C24

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M7 Planning

Professional Land Promotion

ENERGY STATEMENT

Land at Mulberry Road, Congresbury

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CONTENTS

1. Introduction 2
2. Planning Policy 3
3. Energy and Water Strategy 7
4. Conclusion 14

1. INTRODUCTION

1.1. This Energy & Water Statement relates to the proposed development on land off Mulberry Road, Congresbury which is to comprise of up to 90 residential dwellings.

1.2 The development is subject to the planning requirements of North Somerset Council. This report addresses policies relevant to the energy and water use strategy as set out in National and Local planning policy.

1.3 This report also provides detail on the proposed approach to meet specific targets relating to those policies, Building Regulations and energy and water use on site.

1.4 Matters relating to flood risk and the site drainage strategy are not dealt with in this report but can be found within other reports included with this planning application submission.

2 PLANNING POLICY

Background

2.1 The energy and water use strategy for the proposed development off Mulberry Road, Congresbury has been developed in line with the following relevant planning policy.

National Policy

2.2 The revised National Planning Policy Framework, was updated on 19 February 2019, and has a section regarding sustainability in relation to energy and water consumption;

- Section 14: **Meeting the challenge of climate change, flooding and coastal change** places emphasis on, and sets out guidelines for local planning authorities, for local mitigation and adaptation measures for current and future climate change and for the support of the delivery of renewable and low carbon energy and associated infrastructure where viable.

2.3 The latest update on Government Policy is the **Government Productivity Plan** issued on 10th July 2015, Chapter 9 "Planning freedoms and more houses to buy" states;

- The Government will "repeat its successful target from the previous Parliament to reduce net regulation on housebuilders. The government does not intend to proceed with the zero carbon Allowable Solutions carbon offsetting scheme, or the proposed 2016 increase in on-site energy efficiency standards, but will keep energy efficiency standards under review, recognising that existing measures to increase energy efficiency of new buildings should be allowed time to become established".

Local Policy

2.4 **North Somerset Council Core Strategy** was adopted in January 2017 and includes the following policies;

Policy CS1 : Addressing Climate Change and carbon reduction – this policy includes the following elements in relation to housing;

- "Development should demonstrate a commitment to reducing carbon emissions, including reducing energy demand through good design, and utilising renewable energy where feasible and viable in line with standards set out in Policy CS2";

- "Developers are encouraged to incorporate side – wide renewable energy solutions to be delivered in a phased and co-ordinated way with the proposed development";

- "Maximise the opportunities for all new homes to contribute to tackling climate change through adherence to emerging and national standards such as the Code for Sustainable Homes to ensure they perform well against evolving energy standards, and have a reduced carbon footprint";

- "Developments of 10 or more dwellings should demonstrate a commitment to maximising the use of sustainable transport solutions. Opportunities for walking, cycling and use of public transport should be maximised though new development and in existing areas emphasising the aim to provide opportunities that encourage and facilitate modal shift towards more sustainable transport modes";

- "A network of multifunctional green infrastructure will be planned for and delivered through new development. They should be located throughout and in adjacent developments and demonstrate a functional relationship to the proposed development and existing area including the potential to relate to the Area of Outstanding Natural Beauty. This would include not only green spaces but also the creation and enhancement of woodland areas";

- "Protecting and enhancing biodiversity across North Somerset including species and habitats that are characteristic of the area, in order to support adaptation to climate change. This should be achieved through on and off site measures to conserve and enhance species and habitats as well as the reduction or preferably elimination of any adverse impacts through sensitive design and layout and construction of developments";

- "The reduction, re-use and recycling of waste with a particular emphasis on waste minimisation on development sites";

- "The re-use of previously developed land and existing buildings in preference to the loss of green field sites";

- "Areas will be enhanced to be resilient to the impacts of climate change including flood defence and public realm enhancements including the integration of effective shading through, for example, tree planting" and,

- "Developments should demonstrate efficiency measures to reduce demand on water resources, including through the use of efficient appliances and exploration of the potential for rainwater recycling".

