

Energy and Sustainability Statement

Blackmore Farm



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BDWR



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Executive Summary

This Energy and Sustainability Statement has been prepared in support of a planning application for Phase 1 of a residential housing development at Blackmore Farm, Melksham, Wiltshire.

This Statement includes a carbon dioxide emission assessment showing how selected energy efficiency, low carbon and renewable energy measures have been considered and those which are deemed appropriate for the scheme.

Sample Standard Assessment Procedure (SAP) Calculations using SAP 10.2 have been prepared for the dwellings based upon the construction specification set out within the report, using planning stage drawings. This enables an assessment of the carbon dioxide emissions arising from the site to be undertaken and has allowed a number of different systems and technologies to be tested.

A fabric first approach has been adopted to minimise carbon emissions and reduce regulated and unregulated energy usage by reducing uncontrolled heat loss through high performance insulation, well designed thermal junctions, low airtightness targets, and high-performance glazing. As a result, operational energy and carbon emissions are significantly reduced through the base build, creating a strong foundation for the adoption of renewable technologies to further improve the dwellings performance.

A review of possible low carbon and renewable technologies has been conducted, and the new development site proposes to adopt the use of high efficiency gas boilers, Waste Water Heat Recovery (WWHRS) with Photovoltaics while the site is not able to connect grid and utilise Air Source Heat Pump (ASHP) low temperature renewable solution for both space and water heating. Following the completion of the required local network upgrade the site will adopt an ASHP and WWHRS combination to achieve Part L compliance across the site.

The full adoption of ASHP's across the site is compromised by the Distribution Network Operator (DNO), who has confirmed that high voltage (HV) reinforcement works are required in order to provide sufficient electrical capacity for the proposed development, and that these works are now programmed over a 36 month period, with the commencement date yet to be confirmed. Until the timing and phasing of this reinforcement programme are known, it is not possible to accurately determine how many dwellings can be delivered using ASHP's within the early phases of this scheme.

However, to enable development to commence in advance of these works to facilitate delivery of new homes for the area, the applicant is in dialogue with SSE to secure a temporary High Voltage Point of Connection ("HV PoC") for the site. This temporary supply will provide 400kva and provide enough capacity to build out approximately 75 homes heated by ASHP's, as well as a portion of gas heated homes. The temporary HV PoC must there be disconnected before the full site permanent HV PoC is energised.

On this basis, it is proposed that a mix of electric and gas fired heating will be utilised for the initial phases of development, with the exact number of gas served plots to be agreed in consultation with the Local Planning Authority once the DNO's reinforcement programme and available capacity are

confirmed. Photovoltaic panels will be used in conjunction with plots that are utilising high efficiency gas boilers during this restricted period. The PV design is yet to be finalised across the site to account for plot specific orientation and shading, however, PV arrays are projected to be between 0.8 kWp and 1.2 kWp per house type when used in conjunction with high efficiency gas boilers.

The long-term intention remains to adopt ASHPs for the development as network capacity allows, in line with the Council's decarbonisation objectives and the industries transition to the Future Homes Standard.

The estimated Part L emissions reduction for dwellings across the site is estimated to be between 4.46% and 18.95% for homes heated with high efficiency gas boilers and 62.2% and 74.93% for homes heated with ASHP systems. Both solutions are in full compliance with and exceed Part L requirements.

This approach is aligned with the following relative policies and requirements:

- National Planning Policy Framework 2024 (NPPF)
- Approved Document Part L (2021 edition) Part L 2021
- Wiltshire Core Strategy (Adopted January 2015) CP41: Sustainable Construction & Low Carbon Energy
- Joint Melksham Neighbourhood Plan 2 2020 – 2038 Referendum Version Policy 1: Sustainable Design & Construction

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1. Introduction

This Energy and Sustainability Statement has been prepared in support of a planning application for Phase 1 of a residential housing development at Blackmore Farm, Melksham, Wiltshire. The proposed development site is comprised of 229 low rise residential open market and affordable homes across the Barratt and Redrow brands. The proposed development site comprises of the following tenure mix;

- 111 No. Open market houses
- 118 No. Affordable houses and flats

BARRATT HOMES								
2B	Denford	624	58.0	2	2	4	2,496	232
	Kenley	624	58.0	2	2	9	5,616	522
3B	Maidstone	830	77.1	2	3	16	13,280	1,234
	Ellerton	830	77.1	2	3	14	11,620	1,080
	Moresby	854	79.3	2	3	5	4,270	397
	Ennerdale	917	85.2	2	3	4	3,668	341
	Bewdley	978	90.9	2	3	8	7,824	727
	Norbury	1,107	102.8	2.5	3	8	8,856	823
4B	Kingsley	1,085	100.8	2	4		0	0
	Woodcote	1,217	113.1	2.5	4		0	0
	Hesketh	1,269	117.9	2.5	4		0	0
	Alfreton	1,483	137.8	2	4		0	0
	Radleigh	1,317	122.4	2	4		0	0
Sub Total (Open Market)						68	57,630	5,354
AFFORDABLE HOUSING								
■ SOCIAL/AFFORDABLE RENTED								
F	Loughton	472	43.8	3	1	9	81	38232
	1BF	655	60.9	3	1	9	81	53055
	Hornsea	721	67.0	3	2	9	81	58401
	YB58*	538	50.0	2	1	2	6	3228
	YB59*	584	54.3	2	1	2	6	3504
2B	YB50	866	80.5	2	2	21	651	563766
	WHDG 2B	1130	105.0	2	2	2	24	27120
3B	YB52	1025	95.2	2	3	11	253	259325
	YB55	1049	97.5	2	3	4	40	41960
4B	YB54	1,167	108.4	2	4		0	0
5B	TYPE A5A	1,342	124.7	2.5	5	2	4	5368
*stretched/beposke type to meet affordable mix						71		
● SHARED OWNERSHIP								
2B	YB50	866	80.5	2	2	7	6,062	563
3B	YB52	1025	95.2	2	3		0	0
	YB55	1049	97.5	2	3	2	2,098	195
						9		
▲ FIRST HOMES								
2B	Kenley	624	58.0	2	2	8	4,992	464
3B	Maidstone	830	77.1	2	3	7	5,810	540
	Moresby	854	79.3	2	3	1	854	79
						16		
Sub Total (Affordable) 45%						96	21,043	1,055,800
BARRATT TOTAL						164	78,673	1,061,154

