

Land at Home Farm, Warminster

Bellway Homes Ltd (Wessex)

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

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Rev 0	Maja Wheeler	28/11/2025	Initial Issue
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This statement has been produced by AES Sustainability Consultants on behalf, and commissioned by, Bellway Homes to detail the proposed approach to energy and CO₂ reduction to be employed at the development of Land at Home Farm, Warminster. It should be noted that the details presented, including the proposed specifications, are subject to change as the detailed design of the dwellings progresses, whilst ensuring that the overall commitments will be achieved.

Contents

1.	Introduction	4
2.	Planning Policy	5
3.	Energy Consumption and CO ₂ Emissions	8
4.	Baseline CO ₂ Emissions	11
5.	Low Carbon and Renewable Energy Systems	12
6.	Indicative Dwelling Performance	17
7.	Climate Change Resilience	18
8.	Resource Efficiency	19
9.	Water Conservation	20
10.	Electric Vehicle Charging	21
11.	Conclusions	22

List of figures & tables

Figure 1. Proposed Site Layout - Land at Home Farm, Warminster	4
Table 1. CO ₂ Emissions improvements from successive Part L editions	8
Table 2. Benefits of the Fabric First approach	9
Table 3. Indicative construction specification - main elements	10
Table 4. Part L compliant baseline CO ₂ emissions by house type	11
Table 5. Part L compliant baseline CO ₂ emissions for the site	11
Table 6. Individual Biomass Heating feasibility appraisal	13
Table 7. Solar Thermal systems feasibility appraisal	13
Table 8. Solar Photovoltaic systems feasibility appraisal	14
Table 9. Air Source Heat Pump systems feasibility appraisal	14
Table 10. Ground Source Heat Pump systems feasibility appraisal	15
Table 11. Hot Water Heat Pump Feasibility Appraisal	15
Table 12. Indicative dwelling performance - CO ₂ emissions	17
Table 13. Fabric Energy Efficiency of sample dwellings	17
Table 14. Site-wide CO ₂ emission reductions achieved	17
Table 15. Typical Water Demand Calculation	20

1. Introduction

Preface

- 1.1. Written by AES Sustainability Consultants on behalf of Bellway Homes, this Energy and Sustainability Statement has been prepared in support of the full detailed planning application for the development at Land at Home Farm, Warminster.

Development Description

- 1.2. The development site is in Warminster – a historic market town located in the south-west of Wiltshire. The site is surrounded by residential areas to the east and surrounded by farmland to the north and west.
- 1.3. The proposals would deliver up to 135 dwellings across a mix of one to five bedroom detached, semi-detached and terraced housing, as well as public open space. The proposed site layout is shown in Figure 1.

Purpose and Scope of the Statement

- 1.4. This statement will address relevant national and local policies relating to sustainable development, including the Wiltshire Core Strategy, adopted in January 2015.
- 1.5. This statement demonstrates that the development will be designed and constructed to meet Part L 2021 standards as a minimum, equating to a circa 31% improvement over Part L 2013.
- 1.6. Additional sustainable construction considerations are addressed, including overheating risk and climate resilience, sustainable and responsible materials usage, water consumption of the dwellings and Electric Vehicle Charging (EVC).



Figure 1. Proposed Site Layout – Land at Home Farm, Warminster.

2. Planning Policy

National Planning Policy Framework

- 2.1. In January 2024, the Government published the updated National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England and how these are expected to be applied.
- 2.2. The planning process has been identified as a system to support the transition to a low carbon future in response to climate change by assisting in the reduction of greenhouse gas emissions and supporting renewable and low carbon energy.
- 2.3. Paragraph 159 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

159. New development should be planned for in ways that:

- a) 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 adaption measures, including through the planning of green infrastructure; and
- b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

Current National Policy Standards

- 2.4. Government policy in relation to the energy performance of buildings has been evolving over the past decade, following government commitments to reduce the emission of greenhouse gases – particularly CO₂. This obligation was enshrined in the Climate Change Act 2008, which commits the UK to achieving a mandatory 80% reduction in the UK's CO₂ emissions by 2050, compared with 1990 levels.
- 2.5. In 2016, the UK government ratified the Paris Agreement, which provides a framework for governments to pursue the target of limiting global warming below 2°C.
- 2.6. In June 2019, the Government announced it had set a new net zero greenhouse gas emission target for the UK by 2050, compared with the previous target of at least 80% reduction from 1990 levels.

- 2.7. The built environment has a key role to play in delivering on these international commitments, as it accounts for approximately a third of overall CO₂ emissions. These commitments have been translated into national policies within the built environment driven by, amongst other mechanisms, the EU Energy Performance of Buildings Directive and the 2012 Energy Efficiency Directive.
- 2.8. Following the introduction of the 2013 edition of Building Regulations Part L, the successive updates required regulated CO₂ emissions levels from new build domestic buildings to be approximately 30% lower than 2006 levels.
- 2.9. The introduction of Part L 2021, mandatory from June 2023, introduced a further uplift in carbon reduction standards of 31% over Part L 2013, mandating improved fabric standards and the incorporation of low carbon or renewable energy systems.

