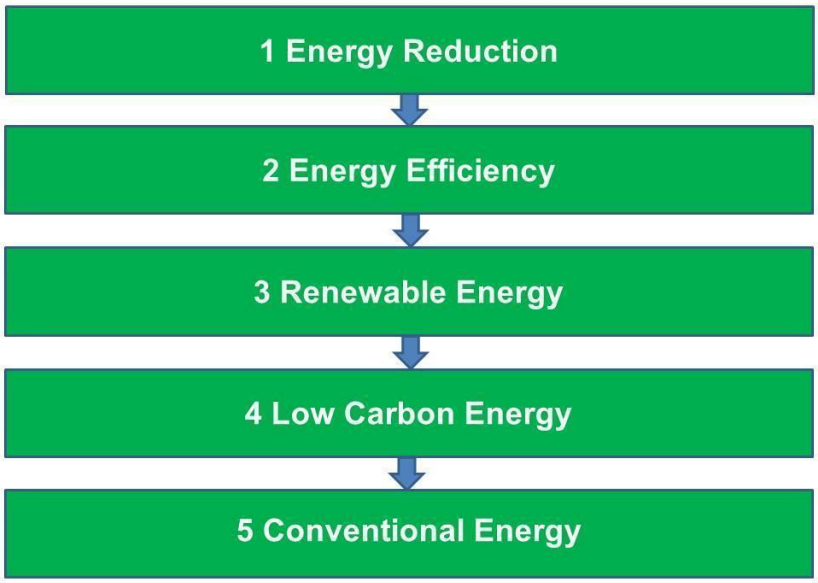
# Proposal

It should be noted that due to the scale of the development, delivery of some of the individual plots is likely to be subject to the Interim Future Homes Standard programme of changes to Part L of the Building Regulations. This will result in carbon reductions for these plots of at least 31% over Part L 2013 along with significantly improved fabric performance.

As the software used to calculate the required metrics for Policy EN1 is only available in Beta version and should not be relied on for compliance, this Report is founded in Part L1a 2013 which are the Regulations in force at the time of writing, though significantly higher carbon reductions will be achieved.

It should be noted that the proposed sustainability strategy places a great importance on the efficiency of a property's thermal envelope and internal building services, as encouraged by the Energy Hierarchy. This emphasis is to be encouraged as it recognises that it is inherently more sustainable to invest resources in reducing a property's long-term carbon emissions before considering shorter term generation benefits. Award Energy have therefore used approved SAP 2012 software to analyse the potential energy efficiencies that can be achieved through a fabric-first approach, aligning with the Government's Energy Hierarchy Barnsley Metropolitan Borough Council's Planning Policies.

## Energy Hierarchy



# Energy Demand Calculation Method

The Target Fabric Energy Efficiency (TFEE) has been used as a Baseline against which to measure specification performance of dwellings. The comparison of the Dwelling Fabric Energy Efficiency (DFEE) against a notional Target Fabric Energy Efficiency (TFEE), as calculated via SAP 2012, is currently the only mandatory Building Regulatory requirement which specifically relates to energy. This approach, therefore, appears the most logical. The Fabric Energy Efficiency ratings DFEE and TFEE (as developed by the Zero Carbon Hub and implemented into Building Regulations Part L1a 2013) are defined as the space heating and cooling requirements, per square metre of floor area, per year, for the as-designed and notional dwelling, respectively, and are measured in units of kWh/m²/year.

Award Energy have compared the specification that will achieve minimum compliance with Part L1a 2013 with the intended enhanced specification, as shown in Table 1. Within the enhanced specification, all heat loss elements have been insulated beyond regulation requirements and regulated u-values for external walls, floors and roofs have been surpassed. A design air pressure test of 4.50 has also been specified and highly efficient gas boilers have been included with high specification heating controls. In addition, calculated thermal model results were used; thermal bridging is an important element within Part L1a 2013 and can be calculated by thermally modelling standard structural details.

**Table 1**

| Element | Value required By 2013 regulations* (u-value) | Enhanced specification (u-value) | Percentage Improvement |
|---|---|---|---|
| Walls (w/m²k) | 0.30 | 0.21 | 30% |
| Roofs (w/m²k) | 0.20 | 0.09 | 55% |
| Floors (w/m²k) | 0.25 | 0.14 | 44% |
| Windows (w/m²k) | 2.0 | 1.3 | 35% |
| Doors (w/m²k) | 2.0 | 1.1 | 45% |
| Design air pressure test ($m^3/h/m^2$) | 10 | 4.50 | 45% |

* For U-values: See Approved Document L1a 2013 Building Regulations

# Energy Demand Calculations

Using SAP2012 software and the specification detailed in Table 1, the predicted fabric energy demand for each house type in kWh/m$^2$ per year was calculated, as shown in Table 2 below.