Figure 1: Barratt Accommodation Mix Phase 1 Blackmore Farm, Courtesy of Pegasus Group

REDROW									
3B	Letchworth	983	91.3	2	3	4	3,932	365	
	Warwick	1,075	99.9	2	3	7	7,525	699	
	Amberley	1,144	106.3	2	3	2	2,288	213	
4B	Stratford	1,211	112.5	2	4	5	6,055	563	
	Marlow	1,288	119.7	2.5	4	7	9,016	838	
	Oxford	1,316	122.3	2	4	8	10,528	978	
	Overton	1,410	131.0	2	4	3	4,230	393	
	Shaftesbury (toolkit)	1,423	132.2	2	4	1	1,423	132	
	Harrogate	1,553	144.3	2	4	4	6,212	577	
	Ledsham (toolkit)	1,841	171.0	2	4	0	0	0	
	Henley	1,768	164.3	2	5	0	0	0	
5B	Hampstead	1,842	171.1	2	5	2	3,684	342	
Sub Total (Open Market)						43	54,893	5,100	
AFFORDABLE HOUSING									
■ SOCIAL/AFFORDABLE RENTED									
2B	Hadleigh	801	74.4	1	2	3	2,403	223	
	Trent	868	80.6	2	2	2	1,736	161	
3B	Stour	1017	94.5	2	3	0	0	0	
						5			
● SHARED OWNERSHIP									
2B	Trent	868	80.6	2	2	0	0	0	
3B	Stour	1017	94.5	2	3	3	3,051	283	
						3			
▲ FIRST HOMES									
2B	Trent	868	80.6	2	2	9	7,812	124,992	
3B	Stour	1,017	94.5	2	3	5	5,085	472	
						14			
Sub Total (Affordable)						22	20,087	126,132	
REDROW TOTAL						65	74,980	131,232	

Figure 2: Redrow Accommodation Mix Phase 1 Blackmore Farm, Courtesy of Pegasus Group

The following statement seeks to outline how the proposed development site will comply with the relevant national and local policies relating to carbon emission reduction. In particular the following documents and policies have been referred to in this statement:

- National Planning Policy Framework 2024 (NPPF)
- Approved Document Part L (2021 edition) Part L 2021
- Wiltshire Core Strategy (Adopted January 2015) CP41: Sustainable Construction & Low Carbon Energy
- Joint Melksham Neighbourhood Plan 2020 – 2038 Referendum Version Policy 1: Sustainable Design & Construction

This report will ensure the development incorporates sound sustainability principles by:

- Reducing carbon emissions associated with the development redesign by following the Energy Hierarchy and promoting a fabric first construction solution
- Carrying out a Renewable Energy Feasibility Assessment to determine the most viable low carbon and renewable technologies for the development
- Identifying additional solutions outside the scope of renewable energy technologies which will assist in improving the energy efficiency of the proposed development

2. Policy Review

2.1 Policy Context

Anthropogenic climate change can be described as the production of greenhouse gases and associated change in global climate caused by human activity. In response to the increased scientific awareness of the effect of human activities there has been a push in developed economies towards more sustainable development.

In 1992, the UK signed the Kyoto protocol committing itself and other nations to cut emissions of various greenhouse gases, the most significant being carbon dioxide. Since then, different policies and targets have been set at national, regional and local levels to stimulate and regulate more sustainable development. The Climate Change Act 2008 set carbon budgets to ensure that by 2050 there would be at least an 80% reduction in UK carbon emissions from the 1990 baseline. Additionally, the Conference of the Parties COP21 Paris agreement limiting global warming to 1.5 - 2°C above pre-industrial levels came into force in November 2016.

2.2 National Policy

2.2.1 National Planning Policy Framework 2024

National planning policy framework 2024 aims to make the planning system less complex and easier to understand.

Planning policies and decisions should play an active role in guiding development towards sustainable solutions, but in doing so should take local circumstances into account, to reflect the character, needs and opportunities of each area.

So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development

Planning for climate change

Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating and drought from rising temperatures. Policies should support appropriate measures to ensure the future health and resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

The need to mitigate and adapt to climate change should also be considered in preparing and assessing planning applications, taking into account the full range of potential climate change impacts.