Policy CS2: Delivering Sustainable Designated – this policy includes the following elements:

- "Require designs that are energy efficient and designed to reduce their energy demands";

- "Require the use of on – site renewable energy sources or by linking with/contributing to available local off-site renewable energy sources to meet a minimum 15% predicted energy use for residential development proposals involving 10 or more dwellings";

- "Require as a minimum Code for Sustainable Homes Level 6 for all new dwellings";

- Require all developments of 10 or more new homes to incorporate 100% constructed to the Lifetime Homes standard ";

- Require the application of best practice in Sustainable Drainage Systems to reduce the impact of additional surface water run-off from new development. Such environmental infrastructure should be integrated into the design of the scheme and into landscaping features, ad be easily maintained".

2.5 North Somerset Council Development Management Policies – Sites and Policies Plan Part 1 adopted July 2016 contains the following policies:

Policy DM2 - Renewable and Low Carbon Energy states:

Proposals for renewable and low carbon energy installations, excluding wind turbines, will be supported in principle subject to:
- adequate measures being taken to mitigate adverse impacts; and
- where the environmental, social and economic benefits outweigh any negative impacts.

The following criteria will be key considerations:
- living conditions, including noise and visual impacts including the cumulative impact on the landscape;

- the local natural environment, its resources and characteristics, wildlife and habitats;
- local infrastructure resulting from installation and operation of large scale sites;
- any designated or undesignated heritage asset;
- the openness of the Green Belt;
- the quality and setting of the Mendip Hills Area of Outstanding Natural Beauty (AONB) including both views to and from it; and
- the safeguarding parameters associated with any identified aerodromes including Bristol Airport. In addition to any adverse impacts, the positive implications of the proposal should be factored in including the creation of local employment, support for the local economy, the contribution to the reduction in greenhouse gas emissions locally and community ownership benefits.

Building Regulations

2.6 Building Regulation Part L 2013 Edition, Conservation of Fuel and Power, came into force on the 6th April 2014 in England with the next step forward to Zero Carbon in new buildings. New dwellings need to improve by a further 6% reduction in CO_2 emissions over the 2010 Target Emission Rate (TER). Building Regulation Part L1A requires a Code of Sustainable Homes of Level 4, equivalent to a 19% improvement. In addition, dwellings will have to meet a second mandatory target under Fabric Energy Efficiency Standard (FEES). FEES will give a value in terms of mass of CO_2 emitted per square metre of floor area per year. FEES have been included as a mechanism to ensure “fabric first” efficiencies are built into the main envelope of a dwelling.

2.7 Building Regulations Part G 2010, 2015 edition with 2016 amendments, requires new buildings to meet a maximum consumption of water of 125 litres per person per day for standard developments with an enhanced level of 110 litres per person per day maximum where planning policy dictates a higher standard.

Conclusions

2.8 Following consideration of the National and Local policies that relate to the proposed scheme, the targets for the development at Congresbury are;

- Meet Building Regulations Part L1A 2013 in terms of water consumption and reduction in CO_2 emissions; and
- Incorporate facilities to enable the charging of plug-in or ultra-low emission vehicles.

2.9 The calculation of predicted annual energy demand and associated annual Carbon Dioxide (CO_2) emissions for this development can only be achieved and confirmed at detailed design stage.

3 ENERGY & WATER STRATEGY

3.1 Proposals

3.1.1 Essentially the proposed scheme will follow the latest guidance to reduce CO_2 emissions by providing a "fabric first" approach. The following techniques will be considered;

- Increase insulation
- Reduce the effects of thermal bridging
- Effective air tightness
- Mechanical controlled ventilation with the consideration to heat recovery input ventilation.

3.1.2 As per the Energy Savings Trust Guide "Fabric First", October 2010, these methods alone can achieve the target 25% reduction in CO_2 emissions as required for Regulations Part L 2010.