Future Homes Standard

- 2.10. In December 2023, the Government released the consultation on the forthcoming Future Homes Standard (FHS). The consultation presents two options aimed at delivering homes with carbon emissions at least 75% lower than Part L 2013 requirements.
- 2.11. At this stage, both options closely follow Part L 2021 fabric standards, with the addition of low carbon heating systems in the form of air source heat pumps. The higher performance option (Option 1) additionally includes solar photovoltaics and waste-water heat recovery, as well as a slightly lower design air leakage figure.
- 2.12. It is currently unclear whether similar transitional arrangements will apply or when the regulations may be introduced.

Local Planning Policy

- 2.13. In January 2015 the Wiltshire Core Strategy was adopted, Policy 41 relates to sustainable design and construction of new development:

Policy 41 - Sustainable construction and 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. Conversions of property to residential use will not be permitted unless BREEAM's Homes "Very Good" standards are achieved. All non-residential development will be required to achieve the relevant BREEAM "Very Good" standards, rising to the relevant BREEAM "Excellent" standards from 2019.

Existing buildings

Retrofitting measures to improve the energy performance of existing buildings will be encouraged in accordance with the following hierarchy:

- i. Reduce energy consumption through energy efficiency measures
- ii. Use renewable or low-carbon energy from a local/district source
- iii. Use building-integrated renewable or low-carbon technologies.

Opportunities should be sought to facilitate carbon reduction through retrofitting at whole street or neighbourhood scales to reduce individual costs, improve viability and support coordinated programmes for improvement.

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. In all cases, including those listed above, proposals relating to historic buildings, listed buildings and buildings within conservation areas and world heritage sites should ensure that appropriate sensitive approaches and materials are used. Safeguarding of the significance of heritage assets should be in accordance with appropriate national policy and established best practice. In all cases the impact of these requirements on the viability of development will be taken into consideration.

Code for Sustainable Homes

- 2.14. The Code for Sustainable Homes was discontinued in 2015, with a ministerial statement advising:

"From the date the Deregulation Bill is given Royal Assent, local planning authorities and qualifying bodies preparing neighbourhood plans should not set in their emerging Local Plans, neighbourhood plans, or supplementary planning documents, any additional local technical standards or requirements relating to the construction, internal layout or performance of new dwellings. This includes any policy requiring any level of the Code for Sustainable Homes to be achieved by new development; the Government has now withdrawn the Code, aside from the management of legacy cases."

- 2.15. The statement additionally provided guidance on appropriate energy standards which may be enforced for new development:

"For the specific issue of energy performance, local planning authorities will continue to be able to set and apply policies in their Local Plans which require compliance with energy performance standards that exceed the energy requirements of Building Regulations until commencement of amendments to the Planning and Energy Act 2008 in the Deregulation Bill. Until the amendment is commenced, we would expect local planning authorities to take this statement of the Government's intention into account in applying existing policies and not set conditions with requirements above a Code level 4 equivalent.

Proposed Strategy

- 2.16. This statement is intended to establish the proposed approach to sustainable construction and reduction in CO₂ emissions to be delivered at the development.
- 2.17. It is proposed that the development is designed to incorporate all applicable guidance contained within the policies relating to renewable energy provision and the construction of highly efficient buildings which seek to minimise energy demand and CO₂ emissions.
- 2.18. The dwellings will be constructed following a fabric first approach to meet and exceed the current Building Regulations, with insulation standards, thermal bridging and air leakage all improved beyond the minimum compliance levels.
- 2.19. In addition, consideration will be given to building design, passive solar design and energy efficiency site-layouts where possible, together with the installation of low carbon energy systems to further reduce carbon emissions arising from the development.
- 2.20. The proposed build programme will mean that all dwellings will be built out under Part L 2021, which will require a minimum 31% improvement on Part L 2013 standards, thereby exceeding the requirements of the Policy 41.
- 2.21. There are many other aspects of sustainability which relate to new housing development and will be considered further within this statement, including water use and the environmental impacts of materials, construction and household waste.

3. Energy Consumption and CO₂ Emissions

- 3.1. As one of the key areas of ongoing impact of any development, the energy demand of the dwellings to be constructed is a key consideration in the overall sustainability strategy.
- 3.2. As set out within the policy review section of this statement, it is considered that Building Regulations Part L 2021 forms the minimum requirement for new dwellings in terms of energy performance.
- 3.3. As shown in Table 1, the CO₂ standards contained within Part L were increased in 2010 and 2013, reducing the 'Target Emission Rate' (TER) by approximately 25% and a further 6% (9% for non-residential) respectively, requiring substantial improvements to thermal insulation and heating services, or a significant increase in on-site renewable energy provision.
- 3.4. The 2021 uplift to the regulations requires a further 31% reduction in emissions, delivering dwellings with emissions levels less than half of homes built to L1A 2006 standards.
- 3.5. The proposed Future Homes Standard constitutes an emissions reduction of circa 75% over Part L 2013 regulatory standards.