New development should be planned for in ways that:

- Avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through incorporating green infrastructure and sustainable drainage systems; and
- Help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings in plans should reflect the Government's policy for national technical standards.

To help increase the use and supply of renewable and low carbon energy and heat, plans should:

- Provide a positive strategy for energy from these sources, that maximises the potential for suitable development, and their future re-powering and life extension, while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts);
- Consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
- Identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for collocating potential heat customers and suppliers.

In determining planning applications, local planning authorities should expect new development to:

- Comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
- Take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

2.3 Local Planning Policy:

The Wiltshire Core Strategy (Adopted January 2015) sets out the Council's spatial vision, key objectives and overall principles for development in the county. It forms the main basis for assessment in planning terms and this Statement has therefore been designed to address its requirements.

Policy extracts from the Core Strategy which are of most relevance to this document are provided below

2.3.1 CP1: Sustainable Construction & Low Carbon Energy

Climate change adaptation

New development, building conversions, refurbishments and extensions will be encouraged to incorporate design measures to reduce energy demand. Development will be well insulated and designed to take advantage of natural light and heat from the sun and use natural air movement for ventilation, whilst maximising cooling in the summer.

Sustainable construction

New homes (excluding extensions and conversions) will be required to achieve at least Level 4 (in full) of the Code for Sustainable Homes*. (...)

All non-residential development will be required to achieve the relevant BREEAM “Very Good” standards, rising to the relevant BREEAM “Excellent” standards from 2019.

Renewable and low-carbon energy

All proposals for major development will be required to submit a Sustainable Energy Strategy alongside the planning application outlining the low-carbon strategy for the proposal.

2.3.2 SP1: Sustainable Places and Spaces

The Joint Melksham Neighbourhood Plan forms part of the Development Plan for Wiltshire and the policies in the plan will be given full weight when assessing planning applications that affect land covered by the plan. The following policy is of relevance to this document:

Sustainable Design & Construction

As appropriate to their scale, nature and location, development proposals should demonstrate how they have mitigated and been designed to adapt to the impacts of climate change. This includes:

- a. The submission of a Sustainable Energy Strategy to demonstrate how carbon emissions are minimised, with the target of zero carbon in operation (regulated and unregulated energy)
- b. Embedding the Energy Hierarchy within the design of buildings by prioritising fabric first, orientation, design, and landscaping, to minimise energy demand for heating, lighting, and cooling, as well as maximising renewable energy generation. Proposals should respond positively to opportunities to improve space heating and energy consumption by considering a range of low-carbon and renewable technologies
- c. Demonstrating good connections to existing services and facilities, and/or a mix of uses that minimises the need to travel by private vehicle
- d. Using carbon sequestration and other sustainable approaches such as shade
- e. The retention of existing buildings where practicable, and the incorporation of associated retrofitting measures to improve the energy performance of existing buildings

3. The Proposed Development

The newly proposed residential site is located just North East of Melksham, Wiltshire. The proposed site layout is highlighted circled within the red boundary below.