3.1.3 To achieve the additional reduction in CO_2 emissions to meet the 2013 Part L Regulations, further improvements in fabric first insulation performances, window and door U values, and increased air tightness can achieve this requirement, however there may also be a consideration for on-site renewable or low carbon technology as an alternative approach.

3.2 Fabric First Techniques

3.2.1 To achieve a reduction in CO_2 emissions the following techniques will be used, however, the total reduction in CO_2 emissions that will be possible cannot be calculated until detailed design stage.

3.3 Walls

3.3.1 Enhanced U Values to be achieved by increasing the size of the cavity walls and increasing the insulation thickness, or alternatively through the use of timber framed construction with the use of high levels of insulation with the timber stud work.

3.4 Roof

3.4.1 Enhanced U Values to be achieved through increasing the thickness of the insulation.

3.5 Floors

3.5.1 Installation of high performance insulated ground floors will provide enhanced U values.

3.6 Windows & Doors

3.6.1 Utilisation of high performance glazing will provide improved U values.

3.7 Thermal Bridging

3.7.1 By employing enhanced construction details heat losses can be reduced.

3.8 Air Tightness

3.8.1 By following Passive house principles air leakage rates can be significantly improved.

3.9 Ventilation

3.9.1 With excellent air tightness principles used appropriate ventilation will need to be installed in line with Building Regulations to provide fresh tempered air.

3.10 Energy Demand & Energy Generation

3.10.1 The most cost-effective solution is always specific to the development in question, i.e. the energy profile of what is being built and its location. At the outline design stage there is not enough design information available (i.e. dimensions, layout, orientation, fabric type etc) to precisely predict the baseline energy demand for the dwellings and what will be required to provide at least 15% of the scheme's expected energy requirements from decentralised and renewable or low-carbon energy generation technology. It is therefore proposed that this element is determined at detailed design stage.

3.10.2 The final strategy for the site will be based on a combination of fabric first techniques and the installation of renewable energy technologies and will be required to be amended slightly to suit individual building design. This would involve the inclusion or

exclusion of energy efficient measures, or an increased or decreased capacity of renewable energy technologies, as applicable.

3.11 Low and zero carbon technologies

3.11.1 This section reviews the feasibility of a range of Low and Zero Carbon (LZC) technologies that could be used to achieve a reduction in CO_2 emissions' and on-site energy generation.

3.11.2 The LZC technologies that could be considered for use at Congresbury are:

- Photovoltaics
- Solar thermal panels
- Ground & air source heat pumps
- Biomass Boiler

3.11.3 This development would not be suitable for a Combined Heat and Power (CHP) plant. This type of technology is best suited to developments which have a high and constant demand for thermal energy allowing the CHP engines to operate at maximum efficiency for as long as possible throughout the year. Ideal situations include mixed development sites with over 400 domestic dwellings and those including leisure centres with swimming pools, hospitals or hotels.

3.11.4 Small scale, roof mounted turbines are not proposed for a number of reasons. The visual impact of several turbines across the development would be significant and unlikely to be acceptable. More significantly, studies by independent bodies such as Energy Saving Trust have shown that these turbines are not effective in generating power at domestic scale.

3.11.5 An alternative solution could be the installation of a single, medium to large scale turbine. Wind speed from the DTI Wind Speed Database for the site indicates an average wind speed at 10m above ground level of 4.3m/s. This would realistically be the height for domestic scale turbines and for this type of technology to be effective, an average wind speed of at least 6.0m/s is required. It would therefore appear not to be a possible solution. For this to be a viable option a location for a larger scale turbine would need to be identified so at this stage it is proposed that the energy targets for these domestic properties be met through the use of less intrusive technology.

3.12 Photovoltaic

3.12.1 Photovoltaic (PV) panels use sunlight to produce electricity; the cells convert the sunlight into electricity which can be used to run household appliances and lighting. PV cells don't need direct sunlight to work and some electricity will be generated on a cloudy day.