Table 1. CO₂ Emissions improvements from successive Part L editions

Building Regulations	CO ₂ emissions improvements
L1A 2006	-
L1A 2010	25%
L1A 2013	6%
L1 2021	31%
Future Homes Standard	75 – 80% (over L1A 2013)

Energy Reduction Strategy – Fabric First

- 3.6. The proposed construction specification and sustainable design principles to be applied to the development will ensure that all dwellings will be designed to meet and exceed the fabric energy efficiency requirements of Part L 2021 standards.
- 3.7. It is proposed that the energy demand reduction strategy for the development incorporates further improvements beyond a Part L compliant specification and initially concentrates finance and efforts on reducing energy demand as the first stage of the Energy Hierarchy.

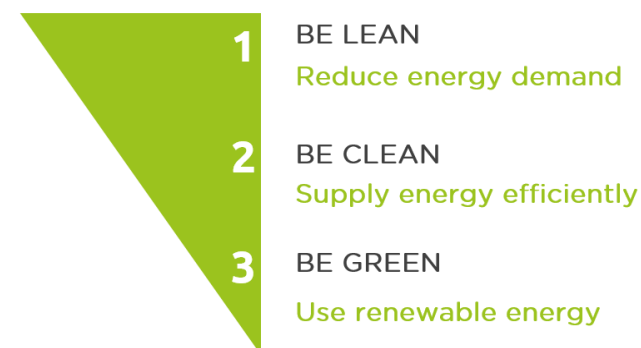


Figure 2. The Energy Hierarchy

Be Lean – reduce energy demand

- 3.8. The design of a development - from the masterplan to individual building design - will assist in reducing energy demand in a variety of ways, with a focus on minimising heating, cooling and lighting loads. Key considerations include:
 - Building orientation – maximise passive solar gain and daylight
 - Building placement – control overshadowing and wind sheltering
 - Landscaping – control daylight, glare and mitigate heat island effects
 - Building design – minimise energy demand through fabric specification

Be Clean – supply energy efficiently

3.9. The design and specification of building services to utilise energy efficiently is the next stage of the hierarchy, taking into account:

- High efficiency heating and cooling systems
- Ventilation systems (with heat recovery where applicable)
- Low energy lighting
- High efficiency appliances and ancillary equipment

Be Green – use low carbon / renewable energy

3.10. Low carbon and renewable energy systems form the final stage of the energy hierarchy and can be used to directly supply energy to buildings, or offset energy carbon emissions arising from unavoidable demand. This may be in the form of:

- Low carbon fuel sources – e.g., biomass
- Heat pump technologies
- Building scale renewable energy systems
- Small-scale heat networks
- Development-scale heat networks

3.11. As this hierarchy demonstrates, designing out energy use is weighted more highly than the generation of low-carbon or renewable energy to offset unnecessary demand. Applied to the development, this approach is referred to as ‘fabric first’ and concentrates finance and efforts on improving U-values, reducing thermal bridging, improving airtightness, and installing energy efficient ventilation and heating services.

3.12. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub¹ and the Energy Savings Trust² having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

3.13. The benefits to prospective homeowners of following the Fabric First approach are summarised in Table 2.

Table 2. Benefits of the Fabric First approach

	Fabric energy efficiency measures	Bolt-on renewable energy technologies
Energy/CO ₂ /fuel bill savings applied to all dwellings	✓	✗
Savings built-in for life of dwelling	✓	✗
Highly cost-effective	✓	✗
Increases thermal comfort	✓	✗
Potential to promote energy conservation	✓	✓
Minimal ongoing maintenance / replacement costs	✓	✗
Significant disruption to retrofit post occupation	✓	✗

Building Regulations Standards – Fabric Energy Efficiency

3.14. In addition to the CO₂ reduction targets, the importance of energy demand reduction was further supported by the introduction of a minimum fabric standard into Part L1A 2013, based on energy use for heating and cooling a dwelling. This is referred to as the ‘Target Fabric Energy Efficiency’ (TFEE) and expressed in kWh/m²/year.

3.15. This standard enables the decoupling of energy use from CO₂ emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting CO₂ emissions through low carbon or renewable energy technologies.

3.16. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L1. These reference values are described as ‘statutory guidance’ as opposed to mandatory requirements, allowing full flexibility in design approach and balances between different aspects of dwelling energy performance to be struck so that the ultimate goal of achieving the TFEE is met. The proposed approach and indicative construction specifications are set out in the following sections of this Strategy.

