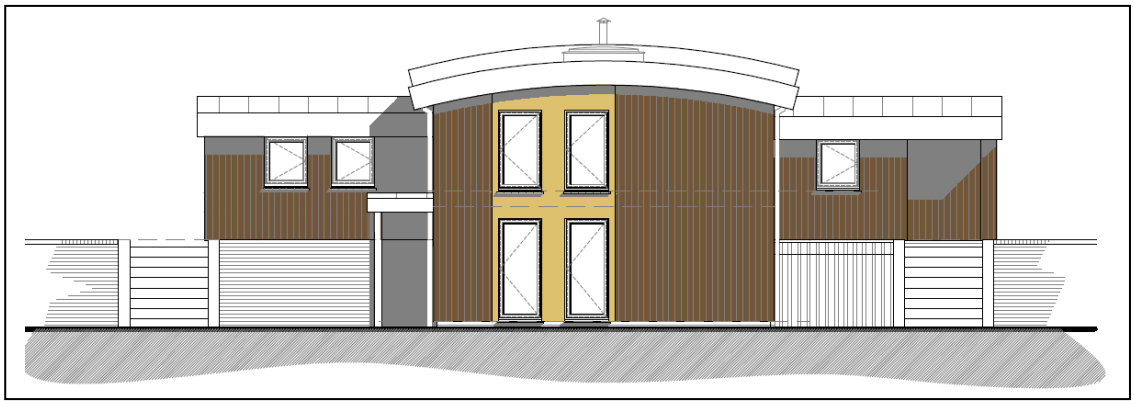
Proposed Replacement Dwelling, The Old Parsonage, Beaford.

Energy and Sustainability Statement



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E.0 Executive Summary

e.1 Introduction

This Energy and Sustainability Statement sets out the approach for a sustainable development and assesses methods of achieving the highest levels of energy efficiency and reductions in carbon emissions beyond Building Regulations 2021 on the proposed development of a new dwelling at The Old Parsonage, Beaford, North Devon. It will ensure the proposal meets the targets as set out in existing Local Plan policies and consider any draft policies, where appropriate as well as achieve the developer goals of very low carbon and low energy use dwellings.

Specifically, the Energy and Sustainability Statement sets out to demonstrate the development's approach to meeting the following key obligations: -

- Achieving current Building Regulations Part L 1 2021 requirements
- Meet the requirements as set out in the North Devon and Torridge Local Plan key policies - Policy ST01 Sustainable Development, Policy ST02 Mitigating Climate Change, Policy ST03 Adapting to Climate Change and Strengthening Resilience, Policy ST05 Sustainable Construction and Buildings
- Meet the Potable Water Efficiency target of 110 litres per person per day
- The developer's goals of very low carbon and low energy demand dwellings.

e.2 Minimum Fabric Standards

The minimum fabric standards set out in Table 0.a are expected to be implemented to reflect the requirements of the new Building Regulations Part L 2021 requirements and establish the highest fabric energy efficiency values to reduce dwelling energy requirements to a minimum.

As upgrades to existing fabric elements under the new Approved Document L in this case cannot practically achieve the higher energy efficiency targets required by the developer (near zero carbon and low energy use), the developer is keen that the new dwelling proposal is better suited to the higher fabric standards as in Column c, Table 0.a. below.

Table 0.a. Summary of Building Fabric Standards to achieve the requirements of new buildings in Building Regulations Part L1 2021 compared to Existing Dwellings requirements

(a) Element	(b) Existing Dwellings and change of use Threshold /Improved/New (W/m^2K)	(c) New Dwelling (Notional) (W/m^2K)
Walls (Cavity)	0.7/0.55/0.18	0.18
Walls	0.7/0.55/0.18	0.18
Roof (Insulation at Joist Level and/or Rafter level)	0.7/0.3/0.15	0.11
Ground floor	0.7/0.25/0.18	0.13
Glazing/Rooflight	1.4/2.2	1.2
Opaque doors	1.4	1.0
Thermal Mass Parameter	Not required	Calculated
Air Permeability (m^3/m^2hr @ 50pa)	No required	2.5 - 5
Thermal Bridges (Y	Calculated	Calculated

As e.3Technologies and Energy Strategy approach

In achieving the relevant targets, a summary of the potential energy strategy across the development is shown in Table 0.b

Table 0.b Energy strategies for residential Unit at the proposed development at The Old Parsonage

