ENERGY STATEMENT

For the proposed development at:

Badgers Brook
London Road
Bolney
Haywards Heath
West Sussex
RH17 5PY

For The Erection of 4 x 4 Bedroomed Houses and 2 x 5 Bedroomed Houses

dps Architectural Consultants

CIAT Registered Practice

CONTENTS

SECTION 1 PLANNING POLICY

The application site is located to the eastern side of London Road, although fairly central within Bolney Village, the built up area boundary runs along the southern (side) and western (front) boundaries, with the application site being located within the Countryside.

The site is also designated as being within the High Weald Area of Outstanding Natural Beauty (AONB) with a group TPO on the trees to the southern boundary.

The site is fairly well screened to the frontage, with an existing close boarded fence and mature trees, the existing entrance is located at the South Western corner and leads to the existing dwelling and to a further parking area to the rear of the site.

The site is currently occupied by an existing detached bungalow and associated buildings and paddock areas used in connection with keeping animals. In addition from the signs and from the planning history the site appears to have a commercial use.

This statement will incorporate the assessment of the site and provide guidance and designs that show compliance with Policy DP 39

DP39: Sustainable Design and Construction

Strategic Objectives: 1) To promote development that makes the best use of resources and increases the sustainability of communities within Mid Sussex, and its ability to adapt to climate change.
Evidence Base: Gatwick Sub Region Water Cycle Study; West Sussex Sustainable Energy Study, Mid Sussex Sustainable Energy Study.

All development proposals must seek to improve the sustainability of development and should where appropriate and feasible according to the type and size of development and location, incorporate the following measures:

- **Minimise energy use through the design and layout of the scheme including through the use of natural lighting and ventilation;**
- **Explore opportunities for efficient energy supply through the use of communal heating networks where viable and feasible;**
- **Use renewable sources of energy;**
- **Maximise efficient use of resources, including minimising waste and maximising recycling/ re-use of materials through both construction and occupation;**
- **Limit water use to 110 litres/person/day in accordance with Policy DP42: Water Infrastructure and the Water Environment;**
- **Demonstrate how the risks associated with future climate change have been planned for as part of the layout of the scheme and design of its buildings to ensure its longer term resilience**

Fig 1

SECTION 2 INITIAL ASSESSEMENT

Local Authorities are now being expected to include Renewable Energy in all new developments to off-set energy demand of sites by reducing the Carbon emissions via renewable energy technologies.

Domestic energy use is responsible for 27% of the UK carbon dioxide emissions, contributing to global climate change. The Kyoto Protocol developed in 1997 obligates the UK to reduce its greenhouse gas emissions to 12.5% below 1990 levels by 2012 and by 18% by 2020, however, the UK has made a further commitment to reducing its carbon dioxide emissions to 60% below 1990 levels by 2050.

With this in mind this report will review the low energy and sustainable options for the development with the aim to reduce C02 emissions.

To determine a strategy that could be adopted to meet planning policy requirements an initial calculation has been completed using SAP 2013 software.

SAP is the Standard Assessment Procedure and is the Department for Communities and Local Government (CLG) Approved software for calculating the predicted CO_2 emissions from residential properties in accordance with Building Regulations Approved Document L1A 2013.

In order to comply with criterion 1 of AD L1A the calculated Dwelling Emission Rate (DER) must be lower than the Target Emission Rate (TER), both of which are calculated by the software based upon the proposed dwelling layout, orientation and construction details.

An initial SAP calculation has been undertaken for the dwelling based upon the design information stated below to assess performance against Part L1A 2013 requirements. Building fabric design data used within the initial SAP calculation is shown in table 1 below, whilst services data is shown in table 2.

	Target U value W/m2K	2013 Limiting Fabric Parameters W/m2K
External walls	0.21	0.30
Roof	0.11	0.20
Floor	0.12	0.25
Glazing (g-value 0.5)	1.40	2.00
Air Permeability	5.00	10.0

Fig 2

SECTION 2 INITIAL ASSESSEMENT

What are Renewable Energy Sources and Why Should We Use Them?

Renewable sources of energy are those, which are continuously available in our environment. Renewable energy sources are derived from solar radiation, wind, hydropower, geo-thermal and biomass.