¹ Zero Carbon Hub, Zero Carbon Strategies for tomorrow’s new homes, Feb 2013

² Energy Savings Trust, Fabric first: Focus on fabric and services improvements to increase energy performance in new homes, 2010

Proposed Fabric Specification

- 3.17. In order to ensure that the energy demand of the development is reduced, the dwellings should be designed to minimise heat loss through the fabric wherever possible. Table 3 details the proposed fabric specification of the major building elements, with the first column in this table setting out the Part L limiting fabric parameters in order to demonstrate the improvements to be delivered.

Table 3. Indicative construction specification – main elements

	Part L Limiting Fabric Parameters	Design Specification
External wall – u-value	0.26 W/m ² K	0.24-0.26 W/m ² K
Party wall – u-value	0.20 W/m ² K	0.00 W/m ² K
Roof – u-value	0.16 W/m ² K	0.09W/m ² K
Ground floor – u-value	0.18 W/m ² K	≤ 0.13 W/m ² K
Windows – u-value	1.60 W/m ² K	1.30 W/m ² K
Doors – u-value	1.60 W/m ² K	1.40 W/m ² K
Air Permeability	8.00 m ³ /h.m ² at 50 Pa	4.00-5.01 m ³ /h.m ² at 50 Pa

Thermal bridging

- 3.18. The significance of thermal bridging as a potentially major source of fabric heat losses is increasingly understood. Improving the U-values for the main building fabric without accurately addressing the thermal bridging will not achieve the desired energy and CO₂ reduction targets.
- 3.19. The specification should seek to minimise unnecessary bridging of the insulation layers, with avoidable heat loss therefore being reduced wherever possible. Accurate calculation of these heat losses forms an integral part of the SAP calculations undertaken to establish energy demand of the dwellings, and as such thermal modelling will be undertaken to assess the performance of all main building junctions.

Air leakage

- 3.20. After conductive heat losses through building elements are reduced, convective losses through draughts are the next major source of energy wastage. The proposal adopts an airtightness standard of 4.00-5.01 m³/h.m² at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

Heating Systems

- 3.21. Heating generation and distribution systems throughout will be designed to give the occupants very good control over their use, encouraging and allowing energy-efficient behaviour. Controls will be included in each dwelling to allow occupants control over the heating in each room, therefore avoiding unnecessary heating of uninhabited spaces when not required (e.g. bedrooms during the day, living areas at night).

Provisions for Energy-Efficient Operation of the Dwelling

- 3.22. Energy consumption can be reduced by passive design features that ensure that the building systems and equipment are utilising energy in the most efficient manner possible. Improving energy efficiency is principally addressed through the buildings themselves through various measures such as:
- Specifying glazing with solar transmittance value (g-value) to strike a balance between useful solar gain in winter and unwanted solar gain in summer
 - Fully insulating all primary pipework
 - Minimising the overshadowing from adjacent dwellings and vegetation to maximise solar gains where possible
 - Installing energy efficient lighting
- 3.23. However, the occupant also has a more active part in reducing energy by ensuring efficient operation of the dwelling.
- 3.24. The occupants will be provided with all necessary literature and guidance relating to the energy efficient operation of fixed building services.
- 3.25. Currently it is assumed that all dwellings will be provided with very efficient gas boilers, fully insulated primary pipework, and multi-zone zone controls to avoid unnecessary heating of spaces when not required.

4. Baseline CO₂ Emissions

- 4.1. The development is to be designed and constructed to meet the requirements of Part L of the Building Regulations 2021, therefore compliance with this standard forms the first stage in the sustainable construction approach.
- 4.2. Part L compliance is assessed through the Standard Assessment Procedure (SAP), which uses the 'Target Emission Rate' (TER) – expressed in kilograms CO₂ per meter squared of total useful floor area, per annum – as the benchmark. The calculated performance of the dwelling as designed – the Dwelling Emission Rate (DER) – is required to be lower than this benchmark level.
- 4.3. Calculations have been undertaken to a representative sample of house types proposed to assess the carbon emissions of the development. The Part L 2021 compliant calculated baseline carbon emissions and baseline energy demand are reported in Table 4.

Table 4. Part L compliant baseline CO₂ emissions by house type

House type	CO ₂ emissions (kgCO ₂ /yr)
Hooper	12.45
Blemmere	10.87
Coppersmith	10.81
Hillard	11.48

- 4.4. Based on these calculations, the representative site-wide Part L compliant CO₂ emissions are shown in Table 5.

Table 5. Part L compliant baseline CO₂ emissions for the site

Part L Compliant CO ₂ emissions (kgCO ₂ /yr)
145,800

5. Low Carbon and Renewable Energy Systems

- 5.1. A range of technologies have been assessed for potential incorporation into the scheme in accordance with Regulation 25A of the Building Regulations and with the intent of meeting Part L 2021 and the relevant policies within the adopted North Somerset Core Strategy.