Building Type	Summary of Proposed Energy Strategies
Residential House/Flat Types	• High fabric energy efficiency in all elements to reduce overall energy demand • High efficiency Heat Pump Technologies for Domestic space and water heating • Mechanical Ventilation and Heat Recovery • High efficiency Thermal Stores for integrated domestic hot water and heating • Solar Photo Voltaic Panel mounted on Southernmost aspect roof spaces or free standing and/or Solar thermal panels, where appropriate.

e.4 Additional Measures

In addition to the fabric standards, the following measures are proposed as part of the passive design of buildings on the proposed development: -

- Design the ventilation approach to ensure good fresh air supply throughout the year and to allow passive cooling in summer.
- Utilise the orientation of exposed facades to maximise natural daylight and solar gain (especially living and working accommodation) on the south side.
- High levels of thermal mass to ensure passive heat capture and balanced internal temperatures without the requirement of mechanical cooling and ventilation.
- Residents will be provided with energy display devices with simple default displays including traffic light indicators and information on the cost of energy used.

e.5 Sustainable Development

Key issues are: -

- Sustainable design elements such as a Surface Water Drainage system (SuDS) and rainwater capture
- Flexibility of design to allow for roof mounted Solar PV and/or other Low Zero Carbon Technologies (LZCs)
- Living areas orientated to maximise daylight and solar gain in winter.
- Use of sustainable building materials with low embodied energy, carbon contents and a focus on local sourcing.
- Site waste management and storage of waste to ensure minimal waste to landfill and maximum recycling.

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1.0 Introduction

1.0 Background

1.1.1 This Statement has been prepared by Carbon Green Consulting Ltd (CGC) in response to the National Planning Policy Framework which requires all developments to be sustainable, to mitigate and adapt to climate change, taking full account of flood risk, coastal change and water supply and demand considerations. It accompanies an outline planning application for the development of a new dwelling (Use Classes C3) at The Old Parsonage, Beaford, North Devon.

1.1.2 The following documents have been referred to in this report to demonstrate compliance:

Climate Change Act 2008
The Climate Change Act (UK Government 2008) introduced a legally binding target to reduce the UK's greenhouse gas emissions (GHG) to at least 80% below 1990 levels by 2050.

The National Planning Policy Framework February 2019
The National Planning Policy Framework (NPPF) (Department of Communities and Local Government 2019) sets out the Government are planning Polices for England and how these are expected to be applied. It provides a framework within which local needs can be reflected.

Key elements for this proposed development are: -
"New development should be planned for in the ways that can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government policy for the national technical standards."
The document also lists methods to help in increasing the use and supply of renewables and low carbon energy and heat plans:
"a) Provide a positive strategy for energy from these sources, which maximizes the potential for suitable development, whilst ensuring that adverse impacts may be addressed satisfactorily (including cumulative landscape and visual impacts).
b) Consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure where this would help secure their development; and
c) Identify opportunities for development to draw its energy supply from decentralized, renewable/low carbon energy supply systems and for co-locating potential heat customers and suppliers."

Building Regulations 2021 Edition Part L1 Conservation of Fuel and Power Volume 1 Dwellings
Part L of the Building Regulations (Department of Communities and Local Government 2016) forms the cornerstone of regulatory measures for the use of fuel and power in buildings and is the driver in improving building energy efficiencies and a reduction of carbon dioxide in buildings.

North Devon and Torridge Local Plan 2011-2031

Policy ST02: Mitigating Climate Change
Development will be expected to make a positive contribution towards the social, economic and environmental sustainability of northern Devon and its communities while minimising its environmental footprint by:

(a) reducing greenhouse gas emissions by locating development appropriately and achieving high standards of design;

(b) conserving and enhancing the natural, built and historic environment through the prudent use of key resources including land, buildings and energy, whilst protecting and enhancing the area's biodiversity, geodiversity, landscape, coastline, air, water, archaeology and culture;

(c) ensuring a balanced mix of uses where development takes place in environmentally, socially and economically sustainable locations by reducing the need to travel, especially by car, and facilitating a

step-change towards the use of sustainable modes of transport including walking, cycling and public transport;

(d) promoting opportunities for renewable and low-carbon energy generation whilst conserving and enhancing the natural and built environment;

(e) redeveloping previously developed land and reducing, reusing and recycling resources, including construction materials, providing for more efficient use of facilities and enhanced opportunities for recycling; and

(f) reducing pressure on water resources and increasing their reuse through sustainable water management.

Policy ST05: Sustainable Construction and Buildings
(1) All new major development proposals will make a positive contribution towards the creation of resilient and cohesive communities and ensure that built and environmental assets can adapt to and be resilient to climate change.

(2) Non-domestic development of at least 1,000m2 will be expected to achieve a BREEAM rating of 'Very Good'.