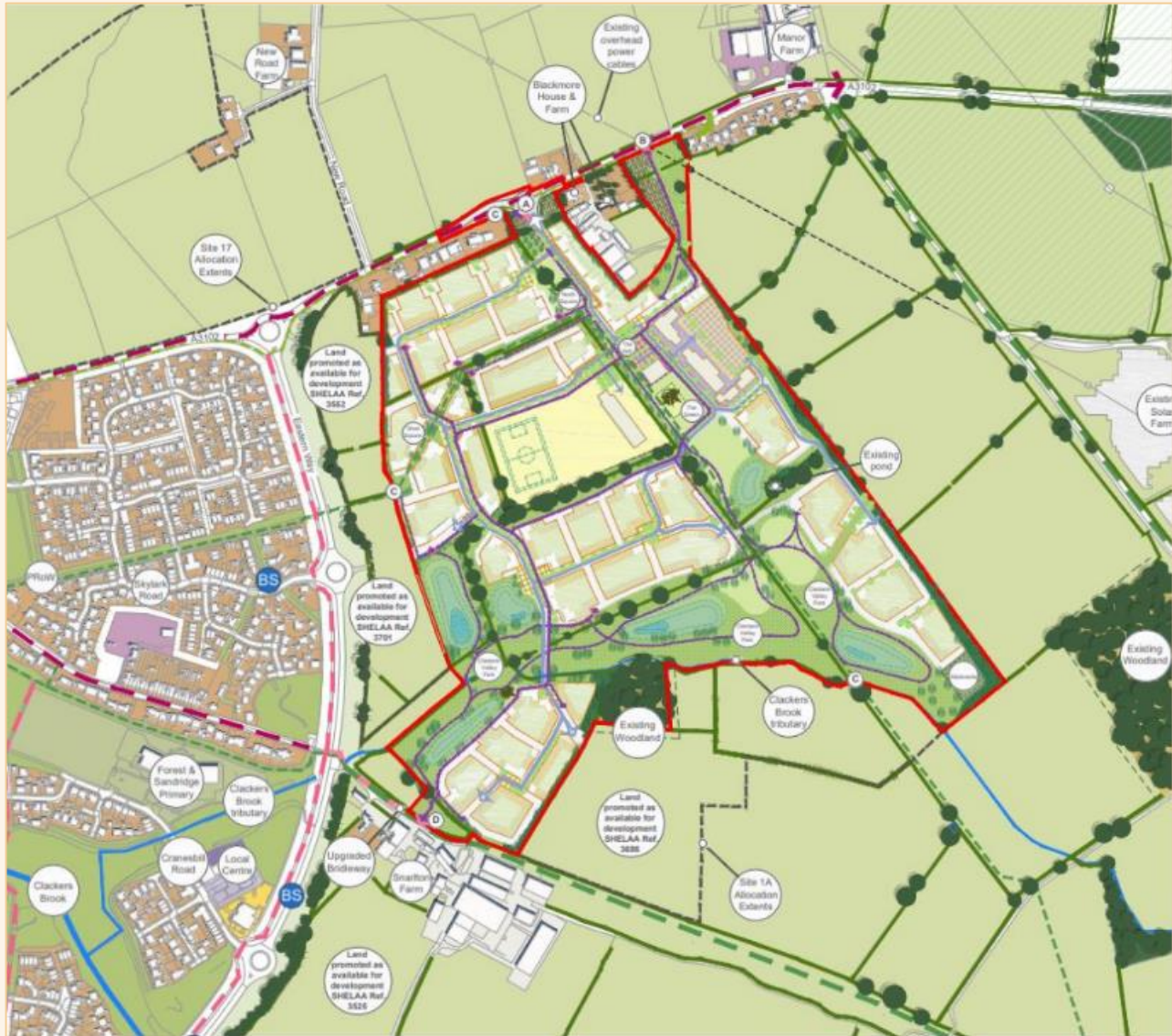
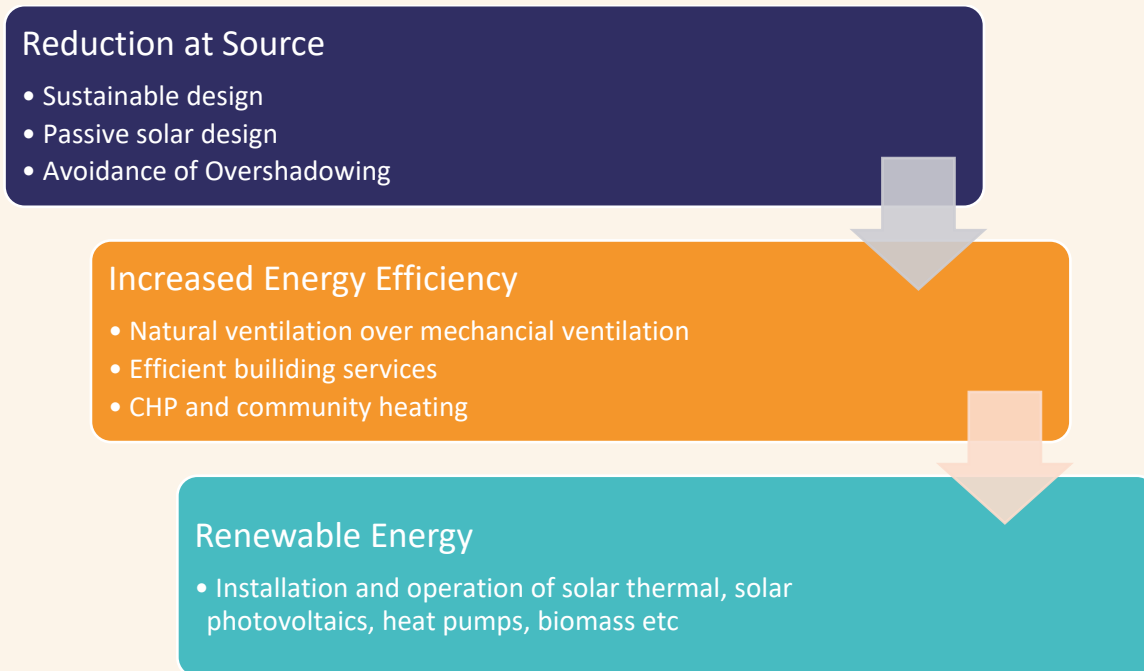


Figure 3: Site Location of Blackmore Farm, Courtesy of Daedalus Environmental Energy & Sustainability Statement

4. The Energy Hierarchy

The Energy Hierarchy is a widely adopted and recognised set of principles to guide design, planning and development decisions to optimise energy provision. The Hierarchy prioritises minimising the need for energy consumption through firstly design and energy efficiency and then through generating the reduced energy demand via renewables. The Hierarchy can also help to balance the economic and environmental dimensions of sustainability, supporting choices which are both environmentally and economically sustainable.



Graph 1 – Energy Hierarchy

It is considered that the above principles carbon reduction forms the most appropriate approach from both the practical and financial perspective. The industry is broadly in agreement that the energy efficiency and low carbon technologies have the greatest impact offsetting CO₂ emissions. Therefore, it is logical to encourage enhanced mitigation through energy efficiency and low carbon technologies in the first instance, as opposed to applying renewables as the first option at a significantly greater cost.

This fabric first approach has been adopted within the proposed site redesign.

5. Fabric Performance

The energy performance of a building is affected by its design, construction and use and whilst occupant behaviour is beyond the remit of this statement, better design and construction methods can significantly reduce the life cycle emissions of a building and assist the occupant to reduce consumption.