Combined Heat and Power (CHP) and District Energy Networks

- 5.2. A CHP unit is capable of generating heat and electricity from a single fuel source. The electricity generated by the CHP unit is used to displace electricity that would otherwise be supplied from the national grid, with the heat generated as effectively a by-product utilised for space and water heating.
- 5.3. The economic and technical viability of a CHP system is largely reliant on a consistent demand for heat throughout the day to ensure that it operates for over 5000 hours per year. Heat demand from mainly residential schemes is not conducive to efficient system operation, with a defined heating season and intermittent daily profile, with peaks in the morning and the evening. For this reason, the use of a CHP system is considered unfeasible for this development.
- 5.4. There are currently no heat networks which extend near the proposed development. High network heat losses associated with distribution to individual houses, as opposed to large high-rise apartment blocks and commercial developments mean that a new heat network to serve the area is not considered viable or an environmentally preferred option. Due to these reasons, the provision for future connection to a district heating system is also not proposed.

Wind Power

- 5.5. Locating wind turbines adjacent to areas with buildings presents a number of potential obstacles to deployment. These include the area of land onsite required for effective operation, installation and maintenance access, environmental impact from noise and vibration, visual impact on landscape amenity and potential turbulence caused by adjacent obstacles.
- 5.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 4.9m/s³. Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective⁴. For these reasons wind power is not considered feasible.

³ NOABL Wind Map (<http://www.rensmart.com/Weather/BERR>)

Building Scale Systems

- 5.7. The remaining renewable or low carbon energy systems considered potentially feasible are at a building scale. These are as follows;
- Individual Biomass Heating
 - Solar Thermal
 - Solar Photovoltaic (PV)
 - Air Source Heat Pumps (ASHPs)
 - Ground Source Heat Pump (GSHPs)
- 5.8. The advantages and disadvantages of these technologies are evaluated in Tables 6-11.

⁴ CIBSE TM38:2006. Renewable energy sources for buildings.

Table 6. Individual Biomass Heating feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Potential to significantly reduce CO₂ emissions as the majority of space and water heating will be supplied by a renewable fuel • Decreased dependence on fossil fuel supply	• A local fuel supply is required to avoid increased transport emissions • Fuel delivery, management and security of supply are critical • Space is required to store fuel, a thermal store and plant • A maintenance regime would be required even though modern systems are relatively low maintenance • Building users or a management company must be able to ensure fuel is supplied to the boiler as required. Local environmental impacts potentially include increased NO_x and particulate emissions
Conclusions	
Biomass heating is not considered technically feasible in this development scheme due to insufficient space and difficulty in securing adequate fuel supply.	

Table 7. Solar Thermal systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Mature and reliable technology offsetting the fuel required for heating water (typically gas) • Solar thermal systems require relatively low maintenance • Typically, ~50% of hot water demand in dwellings can be met annually	• Installation is restricted to favourable orientations on an individual building basis • The benefit of installation is limited to the water heating demand of the building • Safe access must be considered for maintenance and service checks • Buildings need to be able to accommodate a large solar hot water cylinder • Distribution losses can be high if long runs of hot water pipes are required • Visual impact may be a concern in special landscape designations (e.g. AONB)
Estimated costs and benefits	
• Ongoing offset of heating fuel, minimal maintenance requirements	
Conclusions	
Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations.	

Table 8. Solar Photovoltaic systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- The technology offsets the high carbon content of grid supplied electricity used for lighting, pumps and fans, appliances and equipment - Mature and well proven technology that is relatively easily integrated into building fabric - Adaptable to future system expansion - Solar resource is not limited by energy loads of the dwelling as any excess generation can be transferred to the national grid - PV systems generally require very little maintenance - Occupiers could benefit from Feed in Tariff payments - Service and maintenance requirement minimal, and 2-3 storey buildings should not require significant additional safety measures (mansafe systems etc) for roof access	- Poor design and installation can lead to lower than expected yields (e.g. from shaded locations) - Installation is restricted to favourable orientations - Feed in Tariff support mechanism has been discontinued - Safe access must be considered for maintenance and service checks - Visual impact may be a concern in special landscape designations (e.g. AONB) or conservation areas - Reflected light may be a concern in some locations
Estimated costs and benefits	
Ongoing offset of electricity fuel costs, minimal maintenance requirements	
Conclusions	
PV panels are considered technically feasible for all buildings with suitable roof orientations. The relatively low cost, high carbon saving potential and limited additional impacts mean that PV is considered a feasible option for this development.	