(3) All new major development will be encouraged to build to a standard which minimises the consumption of resources during construction and thereafter in its occupation through:

(a) incorporating passive design measures to reduce overall energy demand and improve energy efficiency through the design and layout of the site;

(b) connecting to any existing or proposed decentralised energy scheme or developing a scheme individually or jointly within a specified time frame;

(c) maximising opportunities for renewable and low carbon technologies; and

(d) using locally sourced and/or recycled materials in construction where they are available and represent a viable option.

Policy ST03: Adapting to Climate Change and Strengthening Resilience
Development should be designed and constructed to take account of the impacts of climate change and minimise the risk to and vulnerability of people, land, infrastructure and property by:

(a) locating and designing development to minimise flood risk through:

(i) avoiding the development of land for vulnerable uses which is or will be at risk from flooding, and

(ii) managing and reducing flood risk for development where that has wider sustainability or regeneration benefits to the community, or where there is no reasonable alternative site;

(b) reducing existing rates of surface water runoff within Critical Drainage Areas;

(c) upgrading flood defences and protecting key transport routes from risks of flooding;

(d) re-establishing functional flood plains in accordance with the Shoreline Management Plan, Flood Risk Management Plan and Catchment Action Plan;

(e) locating development to avoid risk from current and future coastal erosion;

(f) adopting effective water management including Sustainable Drainage Systems, water quality improvements, water efficiency measures and the use of rainwater;

(g) ensuring development is resilient to the impacts of climate change through making effective use of renewable resources, passive heating and cooling, natural light and ventilation;

(h) ensuring risks from potential climate change hazards, including pollutants (of air and land) are minimised to protect and promote healthy and safe environments;

(i) conserving and enhancing landscapes and networks of habitats, including cross-boundary green infrastructure links, strengthening the resilience of biodiversity to climate change by facilitating migration of wildlife between habitats and improving their connectivity;

(j) protecting and integrating green infrastructure into urban areas, improving access to natural and managed green space; and

(k) promoting the potential contribution from ecosystem services that support adaptation to climate change.

The development of The Old Parsonage, Beaford, will demonstrate reduced energy demand compared to the Notional Building and reliance on the National Electricity Grid using firstly fabric energy efficiency measures and then energy saving and zero carbon or low carbon (renewable energy) sources (LZCs), as demonstrated using FSAP 10.2 2022.

1.2 Scope of the Report

1.2.1 In view of this and government's "No gas" approach to the future of domestic heating and hot water after 2025, the focus of this document and thus the proposed scheme will be electric led for both domestic heating and hot water.

1.2.2 The structure and content of this report is based on the latest government guidance on preparing Energy Assessments (2016). Building CO_2 emission reductions have been computed at each stage of the Energy Hierarchy. SAP 10.2 will be used to establish how the new Building Regulations Approved Document Part L 2021 (ADL1) targets may be achieved.

1.2.3 The objectives of the Energy and Sustainability Strategy are: -

- To clearly demonstrate the applicant's commitment towards reducing Green House Gas and CO_2 Emissions and to detail the measures proposed to achieve such reductions.
- To account and mitigate any potential air quality impacts arising from the selection of technologies for reducing CO_2 emissions.
- To demonstrate the adopted measures for reducing any risk of overheating, including incorporation of building passive design measures.
- To demonstrate how the new development will reduce potable water and capture rainwater where feasible.
- To select renewable technologies that are complementary with the new development and can achieve the "Zero Carbon Ready" requirements under Future Homes Standards.
- To achieve a Building Regulations compliant building in the baseline, achieving Building Regulations Part L1 2021 compliance.
- Consider the use of LZC technologies in achieving a reduction in CO_2 emissions and energy demand below the Part L 2021 targets.

1.3 Expected Outcomes

1.3.1 The Energy and Sustainability Statement for the proposed development at The Old Parsonage, Beaford Farm will demonstrate the requirement for reduction in energy demand as set out in The National Planning Policy Framework and conform to national, regional and local policy guidance.

1.4 Methodology

1.4.1 CGC has used FSAP 10.1 methodology to calculate energy demand for the proposed dwelling and demonstrate the carbon emissions and energy demand before and after a carbon reduction from renewable technologies over ADL1 2021.

1.5 Disclaimer

1.5.1 The report has been drafted using all reasonable skill, care and diligence of a competent engineer. No responsibility is accepted for the use of this document and its content by any parties other than the Client. Any third parties rely upon the report and its content at their own risk and shall be responsible for their own checking of any detail herein.