**Table 2**

| House Type | Fabric Energy Demand (kWh/m²/yr) Part L1a 2013 TFEE | Fabric Energy Demand (kWh/m²/yr) Part L1a 2013 DFEE | % Reduction in Fabric Energy Demand |
|---|---|---|---|
| Semi-Detached | 49.93 | 43.48 | 12.92% |
| Mid-Terrace | 49.20 | 40.96 | 16.75% |
| Detached | 60.31 | 52.00 | 13.78% |

Table 3 below shows the predicted weighted fabric Energy Demand to reflect the mix of house types. The baseline average predicted fabric Energy Demand for the site is 53.96 kWh/m²/year (with all properties meeting the minimum requirements of Part L1A 2013). The average predicted fabric Energy Demand with the proposed enhanced specification is 46.67 kWh/m²/year – an impressive **13.50%** reduction in site-wide fabric Energy Demand.

**Table 3**

| House Type | Number | Fabric Energy Demand (kWh/m²/yr) Baseline specification TFEE | Fabric Energy Demand (kWh/m²/yr) Enhanced specification DFEE |
|---|---|---|---|
| Semi-Detached | 28 | 27.41 | 23.87 |
| Mid-Terrace | 3 | 2.89 | 2.41 |
| Detached | 201 | 23.65 | 20.39 |
| **Total/Average** | **51** | **53.96** | **46.67** |
| **Site-wide average fabric Energy Demand (kWh/m²/yr) = 13.50%** | | | |

# Results of Carbon Reduction Calculations

Award Energy have compared the specification that will achieve minimum compliance with Part L1a 2013 with the intended enhanced specification as shown in Table 1. Table 4 below shows the predicted Carbon Emissions for the proposed dwelling types.

**Table 4**

| House Type | Carbon Emissions ($KgCO_2/Year/m^2$) Baseline specification | Carbon Emissions ($KgCO_2/Year/m^2$) Enhanced specification | % reduction in Carbon Emissions |
|---|---|---|---|
| Semi-Detached | 17.30 | 16.16 | **6.59%** |
| Mid-Terrace | 18.73 | 16.85 | **10.04%** |
| Detached | 17.35 | 16.26 | **6.28%** |

*calculated using SAP2012 software

Table 5 below shows the weighted predicted Carbon Emissions for each dwelling type, reflecting the mix for the development. The baseline weighted average predicted carbon emissions for the site are 17.40 $KgCO_2/Year/m^2$ (with all properties meeting the minimum requirements of Part L1a 2013). The average predicted carbon emissions with the proposed enhanced specification are 16.24 $kgCO_2/Year/m^2$ – a **6.69%** reduction in site-wide carbon emissions.

**Table 5**

| House Type | Number | Weighted Average Carbon Emissions ($KgCO_2/Year/m^2$) Baseline specification | Weighted Average Carbon Emissions ($KgCO_2/Year/m^2$) Enhanced specification |
|---|---|---|---|
| Semi-Detached | 28 | 9.50 | 8.87 |
| Mid-Terrace | 3 | 1.10 | 0.99 |
| Detached | 20 | 6.80 | 6.38 |
| | | | |
| **Total** | 51 | **17.40** | **16.24** |
| **Weighted Average Carbon Emission Reduction = 6.69%** | | | |

*calculated using SAP2012 software

# Sustainable Design Measures

Newett Homes anticipate the incorporation of the following additional sustainability measures into the development at Green Road:

- 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

- Highly efficient space and hot water heating systems. Where appropriate, these will be accompanied by thermostatic controls, zoned heating and programmers 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

- High levels of air tightness to be achieved within the construction of all buildings to reduce unnecessary heat loss.

- Addressing Thermal Bridging limits heat loss across junctions; the design team 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 a minimum of 35% 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

- Natural ventilation is the most energy efficient form of ventilating a space. To this end, the buildings will be naturally ventilated via open-able windows and trickle vents

- The dwellings will be provided with adequate external space for storing household waste that caters for the widest range of users. Barnsley Metropolitan Borough Council provides refuse and recycling collection services, including garden waste, and external space at the dwellings will accommodate the Council's storage provision

- Electric Vehicle Charging Points or Bollards will be provided for each dwelling.

# 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 dwelling 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** |

# Conclusion

This report demonstrates that the proposed enhanced fabric specification reduces predicted Energy Demand on the site by a minimum of **13.50%** and Carbon Emissions by **6.69%** over the 2013 Building Regulations. Water consumption per person per day is anticipated to be less than that required by Building Regulations. In addition, sustainable measures are proposed that are in line with the National Planning Policy Framework 2021, which emphasises sustainable development and energy efficiency. The proposed sustainability strategy for Green Road, Dodworth places great importance on the efficiency of a building's thermal envelope and internal building services, therefore ensuring that each dwelling on the development benefits from built-in energy reduction measures.