Table 9. Air Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle - Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 250% - Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings - Will benefit from ongoing decarbonisation of the electricity grid	- Air source heat pumps are powered by electricity, leading to potentially higher fuel bills than gas heating systems - It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved. Users must be educated in how heat pump systems should be operated for optimal efficiency - Air source heat pump plant should be integrated into the building design to mitigate concerns regarding the visual impact of bolt-on technology - Noise in operation may be an issue particularly when operating at high output
Estimated costs and benefits	
- Low space requirements and no external unit - Significant running cost reduction compared with direct immersion - Low carbon water heating	
Conclusions	
Air source heat pumps are considered technically feasible for the buildings in this scheme.	

Table 10. Ground Source Heat Pump systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- Heat pumps are relatively mature technology providing heat using the reverse vapor compression refrigeration cycle - Heat pumps are a highly efficient way of providing heat using electricity, with manufacturers reporting efficiencies from 320% - Can be of increased benefit where cooling is also required, therefore particularly relevant to commercial buildings - Will benefit from ongoing decarbonisation of the electricity grid	- Low temperature heating circuits (underfloor heating) would be required to maximise the efficiency of heat pumps - A hot water cylinder would also be required for both space and water heating - Ground source heat pumps are powered by electricity, leading to potentially higher fuel bills than gas heating systems - It is critical that heat pump systems are designed and installed correctly to ensure efficient operation can be achieved - Ground source heat pumps either require significant land to incorporate a horizontal looped system or significant expense to drill a bore hole for a vertical looped system
Estimated costs and benefits	
- Shared ground loop approach eligible for non-domestic RHI. Estimated simple payback at circa 18 years (systems only) - Running cost linked to COP of heat pump, circa 3.0 equates to 66% reduction vs electricity or around 5-6p/kWh (higher than mains gas) - Additional costs to upgrade electricity infrastructure currently unknown	
Conclusions	
Ground source heat pumps are considered technically feasible for buildings in this scheme. However, the cost and difficulty associated with vertical boreholes at this site means that they are not considered a preferred low carbon technology at this stage.	

Table 11. Hot Water Heat Pump Feasibility Appraisal

Potential Advantages	Risks & Disadvantages
- Hot water demand met through grid electricity with low effective emissions factor - Heat pump element increases efficiency over immersion heater, circa 200%+ - No external heat exchanger requirement, only intake and exhaust duct runs - Low noise levels - Compact solution in same footprint as hot water cylinder	- Maximum length of duct runs means that cylinder positioning needs to be considered within the dwelling - Less appropriate for larger dwellings with higher hot water demands due to potentially slower recharge rate - Some noise, however likely to be easily suppressed with appropriate cylinder location - Space heating must be met through separate system
Estimated costs and benefits	
Running cost linked to COP of heat pump for hot water provision, likely to be higher than mains gas	
Conclusions	
Hot water heat pumps are considered feasible for dwellings with a relatively low number of wet rooms and appropriate cylinder location to allow for duct runs to building façade.	

Summary

- 5.9. Following this feasibility assessment, it is considered that there are a range of technically feasible low carbon or renewable energy systems, however a number of these may be discounted on the grounds of increased running costs for residents or other adverse effects:
- Biomass heating systems would require significant storage space for fuel as well as regular deliveries at different times to all dwellings. Local NO_x and particulate pollution are also an increasing concern, and therefore they are not appropriate for this development.
 - Ground source heat pump systems may be technically feasible; however, the ground conditions are unknown, and the capital cost is likely to be prohibitive.
- 5.10. There is one main technology with significant potential for the development:
- PV panels
- 5.11. It is currently proposed that houses will incorporate gas boilers supplemented by PV panels. This will be sufficient to achieve compliance with Part L 2021.
- 5.12. For all plots which will fall under Future Homes Standards the specification will be amended, at the Design Stage, to ensure all plots are compliant. For all plots under new regulations ASHP will be supplemented by the PV panels but this will also be assessed at design stage.

6. Indicative Dwelling Performance

- 6.1. Through following the strategy described, the dwellings will significantly reduce energy demand and consequent CO₂ emissions beyond a Part L compliant level of performance through the dwelling fabric, PV panels.
- 6.2. Indicative SAP calculations have been undertaken on a sample of the proposed dwelling types to provide an overview of the typical as-designed energy performance, in comparison with Building Regulations standards. The results of these calculations are shown in Tables 12 and 13.

Table 12. Indicative dwelling performance – CO₂ emissions

House type	Part L compliant emissions (kgCO ₂ /year)	As-designed emissions (kgCO ₂ /year)	Improvement %
Hooper	12.45	11.71	5.94
Blemmere	10.87	10.71	1.47
Coppersmith	10.81	10.62	1.76
Hillard	11.48	11.09	3.40

Fabric Energy Efficiency

- 6.3. Table 13 demonstrates that the dwellings will exceed the uplifted Fabric Energy Efficiency targets within Part L 2021 through the proposed specification.