As a nation we are consuming ever-increasing quantities of energy, and until now have largely depended on the burning of fossil fuels to generate the vast amounts of energy required. These resources are finite and have taken millions of years to form and produce large amounts of carbon dioxide when burnt to provide energy. In contrast, renewable energy sources either emit no greenhouse gases, or they are carbon neutral over their life cycle.

Before any Renewable Technology should be considered there is an energy hierarchy to follow when developing a building.

(Be Lean) : Always make the building as energy efficient as possible thereby reducing Energy demands.

(Be Mean) : Supply Energy efficiently.

(Be Green) : Provide Energy via the use of renewable energy sources.

The new Part L [2013] aims to continue reducing carbon emissions from new buildings by improving the building fabric energy efficiency, for example, provision of a structure which has been built to a very good air pressure testing and improving the insulation levels and heating of the building itself. Renewable energy also aids in reducing the carbon emission of the buildings but should only be assessed after all low energy and passive energy savings options are put in place.

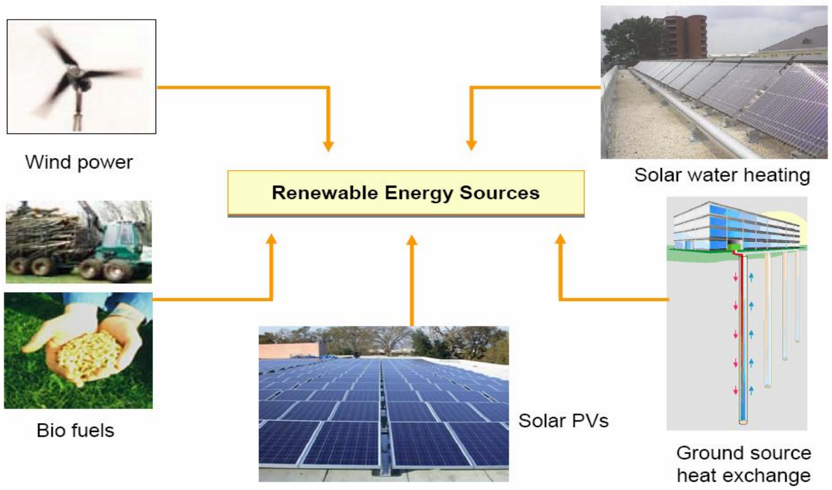

Fig 3

SECTION 3 LOW ZERO CARBON TECHNOLOGIES

The following low and zero carbon technologies have been considered for the inclusion within the dwelling to reduce CO_2 emissions in accordance with planning policy:

Ground Source Heat Pumps

A ground sourced heat pump (GSHP) is a device for extracting heat from the ground to provide space heating and domestic hot water for buildings. Water or another fluid is circulated through pipes buried in the ground and passes through a heat exchanger in the heat pump that extracts heat from the fluid. The heat pump then raises the temperature of the fluid via the compression cycle to supply hot water to the building as from a normal boiler.

Providing the space heating requirement only using ground source heat pumps would provide a reduction in the predicted CO_2 emissions, however due to the high CO_2 emissions associated with grid supplied electricity this would be limited. The technology requires either the drilling of deep boreholes or a significant external area to install a ‘slinky’ loop to transfer the heat, both of which have a very high capital cost and could potentially impact upon the local environment and neighbours. GSHPs are generally only feasibly for larger scale developments and so this technology is not considered viable for this development

Fig 4

Fig 5

Air Source Heat Pumps

An Air Source Heat Pump extracts heat from the outside air using an external condenser unit and transfers it, through refrigeration pipework to the indoor unit which then conveys that heat to the heating emitters and hot water cylinder. This system is capable of providing 100% of heating and hot water within a building.
This system would require units located externally to the building, which could have space and noise implications. The efficiency (referred to as COP) of an Air Source Heat Pump with its CO_2 reduction ,could be considered viable for the dwellings if gas was not available on the site.
Air Source Heat Pumps are therefore considered to be a viable technology for use at this development to reduce the Carbon Emissions

