



Energy & Sustainability Statement

For

New Dwelling West of Venton, Green Acres, Lilley

Prepared on behalf of:

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Executive Summary

This report has been produced on behalf of D. Chandler Architectural Design Ltd to demonstrate how the application for a new build dwelling on land West of Venton, Green Acres, Lilley 2RQ will address the carbon reduction and sustainability requirements set by North Hertfordshire District Council.

The Energy Assessment demonstrates that the proposed specification focuses on a fabric-first approach with renewable energy incorporated into the design. The dwelling has been assessed under Part L 2021 Building Regulations, SAP 10.2.

The carbon savings by the proposed development are shown in this report.

A sustainability statement has been prepared to demonstrate a commitment to enhance the environmental performance of the development. This includes specification of materials, waste reduction, biodiversity and internal water use limited by design to 105 litres/per person/per day.

Introduction to the Proposed Development

The proposed dwelling will be a single detached family home, which will be situated on the land to the west of Venton. It is proposed to demolish the existing detached garage and erect the 2 storey, 3-bedroom dwelling. The proposal will subdivide the existing plot of Venton, still providing substantial outdoor areas.

The location is on the outskirts of Luton which provides all local amenities, schools and a medical centre. The proposed dwelling is well situated for commuting and within a short 15-minute walking distance to the bus stop.

It is proposed that the new dwelling will be sympathetically designed to enhance the local area.



Energy Assessment

This assessment outlines the measures and specification proposed to meet the requirements outlined in North Hertfordshire Local Plan 2011-2031.

The dwelling has been modelled using SAP 10.2 and is designed to achieve a 64.34% reduction in carbon emissions beyond Part L 2021 Building Regulations. An air source heat pump will provide heating and hot water resulting in 77.8% of the energy used, coming from a renewable source.

Part L 2021 results

	Results
Target Emission Rate (TER) TER worksheet	8.61
Dwelling Emission Rate (DER) DER worksheet	3.07
Target Fabric Energy Efficiency (TFEE)	43.04
Dwelling Fabric Energy Efficiency (DFEE)	41.65
Target Primary Energy Rate (TPER)	45.49
Dwelling Primary Energy Rate (DPER)	31.58
% Improvement DER/TER	64.34
% Improvement DFEE/TFEE	3.25
% Improvement DPER/TPER	30.58

Appendix A

On-Site Renewable Energy

	Plot 1	Total
Renewable energy from heat pump	10299.43	10299.43
Renewable energy from wood burner	0.00	0.00
Renewable energy from PV	0.00	0.00
Total renewable energy use	10299.43	10299.43
Total dwelling energy use	13246.72	13246.72
% renewable energy	77.8%	77.8%

Appendix B

Energy Use Intensity

The energy use intensity for this dwelling has been calculated by dividing the total energy consumption by the total floor area.

- **Total Energy Consumption:** 12,708.84 kWh per year.
- **Total Floor Area:** 203.96 m².

$$\text{EUI} = \frac{\text{Total Energy Consumption}}{\text{Total Floor Area}}$$

$$\text{EUI} = \frac{12708.84 \text{ kWh}}{203.96 \text{ m}^2}$$

$$\text{EUI} = 62.29 \text{ kWh/m}^2/\text{year}$$

This means the dwelling consumes **62.29 kWh per square meter per year**.

To calculate the total energy usage intensity (EUI) while considering the heating and hot water efficiency of the air source heat pump, the figures have been adjusted as follows:

- Space Heating Demand: **8,127.47 kWh/year**
- Space Heating System Efficiency: **290.29%**
- Water Heating Demand: **2,781.37 kWh/year**
- Water Heating System Efficiency: **286.61%**
- Total Energy Consumption (before adjustment): **12,708.84 kWh/year**
- Total Floor Area: **203.96 m²**

$$\text{Adjusted Space Heating} = 8,127.47 / 2.9029 = 2,799.78 \text{ kWh/year}$$

$$\text{Adjusted Water Heating} = 2,781.37 / 2.8661 = 970.44 \text{ kWh/year}$$

Revised Total Energy Consumption

$$\text{Total Energy Consumption} = 2,799.78 + 970.44 + 415.37 + 1,384.63$$

$$\text{Total Energy Consumption} = 5,570.22 \text{ kWh/year}$$

Final EUI

$$\text{EUI} = \frac{5570.22}{203.96} = 27.31 \text{ kWh/m}^2/\text{year}$$

Space Heating Demand

The space heating demand for this dwelling is 8,127.47 kWh per year, with a demand of 39.85 kWh per square metre.