Table 13. Fabric Energy Efficiency of sample dwellings

	Target Fabric Energy Efficiency (kWh/m ² /year)	Design Fabric Energy Efficiency (kWh/m ² /year)	Improvement %
Hooper	37.21	36.21	2.68
Blemmere	36.68	35.97	1.93
Coppersmith	36.61	36.39	0.60
Hillard	39.29	39.15	0.36

- 6.4. This calculated performance indicates that the dwellings will significantly exceed the requirements of Part L through the proposed specification.

- 6.5. Table 14 demonstrates the site-wide savings over and above the Part L 2021 compliant baseline that will be delivered.

Table 14. Site-wide CO₂ emission reductions achieved

	CO ₂ Emissions (kgCO ₂ /yr)	
Part L 2021 compliant baseline	145,800	
Part L 2021 calculated emissions	141,554	
	kgCO ₂ /yr	%
Total site-wide savings	4,246	2.91

- 6.6. Any dwellings constructed beyond the implementation of the Future Homes Standard, which is expected to be introduced in 2026, will meet a 75-80% reduction in CO₂ emissions compared with Part L 2013. It will be ensured as design progresses that revised calculations will be undertaken on a plot-by-plot basis under the relevant Part L to accurately represent the final CO₂ emissions of the development.

7. Climate Change Resilience

- 7.1. Dwellings constructed today may be operating in a substantially different climate over the coming decades and therefore should be designed to ensure that they are resilient to future climate change impacts such as increases in temperature, rainfall, wind, and sea level. Climate resilience is important to homeowners against a backdrop of increasingly extraordinary weather events.
- 7.2. Passive design measures will be considered and incorporated to enhance resilience to climate change impacts throughout the lifetime of the development.

Rising Temperatures and Overheating

- 7.3. With the risk of potentially higher summer temperatures and longer hot spells in the future, it is important to consider the thermal comfort of the dwelling. Passive design measures are proposed in order to mitigate future overheating.

Approved Document O

- 7.4. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, 'Part O', into the Building Regulations.
- 7.5. This document requires a more in-depth assessment of the risk of overheating, taking into account site location, dwelling orientation, glazing proportions, and openable window areas for natural ventilation.
- 7.6. This assessment will be undertaken at the start of detailed design and any mitigation measures that may be required will be built in.

Noise Quality

- 7.7. An Acoustician will carry out a noise and vibration assessment to accompany the planning application. A construction noise and vibration assessment will be carried out to determine the potential for any impacts at existing receptors in the vicinity of the site.

Addressing overheating risk

- 7.8. The development is proposed to use traditional masonry construction, which has a relatively high thermal mass, compared with timber or steel construction. A construction with a high thermal mass can help to reduce overheating risk as it absorbs heat during the day and slowly releases it during cooler nighttime hours, effectively smoothing out temperature fluctuations within the property.
- 7.9. Within the development layout, orientation and massing has been considered to maximise useful passive solar gain. Glazing will be specified with a solar transmittance value (g-value) to strike the balance between useful solar gain in the winter and unwanted solar gain in the summer.
- 7.10. Wherever possible, dwellings will be able to benefit from cross-ventilation to effectively purge warm air from the properties during periods of hot weather. Window opening areas will be considered and guided by the Part O assessment, with increased opening areas being designed in as required.

Flexibility & Adaptability

- 7.11. The development has been designed to incorporate numerous flexibility and adaptability measures, in order to ensure the buildings are able to be used to their fullest potential for their designed lifespan, whilst adapting to any impacts from a changing climate.
- 7.12. High levels of insulation, efficient gas boilers and high levels of building energy efficiency will help maintain comfortable internal environments during all seasons, including during extreme heat and cold events.
- 7.13. The buildings have been designed with sufficient space to allow occupants to work from home and live within flexible spaces.

8. Resource Efficiency

- 8.1. This section sets out details of additional resource efficiency and sustainable design principles to be applied at the development.

Materials

- 8.2. The impacts of construction materials range from the depletion of natural resources to the greenhouse gas emissions and water use associated with their manufacture and installation.
- 8.3. Within the development choices will be made in order to reduce the consumption of primary resources and using materials with fewer negative impacts on the environment, including but not limited to the following;
- Use fewer resources and less energy through designing buildings more efficiently.
 - Specify and select materials and products that strike a responsible balance between social, economic and environmental factors.
 - Incorporate recycled content, use resource-efficient products and give due consideration to end-of-life uses.
 - Influence, specify and source increasing amounts of materials which can be reused and consider future deconstruction and recovery.

Waste

- 8.4. Sending waste to landfill has various environmental impacts, such as the release of local pollution, ecological degradation and methane emissions, in addition to exacerbating resource depletion. Waste in housing comes from two main streams; construction waste and domestic waste during occupation.