Fig 6

Biomass

Waste timber, in the form of wood chips and pellets, is used as fuel in boilers providing heating to buildings. Biomass generates about the same amount of carbon dioxide as fossil fuels, however, with new plant/tree growth this carbon dioxide is actually removed from the atmosphere making the Biomass system carbon neutral. Wood chips and pellets present no risk if accidentally released into the environment and there are no harmful by-products. The flue gas is smoke-free and the ash content of between 0.5% and 3% by volume (depending on material), is minimal.
When sizing biomass it is standard practice that the biomass boilers would meet a significant proportion of the heating load and gas condensing boilers would assist with providing load trimming to reduce the amount of on/off cycling of the biomass boilers. A biomass boiler system would therefore need to be coupled with gas fired boilers to offer a bivalent heating solution.
Storage of the biomass fuel is required on site, ideally sized to accommodate several peak months of heating to avoid regular deliveries of fuel. The store would need to be easily accessed by a large delivery vehicle, similarly sized to a petrol tanker and therefore there may be issues surrounding vehicular access to the site. In addition, security of supply could become an issue during cold periods of snow or icy weather, particularly if the fuel storage volume is small. The emissions from biomass systems can also contribute to poor air quality when located in cities and towns.
The space and access requirements for the biomass store are unlikely to be viable on this site. Furthermore the biomass boiler would require a large flue and careful consideration of its sizing, location and the potential impact of local air quality would be required in this residential area. For these reasons a biomass heating system is not considered to be viable for the development

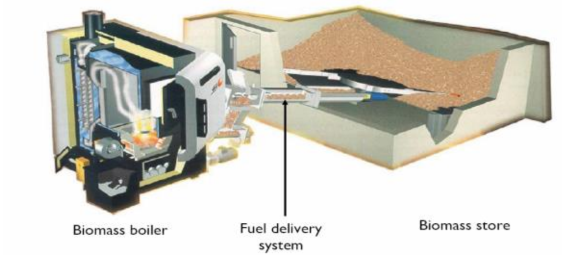

Fig 7

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SECTION 3 LOW ZERO CARBON TECHNOLOGIES

Solar Thermal

Solar water heating systems use the energy from the sun to heat water, most commonly in the UK for hot water needs. The systems use a heat collector, generally mounted on the roof in which a fluid is heated by the sun. This fluid is passed through a heat exchanger and used to heat up water which is stored in either a separate hot water cylinder or a twin coil hot water cylinder inside the building. There are two types of collectors used for solar water heating applications - flat plate collectors and evacuated tube collectors. Evacuated tube collectors are generally more expensive due to a more complex manufacturing process (to achieve the vacuum) but manufacturers generally claim better winter performance.

Solar thermal collectors generally offer a lower reduction in CO_2 emissions for capital cost than photovoltaic (PV) panels. Therefore Solar Thermal Collectors are not to be considered for this site.

Fig 8

Photovoltaics

Solar photovoltaic (PV) technology is a semi-conductor based technology that converts the energy in sunlight into electricity. The term describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun. When sunlight strikes the surface of a PV cell, this electrical field provides momentum and direction to light-stimulated electrons, resulting in a flow of current when the solar cell is connected to an electrical load. Excess energy can be exported to the grid; and a tariff payment can be discussed with the energy provider. Solar photovoltaic (PV) technology is therefore considered to be a viable technology for use at this development to reduce the Carbon Emissions

Fig 9

SECTION 3 LOW ZERO CARBON TECHNOLOGIES

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Water Consumption

Approved Document Part G sets a requirement for all new residential developments to achieve predicted water consumption not exceeding 110 litres per person per day. With this in mind, the proposed new dwelling will incorporate a number of low water consumption solutions.

All WCs will have a dual flush cistern with a low flush capacity, which will avoid high flush volumes being used when not required. Kitchen taps, basin taps and showers will all have a restricted flow to ensure water consumption from these fittings is minimised.

Domestic white goods can be responsible for significant water consumption within residential properties. With this in mind, due consideration will be given to the water efficiency of washing machines and dishwashers prior to purchase, with low water products being the preferred choice.
In this way average water consumption will be reduced to below 110 litres per person per day.