Sustainable design is not just about incorporating renewable technologies; buildings should be designed at the outset to provide suitable environmental conditions for the occupants whilst also consuming as little energy as practically possible.

5.1 Passive design

Passive design is a key principle of sustainable design and can be used to reduce the building's energy demand. Passive design responds to local climate and site conditions to maximise the building user's comfort and health while minimising energy use.

At the earliest stage the homes have been designed using a fabric first approach as to initially minimise energy and resulting CO₂ emissions. Particular attention will be paid to thermal envelope, and a high level of insulation will be specified to all thermal elements to minimise heat losses.

The development has been designed to improve daylighting in all habitable spaces, as a way of improving the health and wellbeing of its occupants. The majority of the habitable rooms, such as living rooms, will benefit from large windows to increase the amount of daylight within the internal spaces.

A portion of the buildings heat loss will occur due to air infiltration. Good construction detailing and the use of best practice construction techniques will minimise the amount of air infiltration. Extra attention to detail will be paid, with adequate sealing to all junctions in the thermal envelope, service penetrations and window casements.

Decentralised mechanical extract will be used to provide fresh air to the dwelling along with operable windows in order to prevent overheating during hottest summer months.

Given the early stage of this project the construction of certain thermal elements have not been finalised. Target u-values, which the client will achieve with their final specification, have been used in these instances.

The following table provides a summary of the energy efficient and carbon reducing design characteristics incorporated across the development.

Table 1: Energy Efficient Measures of SAP Calculations

Design SAP Data Input Table			
Element		Details	Comments
Floor U-Values	Ground Floors	0.11 W/m ² K	Specialist Floor Construction
	Exposed Floors	0.15 – 0.19 W/m ² K	Mineral Wool insulation between joists & underdrawn
Wall U-Values	External Walls	0.18 – 0.30 W/m ² K	Timber Frame or Cavity Insulation
	Party Walls	0.00 W/m ² K	Fully filled and capped
Roof U-Values	Plane Roof	0.08 – 0.11 W/m ² K	500mm insulation at Joists
	Sloping Roof	0.16 – 0.19 W/m ² K	Insulation between rafters
Opening U-Values	Windows	1.20 – 1.30 W/m ² K	G Value: 0.48 – 0.73
	Half Glazed Doors	1.10 – 1.50 W/m ² K	G Value: 0.60 – 0.63
	Rooflights	1.70 W/m ² K	G Value: 0.64
	Front Door	1.00 – 1.20 W/m ² K	Solid Composite Door
Thermal Bridging	y-value	Various	Bespoke Psi Values
Ventilation	Air Tightness	4.00 m ³ /hm ²	All Dwellings to be Air Tested
	Mechanical Ventilation	dMEV	Vent Axia
Lighting		100% Low Energy Lighting	Pendant Lighting Rated at 8W with an Efficacy of 101 Lumens/Watt

5.2 BDWR Design Approach

Building Sustainably is the framework for future homes, great places and better living. It brings together ambitions, targets, activities, and metrics across the most important issues. BDWR are committed to Building Sustainably, protecting and enhancing the things that matter to us most as a business: our people, the places we create, and the natural world in which we operate.



Figure 5: An illustration of the BDWR Design Approach

6. Renewable Technologies

This section reviews the suitability of various renewable technologies for this site redesign.

6.1 Heat Pumps

6.1.1 General Overview

An air-source heat pump works like a fridge in reverse. A refrigerant absorbs heat from the outside air and moves it indoors to warm your home (and often your hot water).

It has three key parts:

- Evaporator coil – takes heat from outdoor air
- Compressor – pushes and compresses the refrigerant to raise its temperature
- Heat exchanger – passes that heat into your home's air or water

Usually, the evaporator and compressor sit outside; the heat exchanger is inside.

Air-to-water systems heat water for a cylinder, underfloor heating, or radiators. The water is lower temperature than a boiler (typically 35–45 °C), so underfloor heating is usually most efficient. Air-to-air systems warm indoor air directly and blow it around with fans. Ground-source heat pumps use the ground's steady temperature (about 12 °C) to heat water or air efficiently, with optional cooling. Heat is drawn because the ground is warmer than the circulating fluid.

For ground loops you can use:

- Boreholes: several holes up to 100 m deep, spaced about 6 m apart
- Foundation loops: closed loops built into piles or pad foundations to make use of existing excavations and maximise contact with the earth

6.1.2 Technical Viability and Feasibility

Space needs:

- Like solar thermal, most homes need room for a hot water cylinder.
- Air-source heat pumps (ASHPs) need an outdoor unit and sometimes an indoor unit, depending on whether it's a monobloc or bi-bloc. Some indoor units include a built-in cylinder.
- Ground-source heat pumps (GSHPs) need indoor space; the outdoor part is buried underground.

Efficiency, emissions, and ratings:

- Heat pumps are very efficient—often 300%+ (COP ~3).
- Put simply: 1 kW of electricity in → ~3 kW of heat out.

Using less electricity for the same heat cuts emissions and boosts energy ratings versus direct electric heating or fossil fuel boilers.

Ground source vs air source:

- GSHPs: efficient and stable, but not recommended here due to high costs (drilling boreholes, ground loops) and uncertain ground conditions. Even with horizontal collectors (possible where gardens exist), costs are still much higher than ASHPs. The extra efficiency generally doesn't justify the added expense and complexity.
- ASHPs: cheaper to install, very efficient when designed well, lower emissions, and improve ratings.