3.12.2 Historically a hindrance to the use of PV was the cost. Although it is still relatively expensive to install panels initially, this has been helped with the introduction of the Feed in Tariff (FiT) which provides a payment to building owners for the generation of renewable electricity where applicable. Although the level of FiT payments has recently been reduced it may still prove to be a financially viable option for this scheme.

3.12.3 Further advantages of PV systems are in their low maintenance requirements and reliability.

3.12.4 Full modelling of the Highnam scheme can only be completed at detailed design stage, but this type of technology would be suitable to assist in providing 15% of the estimated energy required across the site.

3.13 Solar Thermal

3.13.1 An alternative use of solar energy would be the installation of solar thermal panels for the generation of hot water; solar water heating systems use heat from the sun to warm domestic hot water. A conventional boiler or immersion heater is then used to make the water hotter or to provide hot water when solar energy is unavailable. Solar thermal panels are a tried and tested technology that offers good paybacks. However, for optimum performance they need to be located on roofs with an orientation of ±40° of south.

3.13.2 Again, full modelling of the Congresbury scheme can only be completed at detailed design stage and the practicalities of this proposal would need to be reviewed given the number of systems required and the orientation of the houses.

3.13.3 The downside of this technology is that their contribution to carbon reduction can be less than other LZC technologies as they negate a gas demand instead of an electrical one. (The carbon emissions from gas are approximately 3 times lower than those associated with electricity.) However, this technology could help provide 15% of the estimated energy requirement across the site.

3.14 Ground Source Heat Pump

3.14.1 Ground source heat pumps (GSHP) circulate a mixture of water and antifreeze around a loop of a pipe which is buried externally. Heat from the ground is absorbed into this fluid and is pumped through a heat exchanger in the heat pump. Low grade heat passes through the heat pump compressor and is concentrated into a higher temperature; this useful heat is capable of heating water for the heating and hot water circuits of the house. However, the pumps do use electricity to distribute this heat around the home; therefore, they can result in higher carbon emissions than the use of gas heating in an efficiently designed home.

3.14.2 In addition, although relatively low, the density of the proposed layout is unlikely to allow for pipework to be laid in trenches and would require the more costly approach of using boreholes. Feasibility work would be required to determine whether the site is suitable for the use of the boreholes, and whether the ground conditions would be adversely affected by the number of boreholes required.

3.15 Air Source Heat Pump

3.15.1 Air source heat pumps reclaim the heat available in ambient air and convert it to higher temperatures to heat the home. As with ground source heat pumps, they use electricity to distribute heat. Air source systems do not require ground works and are therefore less costly than ground source systems; however, this also means they are less efficient as the temperature of the air varies significantly more than the temperature of the ground throughout the year. Although this system is an efficient way of providing heating and hot water using electricity, the carbon emissions will still be significantly higher than if gas were used.

3.15.2 The Energy Saving Trust does not recommend heat pumps for properties supplied by an existing gas network. Given that the Congresbury scheme can be fed by a connection to a mains gas network, and due to the availability of less costly options, at this stage it is not proposed that heat pumps are used at this development. The developers may reconsider this option at the detailed design phase of the project.

3.16 Biomass Boilers

3.16.1 Biomass fuelled heating systems generally burn wood pellets, chips or logs to power central heating and hot water boilers or to provide warmth in a single room. Other fuel types are available, but the energy density of wood chips or pellets means it is typically the most appropriate solution for applications within the built environment.

Although savings on carbon emissions are significant, other implications need to be considered, especially the requirement for regular deliveries of fuel which would result in unacceptable volumes of traffic around the site. Also, for most urban UK dwellings built with a high thermal performance level, the output of even the smallest high performance boiler on the market (5-10kW) is completely excessive, making both the capital costs and ongoing running costs uneconomic.