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Job no:
Date: 24.08.22
Assessor name: Simon Hodges
Registration no:
Development name: Badgers Brook, Bolney

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WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)

	House Type:	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6	
	Description:	House 1		House 2		House 3		House 4		House 5		House 6	
Installation Type	Unit of measure	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
Is a dual or single flush WC specified?		Dual		Dual		Dual		Dual		Dual		Dual	
WC	Full flush volume	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84	4	5.84
	Part flush volume	2	5.92	2	5.92	2	5.92	2	5.92	2	5.92	2	5.92
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06	6	11.06
Are both a Bath & Shower Present?		Bath & Shower		Bath & Shower		Bath & Shower		Bath & Shower		Bath & Shower		Bath & Shower	
Bath	Capacity to overflow	140	15.40	140	15.40	140	15.40	140	15.40	140	15.40	140	15.40
Shower	Flow rate (litres / minute)	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33	9	39.33
Kitchen sink taps	Flow rate (litres / minute)	12	15.64	12	15.64	12	15.64	12	15.64	12	15.64	12	15.64
Has a washing machine been specified?		No		No		No		No		No		No	
Washing Machine	Litres / kg		17.16		17.16		17.16		17.16		17.16		17.16
Has a dishwasher been specified?		No		No		No		No		No		No	
Dishwasher	Litres / place setting		4.50		4.50		4.50		4.50		4.50		4.50
Has a waste disposal unit been specified?		No	0.00	No	0.00	No	0.00	No	0.00	No	0.00	No	0.00
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00		0.00		0.00
Calculated Use			114.8		114.8		114.8		114.8		114.8		114.8
Normalisation factor			0.91		0.91		0.91		0.91		0.91		0.91
Code for Sustainable Homes	Total Consumption		**104.5**		**104.5**		**104.5**		**104.5**		**104.5**		**104.5**
	Mandatory level		**Level 3/4**		**Level 3/4**		**Level 3/4**		**Level 3/4**		**Level 3/4**		**Level 3/4**
Building Regulations 17.K	External use		5.0		5.0		5.0		5.0		5.0		5.0
	Total Consumption		**109.5**		**109.5**		**109.5**		**109.5**		**109.5**		**109.5**
	17.K Compliance?		**Yes**		**Yes**		**Yes**		**Yes**		**Yes**		**Yes**

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SECTION 4 CONCLUSION

Conclusion and Preferred Option

A full feasibility study for renewable energy options has been undertaken to achieve a reduction of C02 emissions for the Development at Badgers Brook.

The conclusion of findings is that either a Solar photovoltaic (PV) technology providing electricity, or Air Source Heat Pump technology are the best renewables to provide the carbon reduction solution for this development.

These technologies can be used independently or in conjunction with each other.

This conclusion is based on the following factors :

The development comprises of 6 houses.

Solar photovoltaic Panels (PV)

Technical Summary (information provided below is per property)

Roof area required	-	13.20sq.m for West Facing
Roof Pitch	-	30°
Optimum orientation	-	South facing roof
Number of Panels	-	6
Type of Panels	-	380watts
Panel efficiency	-	15.00%
Inverter efficiency	-	90%
kW (peak)	-	2.28 kW(peak)
Impact on services	-	Minor
Impact on structure	-	20 kg per panel
Technical feasibility	-	Feasible
Equipment Budget	-	£5,000.00
Economic feasibility	-	Feasible
Noise Level	-	Nil

SECTION 4 CONCLUSION

Air Source Heat Pump Technical Summary

Technical Summary (information provided below is per property)

The visual impact on the local area is minimal.

There is no internal intrusion and just 1.1m^2 space required for an Air Source Heat Pump to operate.

Area required	-	1.071sq.m for Unit
Heat Pump Space Heater ErP Rating -55º	-	A++
Heat Pump Space Heater ErP Rating -35	-	A+++
Heat Pump Combination Heater ErP Rating	-	A+
OPERATING AMBIENT TEMPERATURE (°C DB)	-	-20 ~ +35
Sound Data Pressure Level at 1m (dBA)	-	45
Sound Data Power Level (dBA)*4	-	58
Technical feasibility	-	Feasible
Equipment Budget	-	£12,000 - £15,000

With regards to the general design of the property, the following is a guide that should be followed prior to the consideration of renewable technologies.

- U values of typically at least 0.21 for walls, 0.12 for floors, 0.11 for roofs and 1.40 for windows/doors
- No electric secondary source of heating
- Low energy lighting to 100% of areas in the dwelling
- High efficiency heating system as a minimum with zoned time and temperature controls. Hot water to have timed and thermostatic controls
- Low air permeability minimum 5m³/h/m²@50 pa
- Low Dual flush toilets 4lt & 2lt
- 140 Litre capacity per bath
- 9 litres/minute showers Capacity/Flow Rate
- 6 litres/minute Capacity/Flow Rate Low flow taps with spray and restrictors
- Low energy and low water use appliances