Main drawback today:

Electricity costs are still higher than natural gas, so running costs may be above a gas boiler (though still far lower than direct electric heating). This gap should reduce as the UK shifts away from gas and adds more renewables, but current tariffs should be considered.

Heat pumps are considered to be the recommended technology for heating and hot water for this site where permitted by the network connection.

6.2 WWHRS

6.2.1 General Overview

Waste Water Heat Recovery Systems (WWHRS) capture heat from warm wastewater, usually from showers, and transfer it to the incoming cold mains via a sealed heat exchanger. As hot wastewater runs to drain, it preheats the cold feed to the shower mixer (and / or hot water appliance), so less energy is needed to reach set temperature. Systems are closed loop (potable and waste streams never mix), have no moving parts, and operate automatically whenever a shower is used. WWHRS can be installed as gravity-fed vertical units on the shower waste stack, or as low-profile, under-tray / under bath horizontal units where headroom is limited, both options deliver reductions in hot water energy demand.

6.2.2 Technical Viability and Feasibility

In low-rise housing, WWHRS is a practical, low-complexity measure, particularly in new build, where layout allows simple inline connection and short pipe reroutes. Vertical, gravity-fed configurations suit upper-floor showers with sufficient fall, offering higher recovery performance; under-tray / under-bath units fit bathrooms with minimal drop (e.g., ground floors or tight joist zones) and maintain standard gravity drainage with modestly lower efficiency.

WWHRS are considered to be a recommended technology for this site

6.3 Photovoltaics

6.3.1 General Overview

Photovoltaic (PV) panels are installed on the roof or elsewhere to convert sunlight into electricity. Ideally this type of system would be installed south-facing with a location that is not shaded by local obstructions. This power from the panels, generated as D.C. (Direct Current), is sent to a device called an inverter. The inverter converts the D.C. (Direct Current), from the solar panels into A.C. (Alternating Current), which is what our appliances use. There are different types of photovoltaic technology - Amorphous, Monocrystalline, Polycrystalline and Hybrid (combines monocrystalline and amorphous technology).

Table 2: Types of PV

Technology	Characteristics	Power Output & Density
Amorphous	Efficient in low light conditions and cheap but needs a large installation area.	Power output: 1000 units/kWp/year Power density: 62Wm/m ²
Monocrystalline	High efficiency and fairly expensive. Prefers high-light conditions.	Power output 850-1000 units/kWp/year Power density = 120 Wp/m ²
Polycrystalline	Lower efficiency and less expensive. Prefers high-light conditions.	Power output 850-1000 units/kWp/year Power density = 120 Wp/m ²

6.3.2 Technical Viability and Feasibility

The site has large areas of pitched roof where photovoltaic panels could be installed. The main benefit to the system is having onsite generation of electrical energy that can be used within a dwelling. Most PV installation are fitted with meters that are export ready, essentially meaning that the electrical energy generated by the PV panels can be exported and sold to the National Grid. This would be dependent on the dwelling's energy provider.

From an emissions and energy perspective as the panels are generating electricity on-site it significantly reduces the emissions and improves the dwelling's energy performance. By having electrical generation on-site this reduces the demand for National Grid Electricity, this therefore reduces the emissions as energy is being generated at source. This is more efficient method of delivery of energy, which is why it has a very positive impact on a dwelling's energy rating. In Part L the notional calculation has PV embedded into the calculation, therefore including PV assists in meeting Part L compliance and in the achievement of good EPC ratings.

Solar PV is a recommended technology for this site supporting the need to adopt high efficiency gas boilers initially on site due to the local restriction of not being able to connect to the national grid until network upgrades are completed

6.4 Solar Thermal

6.4.1 General Overview

The most common solar thermal system uses a twin coil cylinder that is heated by both a boiler (or another heat source) and the solar panels. The solar system and the regular heating system do not come into direct contact with each other, and the only shared part is the cylinder.

The free energy in the sun's rays is absorbed by the solar thermal panel and the heat is transferred into the pipe work. The pipe work is filled with a ready mixed liquid containing an antifreeze (glycol) and water, which is pumped gently through a secondary coil inside a twin coil solar cylinder. The heat is deposited in the storage cylinder and the glycol returns to the panel to absorb more free solar energy. The result is a reduction in demand for hot water from the main heating system.

6.4.2 Technical Viability and Feasibility

There are available areas of pitched roofs on the site which can accommodate the installation of solar thermal panels. This could be a feasible option. However, modern homes with efficient fixtures and heat recovery technologies have low domestic hot water demand, so the collector can be underutilised much of the year.

Solar thermal is therefore not considered to be a recommended technology, and no further investigation will be carried out.

6.5 Wind

6.5.1 General Overview

A wind turbine works the opposite of a fan. Instead of using electricity to make wind, like a fan, wind turbines use wind to make electricity. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity. Small wind systems known as "microwind" or "small-wind" turbines can produce electricity to help power the lights and electrical appliances in a typical home and also generate income from the feed in tariff scheme. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for small domestic turbines.

