

# **Pentangle Design Group**

# Energy and Sustainability Statement

For the Replacement Barn Dwelling at

Marshfield Barn, Hinxworth, Herts

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## 1.0 Introduction

This Sustainability and Energy Statement supports a full planning application for the conversion and extension of a redundant agricultural barn into a single residential dwelling. Prior approval for this conversion was previously granted under Class Q (ref: 22/00547/PNQ). This proposal enhances the earlier scheme with a more sustainable and integrated design, incorporating renewable energy and low-carbon technologies in line with local policy expectations.

## 2.0 Energy Efficiency and Passive Design

- A **fabric-first approach** will be used, with building fabric exceeding the insulation and air permeability requirements of **Building Regulations Part L (2021)**.
- The **form and orientation** of the barn has been retained to respect the existing layout, but adjusted to minimise energy consumption through:
  - **Reduced glazing on the true south elevation** to mitigate overheating.
  - **Cross-ventilation** opportunities to improve internal thermal comfort.
  - Careful detailing of eaves and roof edges to allow shading in summer months.

## 3.0 Renewable and Low Carbon Energy Strategy

The development integrates several renewable and low-carbon technologies, including:

- **A minimum of 16 photovoltaic (PV) panels**, discretely located on the rear (south-facing) roof slope.
- **Battery storage system** to maximise usage of generated renewable energy on-site.
- An **efficient air source heat pump (ASHP)** providing heating and hot water, to the rear of the barn in a discrete location
- **Electric vehicle charging points** for **two vehicles**, situated with the carparking spaces

These technologies reduce reliance on grid-supplied energy and fossil fuels, and significantly lower the dwelling's operational emissions.

## 4.0 Estimated Carbon Emissions

Although detailed SAP calculations will follow at Building Regulations stage, the development is expected to achieve:

- A minimum **20% reduction in CO<sub>2</sub> emissions** compared to the baseline Target Emission Rate (TER).
- Compliance with the **'Silver' performance benchmark** set out in the **North Hertfordshire Sustainability SPD (2024)** for minor residential development.

## 5.0 Materials, Labour and Embodied Carbon

- **Local and sustainable sourcing** of construction materials wherever possible.
- **Re-use of existing timber and structural components** where viable.
- Labour will be sourced from **local trades and suppliers**, reducing transport emissions and supporting the local economy.
- Consideration will be given to BRE's **Green Guide to Specification** to ensure materials have a low environmental impact.

## 6.0 Water and Drainage

- **Water-efficient fittings and appliances** will be used to achieve a consumption rate of **≤110 litres per person per day**, as per Building Regulations.
- **Water butts** will be installed at downpipes for garden irrigation.
- **Permeable paving** will be used for the driveway to promote natural drainage and improve ground permeability.
- A full **SuDS strategy** will be developed as part of the construction detailing.

## 7.0 Sustainable Travel and Site Access

- While Hinxworth is a rural location, the site provides:
  - **Secure cycle storage**
  - **Electric vehicle charging**
  - Access to nearby towns and rail links via the A1(M) (~1 mile away)
- The integration of **EV charging powered by on-site PV** makes the scheme highly sustainable in terms of transport.

## 8.0 Summary Table of Measures

| Theme                       | Measure                                                  |
|-----------------------------|----------------------------------------------------------|
| Energy Efficiency           | Fabric-first design exceeding Part L 2021                |
| Renewable Energy            | 16 PV panels + battery storage + ASHP                    |
| Carbon Emissions            | Targeting $\geq 20\%$ reduction beyond TER baseline      |
| Water Use                   | $\leq 110$ litres/person/day, water butts for irrigation |
| Materials & Embodied Carbon | Locally sourced, sustainable, reused where possible      |
| Transport                   | EV charging x2, cycle storage, proximity to major routes |
| Overheating Mitigation      | Reduced glazing to south, passive ventilation            |

## 9.0 Conclusion

The proposed dwelling at Marshfield Barn will deliver a high-performing, low-carbon home that exceeds the sustainability requirements set out in the North Hertfordshire Local Plan and accompanying SPD. It achieves measurable reductions in energy use and CO<sub>2</sub> emissions, utilises renewable technologies, and responds sensitively to its rural location using passive and resource-efficient design.