



Sustainability Statement

Revision B

Proposal :

Modification of existing chalet bungalow, demolition of outbuildings. Erection of a 3 bed detached bungalow to include associated parking spaces and a new access driveway.

on land at:

"Gilridge"
Brighton Road
Handcross
West Sussex
RH17 6BZ

Job Number 23/114

24.10.2024

This sustainability statement has been produced
by Lightbox Architecture Limited for the sole use
of our client and in support of a full planning application.



Introduction

Energy use in buildings is a significant contributor to global CO₂ emissions and climate change. Designing energy efficient buildings and incorporating low and zero carbon energy generation is a vital part of ensuring this development incorporates sustainability as a core part of its design.

The purpose of this report is to assist evaluating parties in understanding the energy consumption and performance of the proposed development and consider its performance against the “lean, clean, green” performance standard, ie: water consumption reduction, material consumption reduction, energy efficiency, water pollution reduction and green house gas reduction.

In line with best practice the proposed energy strategy for this development will follow the principals of the energy hierarchy. The energy hierarchy has three priorities, seeking to reduce energy use before meeting remaining demand by the cleanest means possible:

- 1) Be lean - use less energy: Improve the building fabric, glazing and structure to reduce energy consumption in the first instance by using low U-Values and good air tightness and by ensuring that active systems run as energy efficiently as possible.
- 2) Be clean - supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible.
- 3) Be green - use renewable energy: when the above design elements have been reasonably exhausted, supply energy through renewable sources where practicable.

Site Waste Management

Modification Of Existing Chalet Bungalow And Demolition Of Outbuildings.

The proposed development includes some modification of the existing chalet bungalow and demolition of the existing outbuildings.

In order to minimise the amount of waste sent to landfill, waste from the demolition of the existing structures will be collected and disposed of by a reputable, local waste management company where all materials that are suitable for recycling such as timber, metals, plastics, cardboard, concrete bricks and blocks, sand, gravel and cement are collected and reused with surplus materials sent to a licensed waste transfer station where they will be transported to suitable locations for legally compliant disposal or treatment. Some aggregate materials may be retained on site and crushed for hardcore should this be a financially / logistically viable option.

I. Energy Efficient Design Measures (“be lean”)

Enhancing the thermal performance of the building envelope helps to future-proof the structure and also yields the greatest CO₂ savings. Adding renewable technology will then yield maximum carbon reductions with lower long-term costs for the home owner.

The proposed development aims to exceed compliance with Approved Document L1 of the Building Regulations (2022) without the reliance on the contribution of renewable technologies.

The following energy-efficient design measures are proposed to the fabric of the proposed buildings:

	Proposed Dwelling U-Value (W/m2K)	AD L1A/B 2022 U-Value (W/m2K)
External Wall U-Value (W/m2K)	0.17	0.18
Pitched Roof (Insulation at ceiling level)	0.11	0.15
Pitched Roof (Insulation at rafter level)	0.13	0.15
New Floors	0.12	0.18
Windows	1.1	1.4
Doors	1.4	1.4
Roof lights	1.4	2.2
Air permeability	4m3/h.m2	10m3/h.m2
Thermal bridging	Accredited construction details	Y=0.15

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and electrical systems with efficiencies that surpass the requirements of the Domestic Building Services Compliance Guide:

	Proposed Development	Bldg Regs Requirements
Low energy lighting	100%	75%
Heating System	Air Source Heat pumps	92% efficient boiler
Heating Controls	Time and temperature zone control with weather compensation controls	Prog/TRVs

Minimising Flood Risk And Conserving Water

Climate change and the more extreme weather that comes with it means that water supply is becoming more unpredictable. Parts of the UK are already subject to water stress due to the increased frequency of drought. To exacerbate matters, UK water demand is set to rise in the next few years.

The following water saving devices will be installed in the proposals to use water more efficiently:

- Use of efficient aerated shower heads
- Use of flow regulators or aerators to taps
- Use of dual flush toilets

- Installation of minimum AA rated white goods (washing machines / dishwashers) with low water consumption rating

Rainwater Harvesting For Garden Use

Rainwater harvesting is the collection and storage of rainwater that would otherwise flow down gutters into the drain. Rainwater is collected from the roof, or from hard landscaping, then re-used within the garden. This can provide substantial savings on water consumption and help prevent flooding.

A 210 litre rain water butt will be installed to the rear garden of each plot 1 for garden watering

2. Energy Efficient Systems (“be clean”)

Combined Heat And Power

Combined heat and power (CHP) systems use relatively cheap and clean fuels (such as natural gas) to generate heat and electricity on site. A typical CHP system uses combustion of natural gas to drive a turbine that produces electricity. The heat generated is captured and used to produce hot water. As losses are minimised the carbon footprint of the energy generated is very low. However this is dependent on there being sufficient year-round local heat demand to fully utilise the heat generated by the CHP plant. An example would be developments of at least 500 dwellings, universities or hospitals.