2.0 Principles of Performance

2.1 Barn Conversions under Class Q versus new dwellings under ADL1

2.1.1 The developer is keen to develop high quality, modern, energy efficient homes. However, it is felt that the restrictions which Class Q imposes, coupled to the inherent structural restrictions any such conversion may be subject to, as well as the technical flexibility of The Building Regulations Conservation of Fuel and Power ADL1, could produce a less acceptable outcome than either the planning authority or the developer intended.

2.1.2 In this case, retaining existing elements (walls, floors and roofs) will offer generally poor or no insulation based on their previous use. Therefore, upgrading these elements to an acceptable standard and offering acceptable comfort levels to the new occupants, presents a significant issue to the developer. Existing building elemental materials may well be scrapped, adding an additional carbon emissions impact..

2.1.3 As Table 2.1 below demonstrates, the improved U values (column b) for the main building elements are significantly less arduous to achieve for barn conversions than those for new dwellings due to the accepted practical difficulties in insulating these elements. This will have a negative affect on the carbon emissions and energy demand for the conversion and will impair the aspirational low carbon and energy use targets of the developer.

Table 2.1. Summary of Building Fabric Standards to achieve the requirements of new buildings in Building Regulations Part L1 compared to Existing Dwelling requirements

(a) Element	(b) Existing Dwellings and change of use Threshold /Improved/New (W/m^2K)	(c) New Dwelling (Notional) (W/m^2K)
Walls (Cavity)	0.7/0.55/0.18	0.18
Walls Internal/external insulation	0.7/0.55/0.18	0.18
Roof (Insulation at Joist Level and/or Rafter level)	0.7/0.3/0.15	0.11
Ground floor	0.7/0.25/0.18	0.13
Glazing/Rooflight	1.4/2.2	1.2
Opaque doors	1.4	1.0
Thermal Mass Parameter	Not required	Calculated
Air Permeability (m^3/m^2hr @ 50pa)	No required	8
Thermal Bridges (Y values)	Not required	Calculated to no more than $0.05w/m^2K$

2.1.3 There are always practical issues where existing structural junctions require adequate insulation, even more so where energy and carbon targets are significant. Much of the time high insulations standards

are not possible to meet and currently no target requirements for thermal bridge calculations for potential barn conversions within ADL1.

2.1.4 Therefore, in this case, it is felt that any conversion is liable to compromise the design principles, impose impractical internal layouts, increase the risk of resource inefficiency, and reduce the overall sustainable qualities of the residential development.

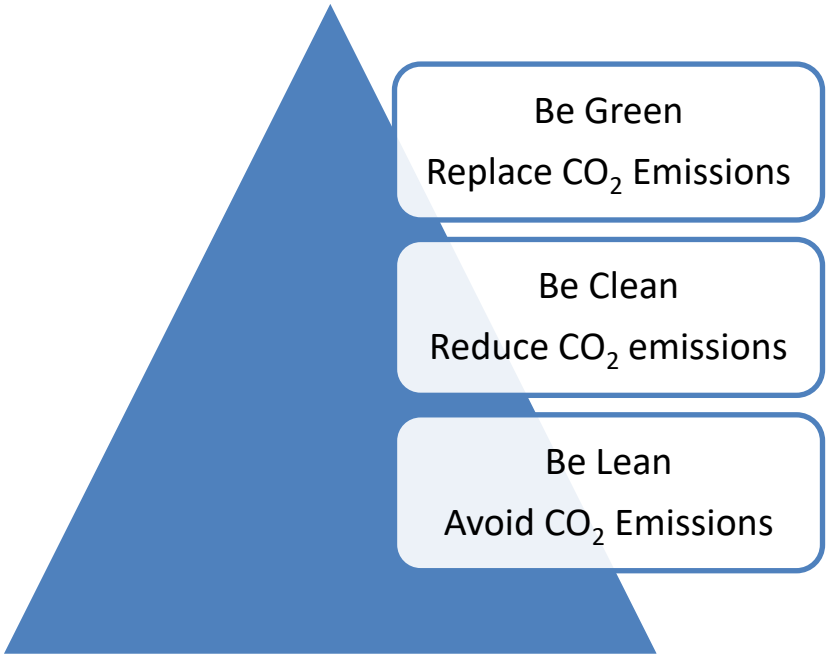
2.2 Fabric First Performance Standards

2.2.1 Reducing the overall demand for regulated energy (energy used for heating, lighting and hot water) by building warm, draft free buildings with plenty of natural light is the primary focus for the proposed development.