Household Waste

- 8.5. In this respect regard has been given to the policy advice contained in the NPPF together with the Council's current strategy in terms of waste and recycling to ensure that the new dwellings are provided with adequate storage facilities for both waste and recyclable materials.
- 8.6. Wiltshire Council currently operates a household collection service in the area. Through this, households are able to recycle materials including paper and cardboard, plastic bottles, tins, glasses and metal foils, along with a separate collection for garden waste. Future occupiers of the dwellings will be provided with an information pack detailing the Council's current

collection arrangements for waste and recycling and advising of the nearest recycling centres to the Application site.

- 8.7. The site plan shows the location of the hard standing for bins and recycling as well as the 900mm wide access path.

Construction Waste

- 8.8. The development will additionally be designed to effectively and appropriately monitor and manage construction site waste. Target benchmarks for resource efficiency will be set in accordance with best practice – e.g., 5m³ of waste per 100m² / tonnes waste per m².
- 8.9. Wherever possible materials will be diverted from landfill through re-use on site, reclamation for re-use, returned to the supplier where a 'take-back' scheme is in place or recovered and recycled using an approved waste management contractor.

9. Water Conservation

- 9.1. In line with Part G of Building Regulations 2021, water use will be managed effectively throughout the development through the incorporation of appropriate efficiency measures.
- 9.2. Water efficiency measures including the use of efficient dual flush WCs, low flow showers and taps and appropriately sized baths will be encouraged with the aim of limiting the use of water during the operation of the development.
- 9.3. Table 15 shows a typical water demand calculation for a 2-3 bed house type and shows how the development could achieve a result less than the required 110 litres/occupier/day calculated in accordance with Building Regulations 17.K methodology.
- 9.4. The calculation results in a total internal water consumption of 101.63/occupier/day for the intended specification, well below the maximum of 125 litres/occupier/day required by Building Regulations.

Table 15. Typical Water Demand Calculation

Installation Type	Unit of measure	Capacity/flow rate	Litres/pers on/day
WC (dual flush)	Full flush (l)	6	8.76
	Part flush (l)	3	8.88
Taps (excluding kitchen taps)	flow rate (l/min)	3.67	7.37
Bath (where shower also present)	Capacity to overflow (l)	155	17.05
Shower (where bath also present)	Flow rate (l/min)	8	34.96
Kitchen sink taps	Flow rate (l/min)	6	13.00
Washing Machine (where supplied)	Litres/kg dry load	8.17	17.16
Dishwasher (where supplied)	Litres/place setting	1.25	4.50
Calculated Use			111.68
Normalisation Factor			0.91
Total Consumption /L			101.63

10. Electric Vehicle Charging

- 10.1. It is recognized that there is a need to ensure that the development is adaptable to accommodate a future shift in personal transportation to electric vehicles, to promote sustainable transport and to minimise air pollution. As Electric Vehicle (EV) ownership increases, developers have an increasing responsibility to provide EV charging points for occupants.
- 10.2. In accordance with these requirements, Bellway commits to the provision of:
- On plot parking – EV charging point provided to side of house
 - Off plot allocated parking – EV charging via charging column, one point per dwelling served
 - Communal unallocated parking – 50% of unallocated spaces will be provided with ducting to enable the future provision of EV charging points
- 10.3. This provision is additionally in line with the standards introduced via the new Approved Document S.
- 10.4. The development will therefore provide EVC infrastructure to all dwellings and further technical details of the charger along with locations will be provided at the appropriate time as preparation for the development progresses.

11. Conclusions

- 11.1. This Energy and Sustainability Statement has been prepared by AES Sustainability Consultants, on behalf of Bellway Homes, in support of the full detailed planning application for development of Land at Home Farm, Warminster.
- 11.2. A review of National Policy including the NPPF and relevant recent Government statements has established that the Building Regulations are now considered the appropriate method for setting standards relating to energy use and CO₂ emissions, considering building design and site-layout to further reduce energy consumption.
- 11.3. The statement demonstrates that the development will be constructed to exceed the requirements of the Part L 2021 standards.
- 11.4. The proposed improvements in insulation specification, efficient building services, a reduction in thermal bridging and unwanted air leakage paths and further passive design measures, alongside a proposed heating design of highly efficient gas boilers supplemented by PV to all dwellings to serve space heating and domestic hot water demand, allows the planned development to achieve a 2.91% carbon reduction over Part L 2021.
- 11.5. The development will additionally consider the longer-term impacts of a changing climate, building in resilience through the construction specification and managing overheating risk through consideration of thermal mass and solar gain.
- 11.6. Appropriate provision for internal waste and recycling storage will be provided to ensure that recycling can be split into the appropriate streams for collection.
- 11.7. All dwellings will have Electric Vehicle charging (EVC) infrastructure to ensure the development is adaptable in accommodating a future shift to electric vehicles for personal transportation.
- 11.8. It has also been determined that the calculated water consumption could equate to a maximum internal water consumption of 101.63 litres/occupier/day and therefore offer a significant improvement on the maximum of 110 litres/occupier/day allowable by Building Regulations 2021.