Due to its size, this development is not suitable for combined heat and power.

District Heating Networks

In a district heating network heat is supplied from one or more central energy centres to multiple buildings within the network. Supply to multiple buildings guarantees high year-round local heat demand which in turn allows the use of low carbon technologies within the energy centre, such as combined heat and power systems. Large plant and aggregated demand allows systems within the energy centre to run more efficiently.

Hot water is distributed within the network via highly insulated pipes. To connect to the network individual boilers are replaced with separately metered heat exchangers.

Due to the fact this proposed development is neither within the coverage of an existing district heating network, nor is it within an area designated as having potential for a future network, district heating can be discounted as a viable option.

3. Low And Zero Carbon Energy Sources (“be green”)

Photovoltaics

Solar photovoltaics (PV) capture the sun's energy using photovoltaic cells. The cells convert sunlight into electricity, which can be utilised on site or sold back to the National Grid. PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on a roof.

The power of a PV cell is measured in kilowatts peak (kWp). This is the rate at which the cell

generates energy at peak performance in full direct sunlight.

Photovoltaics offer high CO₂ savings, are simple to install and suitable for most buildings. The only limiting factor for PV is the availability of suitable roof space. The roof to the proposed bungalow is well orientated to the rear with good clear roof space and little or no overshadowing so integrated photovoltaics are proposed on this unit.

Heat Pumps

Heat pumps collect low temperature heat from renewable sources (such as the air or ground) and concentrate the heat to a usable temperature via a reverse refrigeration cycle. Useable heat is transferred to the dwelling via a heat exchanger and can be used for low temperature central heating and domestic hot water, though an immersion top-up may be required for DHW.

Heat pumps have some impact on the environment as they generally use grid supplied electricity to run the pumps. It is common for heat pumps to have a coefficient of performance of three, meaning that for every 1kWh of electricity used, over 3kWh of heat can be generated. The renewable component of the output is therefore taken as the difference between the output energy and the input energy, in this scenario the heat pump will be deemed to have delivered 2kWh of renewable energy.

Ground source heat pumps require external horizontal ground loops, or as is more likely in built-up environments, vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space.

Air source heat pumps have a slightly lower seasonal efficiency than ground source heat pumps, but require less space. Noise and space considerations should be assessed when determining an appropriate site for external condensing units.

Heat pumps are a very good option for sites not connected to the gas network, or as a replacement of existing electric or oil fired heating systems. When assessed against a gas central heating system on cost versus potential CO₂ savings a heat pump will perform less favourably although legislation in the long term is driving us away from fossil fuel based heating systems.

It is proposed to install an Air Source Heat Pump for the new dwelling.

Solar Thermal

Solar thermal systems, use free heat from the sun to warm domestic hot water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable. Solar thermal systems can be integrated with a ground source heat pump.

Solar thermal systems are most appropriate for buildings with high year-round domestic hot water demand.

Although a typical solar thermal system will be able to meet half the annual domestic hot water demand for a dwelling, many will use electricity to run pumps within the system, this means the resultant CO₂ and cost savings will be relatively low. Given proposal includes significant solar PV provision an additional solar thermal system has been discounted in this instance.

Wind Turbines

Wind turbines use blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine: Pole mounted and building mounted. Pole mounted turbines are free standing and are erected in a suitably exposed position, and are often about 5kW to 6kW in size. Building mounted turbines are smaller and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Large scale turbines, in exposed locations offer one of the best financial returns of all renewable energy systems as the payback of the system increases dramatically with the size of the turbine. However small scale systems offer much lower levels of performance and recent studies have questioned the viability and output from such systems, therefore wind turbines can be discounted as a viable option.

Biomass

Biomass heating systems burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. The carbon dioxide emitted when wood is burned is the same amount that was absorbed over the months and years that the plant was growing. The process is sustainable as long as new plants continue to grow in place of those used for fuel. There are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, but as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels.

Although the CO₂ savings from biomass are substantial, the high levels of NO_x emissions can make biomass systems unsuitable for urban environments.

Biomass has been discounted as a viable option on this site.

Summary

Proposed Low And Zero Carbon Energy Sources

With the carbon emissions within the proposed new dwelling already reduced through enhanced building fabric and energy efficient systems, it is proposed that further reductions will be achieved through the provision of an air source heat pump along with roof mounted PV panels. In addition water saving devices are to be installed within the properties and rainwater butts provided to provide garden some garden irrigation.