2.2.2 The proposal applies best practice measures for the minimisation of carbon emissions associated with energy use.

2.2.3 Following the Carbon Emissions Reduction Hierarchy set out in Figure 2.1., the proposed new development will employ a fabric first approach to exceed the current required Target Emissions Rate (TER) and Fabric Energy Efficiency (FEE) under Part L1.
As below the three steps of the hierarchy will be adhered to: - *Be Lean - Avoid emissions, Be Clean - Reduce emissions, Be Green - Replace Emissions.*

Figure 2.1 Carbon Emission Reduction Hierarchy



2.2.4 The design will employ energy efficiency features including high levels of insulation in all elements (floors, walls, ceilings) to minimise energy requirements and individual calculated Psi values to minimise cold bridging at junctions and conform to or surpass current Building Regulations (Part L1) requirements.

2.3 The Development Baseline

2.3.1 In order to measure the effectiveness of energy demand-reduction measures, it is necessary to calculate the baseline energy demand using FSAP 10 methodology. This is referred to as the Target Emission Rate (TER). The TER, or baseline energy demand, represents the maximum CO_2 emissions that are permitted for the dwellings to comply with ADL 1 2021 as Table 2.1 below.

Table 2.1 Baseline Specification

Element	Baseline Design Specification
Ground Floor U-Value (W/m^{2}K)	0.13
External Wall U-Value (W/m^{2}K)	0.18
Party Wall U-Value (W/m^{2}K)	0 (fully filled and sealed)
Roof – insulated at ceiling U-Value (W/m^{2}K)	0.11
Roof – insulated at slope U-Value (W/m^{2}K)	0.11
Roof – flat, U-Value (W/m^{2}K)	0.11
Glazing U-Value, including frame (W/m^{2}K)	1.2
Door U-Value (W/m^{2}K)	1.0
Design Air Permeability (m^3/m^{2}hr @ 50pa)	8
Space Heating	Ground Source Heat Pump Design Flow - 45^{o}C
Heating Controls	Weather compensation, time, temperature zone controls, thermostatic radiator valves
Domestic Hot Water	Stored hot water in Cylinder with back-up immersion
Ventilation	Natural ventilation with intermittent extract fans
Low Energy Lighting	Efficacy = 90lm/W
Thermal Bridges	Calculated Psi Values

2.3.2 The resulting ADL1 2021 TER for the proposed development has been calculated using Part L model design which have been applied to the proposed development. (See Table 2.2 below)

Table 2.2 Target Emissions Rates (TER) for sample Standard Masonry House Types taken as the baseline for the proposed development, versus Building Regulations Part L 2021 using FSAP 10.

	Gross Internal Floor area (m^2)	Target Emission Rate ($Kg\ CO_2/m^2$)
Replacement Dwelling	201.51	5.34

3.0 Achieving Carbon Emissions Targets

3.1 Avoid CO_2 Emissions

3.1.1 The fabric first or "Be Lean" approach to avoid CO_2 emissions, now accepted as best practice, has been chosen as the preferred method to achieve most of the CO_2 reductions. The current Building Regulations notional building does offer flexibility in setting higher levels of fabric energy efficiency in building elements particularly walls, roofs and floors U values and junction details which may deliver greater Fabric Energy Efficiency.

3.2 Achieving beyond Building Regulations Part L1 standards

3.2.1 The designs at the proposed development at of The Old Parsonage site will employ energy efficiency features including high levels of insulation in all elements (floors, walls, ceilings) to minimise energy requirements and individually calculated thermal bridging values to minimise cold bridging at junctions and conform to or surpass current Building Regulations.

3.2.2 The minimum fabric standards set out in Tables 3.1 will be implemented in the development to ensure compliance with the new Fabric Energy Efficiency Standards set out in Building Regulations Part L 2021

Table 3.1 Summary of Building Fabric Standards for the proposed new unit beyond Part L1 2021 Building Regulations limiting requirements

Element	Residential (W/m^2K)
Walls	0.16
Intermediate Walls	0.0
Roof (Insulation at rafter level)	0.11
Ground floor	0.13
Glazing	U value 1.2, g value 0.6, Frame Factor 0.7
External solid Door	U value 1.0
Thermal Mass Parameter	Calculated
Air Permeability (m^3/m^2hr @ 50pa)	1-3
Thermal Bridges (Y values)	Calculated

3.2.3 As Table 3.1 shows, the proposed development will employ high fabric energy efficiency to key building elements beyond the standards set in Building Regulations Part L1A. These will be utilised

across the proposal to reduce the overall energy requirement and therefore the use of additional solutions in achieving the targets will be minimised. However, there may be some requirement for additional technological solutions in achieving any future conditional requirements which are explored in the following section.