The success of wind power depends totally on the suitability of the site. The key factors are:

- An average wind speed of at least 5 or 6 m/s (metres per second)
- No obstacles nearby which might reduce the wind speed or create turbulence. These include buildings, trees or hills. An ideal site is a smooth hilltop with a clear, open stretch to the prevailing wind
- You are able to connect the turbine to the property and to the national grid

6.5.2 Technical Viability and Feasibility

The predicted wind speed for Blackmore Farm is 4.4 metres per second at 10m above ground level. Data has been sourced from the NOABL Wind Map which can be found at:

<http://www.rensmart.com/Weather/BEERR>. Due to the nature of the site, there are limitations as to where a wind turbine could be installed.

The proposed development does not meet the site constraints for wind turbines to work effectively. A specialist assessment would need to be carried out taking in to account all factors that affect the air flow and efficiency of a proposed turbine. Without this information wind turbines are not considered to be feasible on the site.

Wind Turbines are therefore not considered to be a recommended technology, and no further investigation will be carried out.

6.6 Biomass

6.6.1 General Overview

Biomass is produced from organic materials, either directly from plants or indirectly from industrial, commercial, domestic or agricultural products. It is often called 'bioenergy' or 'biofuels'. For small-scale, domestic or commercial use, the fuel usually takes the form of wood pellets, wood chips or wood logs.

Producing energy from biomass has both environmental and economic advantages. It is a carbon neutral process as the CO₂ released when energy is generated from biomass is balanced by that absorbed during the fuel's production. Biomass can also contribute to waste management by harnessing energy from products that are often disposed of at landfill sites.

6.6.2 Technical Viability and Feasibility

Combustion of wood biomass releases higher quantities of NO_x, SO_x and particulates (PM₁₀ and PM_{2.5}) compared to a comparable system fuelled by natural gas. This would have a negative impact upon the air quality in the vicinity of the area.

There are associated logistical issues associated with Biomass Boilers. The system requires significant space for both the Biomass boiler and fuel storage required.

Biomass Boilers are therefore not considered to be a recommended technology, and no further investigation will be carried out.

6.7 Renewable Summary

Following a review of renewable and low carbon technologies, this proposed scheme will adopt a fabric first approach as the foundation for reducing carbon emissions and energy demand. This ensures that all dwellings achieve high levels of thermal efficiency before the integration of renewable technologies.

To build upon this approach, the following technologies will be incorporated:

- Heat Pumps will be adopted across the site for all heating and hot water requirements (following the completion of the required national grid upgrades). This technology reduces reliance on traditional systems and delivers significant emissions reductions, while aligning with future decarbonisation of the electricity grid.
- Waste Water Heat Recovery Systems (WWHRS) will be installed in all dwellings using gas across the site, as well as Barratt ASHP dwellings to recover heat from shower waste water, further improving energy efficiency and reducing hot water demand.
- Photovoltaic (PV) arrays will be installed on the pitched roofs of all dwellings utilising a high efficiency gas boiler. This renewable solution has been installed alongside the gas boilers to achieve Part L compliance. This solution will not be required on houses or flats that incorporate ASHP technology so they will not be included.

By combining these measures, the development ensures that all homes benefit from reliable, efficient, and low carbon technologies. This strategy provides a robust balance between practicality, affordability, and long-term sustainability while future-proofing the scheme for Net Zero objectives.

Table 3: Low Carbon & Renewable Technologies proposed for adoption

Low Carbon & Renewable Technologies to be adopted			
Element		Details	Comments
Heating and Hot Water	Heating System	All Homes	High efficiency gas boiler for BDW units started prior to the local grid network upgrade ASHP for all Redrow units started prior to the local grid upgrade ASHP for all dwellings started following the completion of the local grid network upgrade
	Hot Water System	All Homes	Gas combination boiler Cylinder linked to ASHP
	WWHRS	All Gas Boiler Homes Barratt ASHP Homes	Connected to showers
Photovoltaics		PV design is yet to be finalised across the site to account for plot specific orientation and shading, however, PV arrays are projected to be between 0.8 kWp and 1.2 kWp per house type when used in conjunction with high efficiency gas boilers.	

7. Site Wide CO₂ Emissions

Sample SAP calculations have been produced for the proposed development site as a means of determining the carbon emissions of the site.

These have been completed using the approved modelling software Elmhurst Design SAP 10.2. Each house type within the proposed site redesign has been assessed to provide an overview of the predicted carbon emissions from the site compared with the Part L 2021 baseline. The predicted development performance is outlined below in table 4.

Table 4: Summary of Emissions (Regulated) of Proposed Assessment – Gas Boilers

Dwelling	Type	m ²	TER	DER	% Pass	Indicative EPC rating
Moresby	EoT	79.42	11.96	10.71	10.45	90 B
YB55	EoT	87.32	11.33	10.64	6.09	90 B
Type 52	EoT	84.54	11.27	10.5	6.83	90 B
Type 58	Semi	39.73	16.18	13.92	13.97	89 B
Type 59	Semi	47.39	15.04	12.19	18.95	90 B
Type WHDG2B (A2Ba)	Semi	104.06	10.08	9.63	4.46	91 B
Norbury	Semi	106.26	10.65	9.43	11.46	91 B
Ennerdale	Det	82.92	12.72	11.84	6.92	89 B
Type 50	EoT	68.06	12.86	11.55	10.19	89 B
Type A5A - Bayswater_H406	Semi	125.96	9.72	9.13	6.07	91 B
Maidstone	Semi	75.38	11.91	10.56	11.34	90 B
Bewdley	Det	75	13.33	12.55	5.85	90 B
Denford	Semi	55.94	14.05	11.43	18.65	90 B
Kenley	Semi	56.64	13.8	11.42	17.25	90 B
Ellerton	Semi	75.46	11.83	10.38	12.26	90 B
Block A_GF	Det	44.23	17.77	15.36	13.56	85 B
Block A_MF	Semi	65.41	11.94	11.2	6.2	87 B
Block A_SF	Semi	44.34	16.37	14.68	10.32	85 B