This has been achieved based on the following design specification.

Proposed Design Specification

The following section outlines the measures which have been taken to reduce the energy demand of the proposal. This includes both architectural and building fabric measures (passive design) and energy efficient services (active design) considered at the earliest design stage.

Active design measures to reduce the energy demand include high efficiency lighting and ventilation. Other possible measure includes enhanced U-values, air tightness improvement and the development approach to limiting thermal bridges. The specification for the proposal is listed below. Passivhaus methods will be considered and implemented where possible.

Demand Reduction Measures	Specification
<i>Building Fabric - U-Values (W/m²K)</i>	
Walls	0.16
Ground floor	0.13
Roofs	0.11-0.13
External solid doors (whole frame)	1
External half glazed doors (whole frame)	1.2
Glazing (glazed doors & windows (whole frame)	1.4
<i>Building Fabric - Other</i>	
Air permeability (m ³ /hm ²)	5.0
Thermal bridging	SAP 10.2 approved
<i>Services</i>	
Ventilation	Natural
Low energy lighting	100%
Heating & Hot Water	ASHP

Cooling and Overheating

The developer will address the following as a matter of priority to reduce overheating risk and the requirement for active cooling:

1. Minimise internal heat generation through energy efficient design

For example, heat distribution infrastructure within the building will be designed to minimise pipe lengths and adopting pipe configurations which minimise heat loss e.g. twin pipes.

2. Reduce the amount of heat entering the building in summer

For example, through use of carefully designed shading measures, including balconies, louvres, internal or external blinds, shutters, trees and vegetation.

3. Manage the heat within the building through exposed internal thermal mass and high ceilings

Increasing the amount of exposed thermal mass can help to absorb excess heat within the building.

4. Passive ventilation

For example, through the use of openable windows, shallow floorplates, dual aspect units, designing in the 'stack effect'.

5. Mechanical ventilation

Mechanical ventilation can be used to make use of 'free cooling' where the outside air temperature is below that in the building during summer months. This will require a by-pass on the heat recovery system for summer mode operation.

6. Active cooling systems

If air conditioning is necessary, the lowest carbon options should be used.

Overheating Risk Analysis

Modelling will be carried out during the design stage to ensure that Part O 2021 compliance is achieved. This will either be through the simplified method or dynamic thermal modelling TM59.

Renewable Energy

The use of renewable technology in the proposed design of the dwelling has been fully considered.

An air source heat pump has been identified suitable to provide space heating.

An ASHP operates by converting the energy of the outside air to heat, creating a comfortable temperature inside the building as well as supplying energy for the hot water system.

Monitoring

The applicant will consider options for post occupancy monitoring of the dwelling. It is the intention of the applicant to provide smart meters at the development to support the growth of demand side response.

Sustainability Statement

The report so far has sought to address the energy requirements set out in North Hertfordshire Local Plan.

The following section of this reports looks to address additional sustainability measures.

Internal Water Use

It is the intention of the applicant to reduce the consumption of potable water within the proposed dwellings from all sources, using efficient fittings and flow restrictors where required.

Performance in domestic properties is assessed under the methodologies set out in Part G of the Building Regulations and the former Code for Sustainable Homes, achieving a maximum internal water use of **105 L/p/d** (litres per person per day) by design.

Although a variety of specifications are available to meet this target, the proposed flow rate criteria for dwellings at the development has been chosen as follows:

Fitting	Flow Rate / Capacity
<i>Sanitary Fittings</i>	
Dual Flush WC	6 litres per flush (full) 4 litres per flush (part)
Taps (main)	5 litres per minute
Shower	8 litres per minute
Taps (kitchen/utility)	6 litres per minute
<i>Appliances</i>	
Washing Machine	8.17 litres per kilogram (dry load)
Dishwasher	1.25 litres per place setting

Appendix D

This specification of fittings achieves an internal water consumption rate of 102.5 litres per person per day, meeting the required result of 105 litres per person per day.