3.3 Ventilation

3.3.1 The use of Mechanical Ventilation and Heat Recovery (MVHR) is planned and will offer the new dwelling high levels of fresh, temperature-controlled air. The heat recovery element of this technology will reduce energy demand and increase overall efficiencies.

3.3.2 As MVHR is being planned for the new dwelling, an air permeability of less than 3m^3/m^2hr @ 50pa will be required as a target, with a minimum of 1 m^3/m^2hr @ 50pa to guard against interstitial condensation risks. Using this strategy will help deliver high levels of comfort, with relatively low space heating requirements. In addition, it will help reduce the Low Zero Carbon Technology requirements to achieve a reduction in CO_2 emissions in achieving the various targets and goals.

3.4 Reduce Emissions

3.4.1 Once the need for energy has been avoided using measures in the previous section, reducing the emissions from the home and equipment within the home is the next stage in the carbon hierarchy. Careful specification of systems and good management of energy in the operation of the building is critical.

3.4.2 Most of the variation between new homes in the efficiency of their use of energy is due to occupant choices. Therefore, it is expected that the following measures will be implemented at the new dwelling development to influence this behaviour:

- The new Resident will be provided with information on energy labelling for white goods, including estimates of typical annual energy costs for each grade of efficiency.
- The new resident will be provided with an energy display device with simple default displays including traffic light indicators and information on the cost of energy used as in Figure 3.2.

3.4.3 It is recognised there is additional energy saving and thus carbon emissions savings through reducing the energy lost from large volumes of waste hot water from household appliances such as showers and baths. Therefore, it is planned to fit Wastewater Heat Recovery (WWHR) units to all shower units.

3.4.4 It is recommended that an energy display device is provided for residents as they highlight where energy is used.

Figure 3.1 Example of Smart Energy Display Devices

3.4.5 Table 3.2 below shows the effect of increased fabric energy efficiency measures on the Dwelling Emissions Rate for the example dwellings.

Table 3.2 Dwelling Emissions Rates (DER) for sample Standard Masonry House Types and Specification 1 (Annex A) taken as the baseline for the proposed development using upgraded fabric measures versus Building Regulations Part L 2021 using SAP 10.1

	Gross Internal Floor area (m^2)	Target Emission Rate ($Kg\ CO_2/m^2$)	Dwelling Emission Rate (DER) ($Kg\ CO_2/m^2$)	% Reduction over TER
Replacement dwelling	201.51	5.34	2.79	47.75%

3.4.6 At this stage, as Table 3.2 shows, avoiding and reducing carbon emissions and energy use can only achieve just beyond Building Regulations targets.

3.5 Replace Emissions

3.5.1 There is a requirement to achieve a reduction in CO_2 emissions compared to Building Regulations Part L 2021. This can be demonstrated using the National Calculation Methodology (NCM) for Part L of the Building Regulations.

3.5.2 As building designs are at the planning stage and therefore have not been finalised, it is useful to develop early-stage Building Regulations Part L models to establish how the proposal can achieve overall compliance. Therefore, models have been built for sample dwellings for the proposed development using SAP 10.1 to demonstrate compliance.

3.6 Technological Alternative solutions

3.6.1 This section offers an analysis of various Low Zero Carbon (LZC) and renewable energy technologies for consideration on the development. Table 3.3 below considers the alternative low and zero carbon energy options for the residential units in compliance with the planning policy requirement.

Table 3.3 Alternative Low and Zero Carbon energy options

Technology	Comments
Solar Thermal	Available in two main forms as flat plate and evacuated tube collectors. In general, the evacuated tube system is more efficient however it is less robust and more prone to breakage of the tubes. Flat Plate is favoured in areas where it is accessible and therefore is a more robust solution. Either system is in common usage mainly for hot water generation

Solar Photo Voltaic	There are three basic types of solar cell. **Monocrystalline** cells are cut from a silicon ingot grown from a single large crystal of silicon whilst **Polycrystalline** cells are cut from an ingot made up of many smaller crystals. These are the most efficient in producing energy. The third type is the **Amorphous** or **Thin-film** solar cell which offers locational flexibility but low efficiencies.
Wind Generation	Small scale wind turbines may be suitable for a development of this size. They could be roof or mast mounted. Wind turbines are available in several types with both horizontal axis and vertical axis blades. Horizontal axis is generally more efficient, but all wind turbines require a clear air path and minimal turbulence to achieve best results

3.9 Recommendations for Renewable technologies

3.9.1 With due consideration of the Low Zero Carbon and Renewable Energy Technologies available for the proposed scheme, Heat Pump Technologies are most suited to the nature of the proposed development.