3.16.2 An alternative approach would be the provision of a centralised boiler system with a district heating system, linked to each home via a network of underground pipework providing space and water heating. However similar disadvantages with regard to traffic requirements would need to be considered together with on-site plant and storage capacity and location, and issues relating to ownership and stewardship of a communal system.

3.16.3 Given that the other technologies present fewer operational, environmental and practical concerns, the use of biomass heating has not been considered further. However, the developers may reconsider this option at the detailed design phase of the project.

3.17 Summary of Low and Zero Carbon Feasibility

3.17.1 At this stage of the design process it is not possible to determine the energy demand for the site and therefore the amount of renewable energy generation technology that may need to be installed to produce 15% of the predicted energy requirement. However, consideration has been given to the options available to the developer that will be investigated further at detailed design stage.

3.17.2 The most suitable at this stage would appear to be the installation of some solar photovoltaic systems within the development. However, there may be a considerable cost implication which would need to be reviewed at detailed design stage.

3.17.3 Alternatively, installation of solar thermal panels could potentially be a more cost effective option but the practicalities of this proposal would need to be reviewed at detailed design stage with an assessment of the orientation of the properties and the level of energy generation required.

3.18 Water Consumption

3.18.1 At this stage of the planning process it is not possible to confirm how the developer will achieve the Building Regs water consumption target of 125 litres per person per day, however the developer could consider the following options;

- 149 litre capacity baths
- Aerated flow control fitted to all taps (5 litres/min and 10 litres/m in the kitchen and utility
- Dual Flush W/C's with 4/2.6 litre flush
- Showers fitted with 9 litre/sec flow limiters
- Water efficient appliances where applicable

3.18.2 The options for rainwater and grey water harvesting will also be considered to ensure the sustainable use of water is maximised where possible together with measures to promote water conservation by residents.

3.18.3 Water conservation during construction will be based on WRAP (Waste and Resources Action Programme) principals and will be considered further at detailed design stage. A number of areas can be considered including the following;

- Fixing leaks quickly
- Turning off taps
- Considering options for more efficient dust suppression
- Controlled urinal flushing devices & low flush cisterns in wc's
- Plan for commissioning activities considering water recirculation and minimisation
- Fit trigger guns to hoses
- Consider more efficient wheel washing systems
- Use high pressure low volume washout sprays for concrete lorries

3.18.4 WRAP principals will also be employed to reduce energy consumption on site where possible.

4 CONCLUSIONS

4.1.1 The application proposes residential development at Land at Mulberry Road, Congresbury. This report has addressed National and Local policies relevant to the energy and water use strategy for the proposed development. This statement also takes into account the Council's 'Creating Sustainable Building and Places in North Somerset' SPD adopted 21st April 2021.

4.1.2 The proposed strategy is based on an improvement in standard energy efficiency to meet Part L of the Building Regulations 2013 in terms of reduction in CO_2 emissions. Full details of how the scheme will fully achieve any Part L Building Regulation targets can only be confirmed at detailed design stage but will encompass a 'Fabric First' approach and will include the following;

- Increase insulation
- Reduce the effects of thermal bridging
- Effective air tightness
- Improved controlled ventilation
- Energy efficient lighting

4.1.3 Additional renewable energy generation technology may be installed within the development to provide some of the development's energy requirements from decentralised and renewable or low-carbon energy generation technology. This can only be developed in more detail as further design and layout information becomes available.

4.1.4 The development can incorporate measures to limit water use. It is anticipated that this aim can be accommodated within the water use strategy for the site and confirmed at detailed design stage. The developer can consider several options to ensure that the average water consumption level meets the Building Regulations target.

4.1.5 During construction WRAP principals will be employed to reduce energy and water consumption levels.

4.1.6 It is anticipated that the development would be designed to enable the installation of plug-in or ultra-low emissions vehicle charging points in safe, convenient locations. The precise location and number of charging points to be provided will be confirmed at the detailed design stage, once the final layout for the site has been determined.