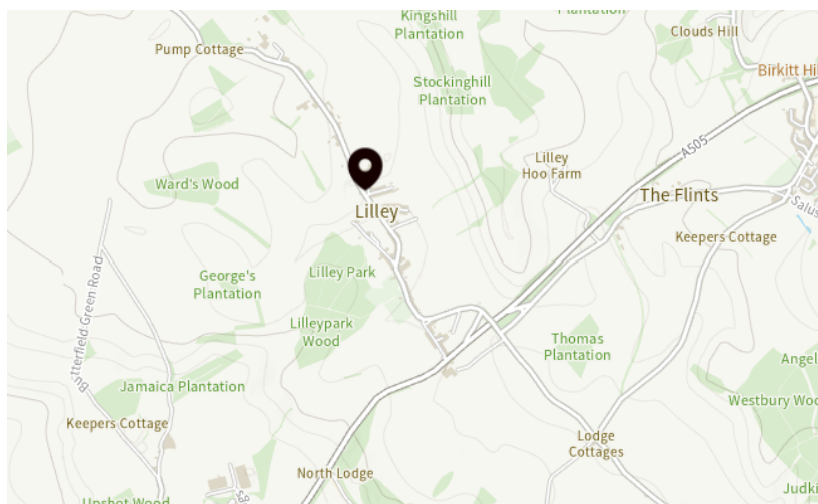
The developer will minimise the use of mains water by:

- A. Incorporating water saving measures and equipment.
- B. Designing residential development so that mains water consumption would meet a target of 105 litres or less per head per day (excluding an allowance of 5 litres or less per head per day for external water consumption).

Flood Risk

Flood risk from rivers or the sea

Using GOV.UK's map, the development has been found to be at a very low risk of flooding. This is staying low between 2036-2069.



Flood risk from surface water

Using the GOV.UK's map, the development is not within an area of flood risk from surface water and classified as 'very low risk'. The yearly chance of surface water flooding is predicted to stay very low between 2040-2060. However, it is difficult to predict rainfall volume and flash flooding. It happens when rainwater cannot drain away through normal drainage systems.



Materials and Waste Reduction

Sustainable Specification

Materials will be chosen to lower the environmental impact of the development wherever possible. BRE's Green Guide will be consulted when finalising specifications of products and element build types. This applies primarily to:

- Roofs
- External walls
- Internal walls (including separating walls)
- Upper and ground floors (including separating floors)
- Windows

In all cases, it is the applicant's intention to secure Green Guide ratings of between A+ and D, exceeding the requirements of the former Code for Sustainable Homes. All timber used during the development will come from a 'legal source' and will not be on the CITES list, or in the case of Appendix III of the CITES list, it will not have been sourced from a country seeking to protect this species as listed in Appendix III.

To promote the reduction of emissions of gases with high Global Warming Potential (GWP) associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials, products will be chosen with a GWP of <5 wherever possible. They may also be chosen to comply with additional voluntary industry standards for responsible sourcing, including FSC Chain of Custody and BES 6001:2008 Framework Standard for Responsible Sourcing of Construction Products certifications where applicable. Products such as paints and varnishes will be sourced to minimise the use of Volatile Organic Compounds (Formaldehyde, VCM, etc.).

Minimising Site Waste

A Site Waste Management Plan (SWMP) will be created to include procedures, commitments for waste minimisation and diversion from landfill, as well as setting target benchmarks for resource efficiency in accordance with guidance from:

- DEFRA (Department for Environment, Food and Rural Affairs)
- BRE (Building Research Establishment)
- Envirowise
- WRAP (Waste & Resources Action Programme)
- Environmental performance indicators and/or key performance indicators (KPI) from Envirowise or Constructing Excellence.

The applicant will seek to establish a 'take back' scheme from suppliers in order to avoid the unnecessary waste of excess materials. Care will also be taken to minimise loss through breakage etc. following guidance from the Waste and Resources Action Programme (WRAP) and others.

Biodiversity

The presence of any significant ecological features as defined using guidance from BRE will be noted, and the appropriate measures for protection and conservation undertaken before works begin. Features to promote biodiversity, such as bird and bat boxes, will be incorporated into the design wherever feasible.

Additional planting will be carried out to ensure a net gain in vegetation.

Conclusion

This report outlines how a variety of sustainability criteria have been considered and solution successfully incorporated into the proposed design of the development.

Based on the modelling undertaken, it has been demonstrated that it is possible to reduce regulated on-site carbon dioxide emissions of the proposed dwelling adjacent to Venton by 64.34% beyond the requirements of Part L 2021 of the Building Regulations, where the building and services specification described in this report is implemented.

Fabric performance has been improved to meet and surpass the requirements of Part L of the Building Regulations, whilst heating, hot water equipment and controls have been chosen to maximize carbon savings. An air source heat pump will provide heating and hot water.

Additional efforts to enhance the environmental performance of the development include the specification of materials, waste reduction, biodiversity and internal water use limited by design to 105 Litres/per person/per day.

Appendices

Appendix A – BREL

Appendix B – SAP worksheet

Appendix C – DER worksheet

Appendix D – Water efficiency