3.9.2 The addition of roof mounted or free-standing Solar PV and Solar Thermal panels will demonstrate that the development achieves future carbon emissions and energy reduction targets.

3.10 Achieving a Zero Carbon and low energy development

3.10.1 In achieving the Target Emissions Rate high levels of building services specification will be used, potentially utilising multi-zonal heating controls, high performance hot water cylinders in combination with Ground Source Heat Pump Technology in all dwelling proposed. Table 3.6 shows SAP results for the proposed dwelling using the building fabric standard and building services specification as set out in Annex A.

Table 3.6 Sample Standard Masonry House Type and Specification 1 (Annex A), versus Building Regulations Part L 2021.

	Gross Internal Floor area (m^2)	Target Emission Rate ($Kg\ CO_2/m^2$)	Dwelling Emission Rate (DER) ($Kg\ CO_2/m^2$)	% Reduction over TER
Proposed dwelling	201.51	5.34	1.01	81.09%

3.10.2 The Table above shows the extent to which the proposed dwelling exceeds current Building Regulations using standard masonry specification and specification in Annex A and goes beyond the policy requirement in carbon emissions using Low Zero Technologies (Ground Source Heat Pump Technologies, Solar PV) to reduce overall energy demand and carbon emissions.

4.0 Sustainability Measures

4.1 Introduction

4.1.1 Although there are no detailed plans for the proposal at present due to the nature of the application, the developer is keen to demonstrate a commitment to current and future sustainability requirements and goals through this section of the report.

4.1.2 The section follows closely on from the sections addressing reductions in carbon and energy demand and will discuss in broad terms, the types of measures which may be employed across the proposed development to deliver a sustainable development in line with the relevant policies in the adopted Local Plan requirements and developer aspirations, as covered in the introduction.

4.2 Internal and External Water Consumption

4.2.1 Measures will be taken to minimise water use, with a target of 110 litres per day per person. This can be achieved by specifying low flow taps, showers and aerators, dual flush toilets and low volume baths, where applicable. However, the specification of baths within residential units will be minimised (i.e where showers could be specified). (See Annex B) The fitting of external main drainage fed water buts for rainwater storage will be explored to reduce surface water runoff.

4.3 Sustainable Drainage (SuDS)

4.3.1 Sustainable Drainage Systems (SuDS) are an approach to drainage which seeks to decrease the amount of surface water runoff and/or divert it for other purposes, thereby reducing the contribution it makes to sewer discharge and flooding. SuDS can also improve the quality of runoff, preventing pollutants from entering the drainage system and provide landscape, amenity and biodiversity benefits.

4.4 Materials and Waste

4.4.1 In the design process, materials and systems will be selected that include an environmental assessment using the BRE Green Guide to Specification for Buildings. These selections will include evaluations of cost and performance as well as environmental considerations.

4.4.2 Preference will be given to the use of local materials and suppliers, where viable, to reduce the transport distances and to support the local economy. Supply chains could be developed locally for timber products where timber frame buildings are specified and many other products such as stairways and panelling.

4.5 Site Waste Management

4.5.1 During development, a Construction Site Waste Management Plan will be employed to monitor and report waste generated in defined waste groups. The plan will include the setting of targets to promote resource efficiency and will include procedures and commitments to sort and divert waste from landfill.

4.6 Storage of Waste and Recycling

4.6.1 Provision will be made for the internal and external storage of non-recyclable waste and recyclable waste. Internal recycling bins will be located in a dedicated non-obstructive position such as a cupboard in a kitchen or utility room. External space should be located on level hard standing and accessed by an inclusive route from the closest external door to the dwelling. The area benefits from Local Authority waste and recycling services.

4.7 Composting

4.7.1 Composting facilities could be supplied for each dwelling to accommodate recycling of green and garden waste

4.8 Pollution

4.8.1 The proposal will include a strategy to ensure all space heating and hot water systems minimise the risks associated with pollutants such as the Nitrogen Oxide group of highly reactive gasses. At this stage in the design process, it is assumed that Heat Pump Technologies will be required for primary space and water heating. Such modern equipment can deliver no or very low NOx emissions.
Building products such as insulants which have high Global Warming Potential (GWP) will be restricted.

4.9 Minimising Construction Site Impacts

4.9.1 The development will adopt best practice in monitoring, reporting and setting targets for Air (dust), noise, water pollution and consumption across the site.

4.10 Overheating

4.10.1 With such well insulated and airtight dwellings, it is critical that the new dwellings not only remain warm in winter, but also stay cool in summer. The design and siting of high-performance glazing and orientation of living areas, as well as designing adequate natural cross ventilation are integral to the scheme. Therefore, and in compliance with Building Regulations Part O, an Overheating Study will be completed to demonstrate compliance.