Table 5: Summary of Emissions (Regulated) of Proposed Assessment – ASHP

Dwelling	Type	m ²	TER	DER	% Pass	Indicative EPC rating
Moresby	EoT	79.42	11.77	3.58	69.58	86 B
YB55	EoT	87.32	11.14	3.52	68.4	89 B
Type 52	EoT	84.54	11.08	3.5	68.41	86 B
Type 58	Semi	39.73	16.11	6.09	62.2	81 B
Type 59	Semi	47.39	14.87	5.28	64.49	82 B
Type WHDG2B (A2Ba)	Semi	104.06	9.91	3.29	66.8	85 B
Norbury	Semi	106.26	10.45	3.1	70.33	86 B
Ennerdale	Det	82.92	12.54	3.9	68.9	89 B
Type 50	EoT	68.06	12.64	3.8	69.94	86 B
Type A5A - Bayswater_H406	Semi	125.96	9.68	2.92	69.83	86 B
Maidstone	Semi	75.38	11.71	3.52	69.94	86 B
Bewdley	Det	75	13.12	4.3	67.23	83 B
Denford	Semi	55.94	13.74	3.84	72.05	87 B
Kenley	Semi	56.64	13.57	3.87	71.48	86 B
Ellerton	Semi	75.46	11.56	3.44	70.24	86 B
Block A_GF	Det	44.23	17.59	4.41	74.93	86 B
Block A_MF	Semi	65.41	11.73	3.29	71.95	87 B
Block A_SF	Semi	44.34	16.31	4.23	74.06	87 B
Hampstead	Det	151.82	9.82	3.65	62.83	82 B
Marlow	Det	101.74	12.5	4.54	63.68	80 C
Oxford	Det	107.54	11.67	4.04	65.38	82 B
Amberley	Det	105.38	12.09	4.15	65.67	82 B
Stratford	Det	111.04	10.85	3.89	64.15	83 B
Warwick	Det	96.96	9.82	3.65	62.83	82 B
Harrogate	Det	142.62	12.5	4.54	63.68	80 C
Shafterbury	Det	129.72	9.44	3.35	64.51	84 B
Overton	Det	113.18	11.67	4.04	65.38	82 B
Trent	EoT	79.76	12.09	4.15	65.67	82 B
Trent	Mid	79.76	10.85	3.89	64.15	83 B
Hadleigh	Det	73.52	11.35	4.02	64.58	83 B
Stour	EoT	93.08	9.57	3.41	64.37	84 B
Stour	Mid	93.08	10.13	3.51	65.35	84 B
Letchworth	Semi	90.22	11.78	4.28	63.67	81 B

The incorporation of high efficiency gas boilers, WWHRs, PV and ASHP for various phases of homes across the proposed site, ensures that all dwellings exceed Part L compliance and meet the requirements of national and local planning policies.

The estimated Part L emissions reduction for dwellings across the site is estimated to be between 4.46% and 18.95% for homes heated with high efficiency gas boilers and 62.2% and 74.93% for homes heated with ASHP systems. Both solutions are in full compliance with and exceed Part L requirements.

The incorporation of low temperature renewable heating and hot water provision following the necessary upgrades to the local grid network leave the site 'Net Zero Ready' and in line with future regulation requirements

8. Conclusion

The new development site proposed at Blackmore Farm, Melksham, Wiltshire, has been assessed against national and local energy and sustainability requirements through detailed sample SAP calculations and consideration of a range of energy efficiency and low carbon measures.

The proposed strategy follows a fabric-first approach, delivering significant reductions in operational energy use and carbon emissions through high-performance insulation, airtightness, thermal detailing and high performance glazing.

This robust baseline is further strengthened by the inclusion of renewable and low carbon technologies, with ASHP and WWHRs proposed for homes across the site. High efficiency gas boilers are proposed to be used in conjunction with PV for early phase units where the HV reinforcement work are completed for the site. PV design is yet to be finalised across the site to account for plot specific orientation and shading, however, PV arrays are projected to be between 0.8 kWp and 1.2 kWp per house type when used in conjunction with high efficiency gas boilers.

The estimated Part L emissions reduction for dwellings across the site is estimated to be between 4.46% and 18.95% for homes heated with high efficiency gas boilers and 62.2% and 74.93% for homes heated with ASHP systems. Both solutions are in full compliance with and exceed Part L requirements.

This approach is aligned with the following relative policies and requirements:

- National Planning Policy Framework 2024 (NPPF)
- Approved Document Part L (2021 edition) Part L 2021
- Wiltshire Core Strategy (Adopted January 2015) CP41: Sustainable Construction & Low Carbon Energy
- Joint Melksham Neighbourhood Plan 2 2020 – 2038 Referendum Version Policy 1: Sustainable Design & Construction

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