5.0 Conclusion

5.1 Summary

5.1.1 This Energy and Sustainability Statement has set out details of how the proposal for the development of a new dwelling (Use Classes C3) at The Old Parsonage, Beaford will achieve a reduction in energy use and carbon emissions as well as achieve a maximum target of 110 litres of potable water per person per day.

5.1.2 The report sets out the benefits of a new build development over conversion and retrofit of the existing building in achieving the National Building Regulations Standards, as well as complying with local planning policy and meeting the developer's goals of producing very low/zero energy and carbon dwellings.

5.1.2 It has demonstrated how the development proposal will be designed using the principles of the Energy Hierarchy and highly energy efficient building designs and materials.

5.1.3 The strategy utilises the principles of passive design and energy efficiency. This approach is advantageous in ensuring reduction in energy consumption at source, instead of installation of costly renewable measures that only provide a means of offsetting energy consumption, rather than controlling demand.

5.1.4 The use of high fabric energy efficient building elements, coupled with Low Zero Carbon Technologies (Heat Pump Technologies, solar PV panels), will achieve and surpass the requirements of the Building Regulations and local planning policy requirements and demonstrate how this is an highly sustainable development, contributing to the broader carbon emissions reduction targets.

Annex A Building Specification - Masonry Cavity

	Houses
External Walls U value	0.16 W/m2k
Intermediate Walls U value	-
Ground Floor U value	0.13 W/m2k
Intermediate floor U value	-
Roof U value	0.11 W/m2k
External Door U value	1.0 W/m2k
Window U value	1.2 W/m2k
Window g value	0.6
Thermal Bridging Y value (ACDs)	Calculated
Indicative Thermal Mass	Calculated
General Construction	Masonry cavity wall, Solid Concrete floor and internal stud walls.

Annex A Building Specification cont… Example Building Services

	Detached dwelling
Domestic Heating	Ground Source Heat Pump with under floor pipe work
Control	Delayed Start Thermostat, weather/load compensation, time and temperature zone control
Hot water Cylinder	250 litre Thermal Store Declared loss factor of 1.4kW/day
Heat emitters	Under floor with zones
Cooling	Natural ventilation through openable windows
Ventilation	Mechanical Ventilation and Heat Recovery
Air Permeability	1-3 $m^3/h/m^2$
Lighting	100% Energy Efficient 95lm/W
Waste bath/shower water	Wastewater Heat Recovery Systems (WWHR)

Annex B Part G Water Calculator for New Dwellings

Installation Type	Unit of Measure	Capacity/Flow rate (1)	Use Factor (2)	Fixed use (litres/person/day) (3)	Litres/person/day = [(1)x(2)] + (3) (4)
WC (single flush)	Flush Volume (litres)		4.42	0.00	0
WC (dual flush)	Full flush Volume (litres)	6	1.46	0.00	8.76
	Part flush Volume (litres)	2.4	2.96	0.00	7.10
WC (multiple fittings)	Average effective flushing Volume (litres)		4.42	0.00	0
Taps (excluding kitchen/utility room taps)	Flow rate (litres/min)	5.00	1.58	1.58	9.48
Bath (where shower also present)	Capacity to overflow(litres)	160.00	0.11	0.00	17.60
Shower (where bath also present)	Flow Rate(litres / minute)	9.00	4.37	0.00	39.33
Bath Only	Capacity to overflow(litres)		0.50	0.00	0
Shower Only	Flow Rate (litres/minute)		5.60	0.00	0
Kitchen/Utility room sink taps	Flow rate (litres/minute)	7.00	0.44	10.36	13.44
Washing Machine	(Litres/kg dry load)	8.17	2.1	0.00	17.16
Dishwasher	(Litres/place setting)	2.15	3.6	0.00	7.74
Waste disposal unit	(Litres/use)	☐ Present	3.08	0.00	0
Water Softener	(Litres/person/day)		1.00	0.00	0
	(5)	**Total Calculated use (litres/person/day) =SUM(column 4)**			120.61
	(6)	Contribution from greywater (litres/person/day)			0
	(7)	Contribution from rainwater (litres/person/day)			0
	(8)	Normalisation factor			0.91
	(9)	Total water consumption (Code for Sustainable Homes) = [(5)-(6)-(7)]x(8) (litres/person/day)			109.76
	(10)	External water use			5.0
	(11)	**Total water consumption (Building Regulation 17.K) =(9)+(10)(litres/person/day)**			114.8