

Land at Foxhole Farm

Cala Homes Limited

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

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This statement has been commissioned by CALA Homes to detail the proposed approach to sustainable construction to be employed at Land at Foxhole Farm, Foxhole Lane, Bolney, West Sussex. 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.

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1. Introduction

Preface

- 1.1. This Energy and Sustainability Statement has been prepared on behalf of CALA Homes in support of the development of Land at Foxhole Farm, Foxhole Lane, Bolney, West Sussex.

Development Description

- 1.2. The proposed development site is located on the Land at Foxhole Farm, Foxhole Lane, Bolney, West Sussex. The site lies within the administrative boundary of Mid Sussex District Council.
- 1.3. This statement has been prepared to support the reserved matters planning application for Land at Foxhole Farm, Bolney, West Sussex. The site benefits from outline planning permission (ref: DM/25/1129), granted by Mid Sussex District Council on 18 November 2025. The proposals would deliver 198 dwellings including one-bedroom maisonettes and two-to-five-bedroom houses. The proposed site layout is shown in Figure 1.

Purpose and Scope of the Statement

- 1.4. This statement has been prepared to address relevant national and local planning policies relating to the energy efficiency and sustainable design of residential development. In particular, it considers the requirements of the Mid Sussex District Plan 2014–2031, the Mid Sussex Design Guide SPD, and the Bolney Neighbourhood Plan, alongside compliance with Building Regulations Part L (2021).
- 1.5. This statement demonstrates that through a combination of fabric first measures and with the implementation of low carbon renewable energy systems, the development will deliver a level of energy performance beyond a Part L 2021 baseline.
- 1.6. A range of additional sustainable design considerations will be addressed including resource efficiency, waste reduction and water efficiency.



Figure 1. Proposed Site Layout

2. Planning Policy

Local Planning Policy

- 2.1. This statement addresses the requirements set out within the Mid Sussex District Plan 2014–2031, including relevant policies relating to sustainable design, energy efficiency and renewable energy, alongside policies contained within the Bolney Neighbourhood Plan.
- 2.2. The proposals have also been developed with regard to the Mid Sussex Design Guide SPD (SPD), which provides guidance on the implementation of Local Plan policies relating to energy efficiency, carbon reduction, climate resilience and water efficiency. The development has considered the relevant measures set out within the SPD in preparing the proposed energy strategy.
- 2.3. Supporting policies include Policy DP39 – Sustainable Design, which promotes sustainable design principles including the efficient use of energy and resources through layout, orientation and building design.

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

DP42: Water Infrastructure and the Water Environment

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; 6) To ensure that development is accompanied by the necessary infrastructure in the right place at the right time that supports development and sustainable communities. This includes the provision of efficient and sustainable transport networks.

Evidence Base: Building Regulations (Approved Document G); Gatwick Sub Region Water Cycle Study; DCLG Housing Standards Review: Technical Consultation, September 2014; South East Water - Water Resources Management Plan 2014, Strategic Flood Risk Assessment.

New development proposals must be in accordance with the objectives of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study with respect to water quality, water supply and wastewater treatment and consequently the optional requirement **Policies Adopted District Plan 99 under Building Regulations – Part G applies to all new residential development in the district. Development must meet the following water consumption standards:**

- Residential units should meet a water consumption standard of 110 litres per person per day (including external water use);
- Non-residential buildings should meet the equivalent of a 'Good' standard, as a minimum, with regard to the BREEAM water consumption targets for the development type.
- such facilities outweighs any adverse land use or environmental impacts and that any such adverse
- impact is minimised.

DP42: Water Infrastructure and the Water Environment – Continued...

Development proposals which increase the demand for off-site service infrastructure will be permitted where the applicant can demonstrate;

- that sufficient capacity already exists off-site for foul and surface water provision. Where capacity off-site is not available, plans must set out how appropriate infrastructure improvements approved by the statutory undertaker will be completed ahead of the development's occupation; and
- that there is adequate water supply to serve the development.

Planning conditions will be used to secure necessary infrastructure provision.

Development should connect to a public sewage treatment works. If this is not feasible, proposals should be supported by sufficient information to understand the potential implications for the water environment.

The development or expansion of water supply or sewerage/sewage treatment facilities will normally be permitted, either where needed to serve existing or proposed new development, or in the interests of long-term water supply and wastewater management, provided that the need for

- 2.4. Policy DP42 – Water, which requires all new residential development to meet the optional requirement of 110 litres per person per day under Part G of the Building Regulations and encourages the use of sustainable drainage and water efficiency measures to reduce demand on the mains water supply network.

Emerging Local Planning Policy

- 2.5. Mid Sussex District Council is currently preparing a new Local Plan (District Plan 2021-2039) which is currently at the examination stage and therefore very little weight can be attributed to the policies contained within the plan. This includes Policy DPS1 – Climate Change, Policy DPS2 – Sustainable Design and Construction, Policy DPS3 – Renewable and Low Carbon Energy Schemes, and Policy DPS5 – Water Neutrality. The development proposals have been designed with regard to the direction of travel established by these emerging policies, incorporating air source heat pumps and photovoltaic panels to achieve a low carbon standard of construction.

Design Guide Supplementary Planning Document

- 2.6. Mid Sussex District Council adopted the Design Guide Supplementary Planning Document (SPD) in 2021. The SPD provides detailed guidance on design and sustainability of new development within the district, supplementing the policies of the District Plan. The development proposals have been assessed against the relevant guidance of the Design Guide SPD, particularly in relation to energy efficiency, water conservation and sustainable construction.

Neighbourhood Planning Policy

- 2.7. The Bolney Neighbourhood Plan forms part of the statutory development plan for the area. The Neighbourhood Plan includes policies relating to sustainable design, energy efficiency and climate change that are relevant to this application. The development proposals have been assessed against the applicable policies of the Bolney Neighbourhood Plan.

National Planning Policy Framework

- 2.8. In February 2025, 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.
- 2.9. 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.
- 2.10. Paragraph 164 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

164. 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

- 2.11. The government introduced the next revision in Building Regulations, known as Part L 2021 in December 2021, which came into effect for buildings where construction commenced after 15th June 2023. The new standards require a 31% reduction in CO₂ emissions compared with the previous Building Regulations standard.

Future Homes Standard

- 2.12. In December 2023, the Government released the consultation on the forthcoming Future Homes Standard (FHS). The consultation presented two options aimed at delivering homes with carbon emissions at least 75% lower than Part L 2013 requirements.
- 2.13. 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 additionally includes solar photovoltaics and waste-water heat recovery, as well as a slightly lower design air leakage figure.

Proposed Strategy

- 2.14. This statement is intended to establish the proposed approach to sustainable construction and reduction in CO₂ emissions to be delivered at the development.
- 2.15. The proposed energy strategy has been developed with regard to the Mid Sussex District Plan 2014–2031, Policy DP39 – Sustainable Design and Policy DP42 – Water, the Mid Sussex Design Guide SPD, and the Bolney Neighbourhood Plan. Regard has also been had to the direction of travel established by the emerging District Plan 2021–2039. The strategy prioritises a fabric-first approach to minimise energy demand, supported by the use of low-carbon heating and renewable energy systems.

- 2.16. The development will be designed to achieve compliance with Building Regulations Part L (2021), demonstrating that regulated CO₂ emissions are reduced through a combination of enhanced building fabric performance and efficient building services.
- 2.17. The development also considers the changing future climate and seeks to build in resilience through appropriate construction techniques and materials to avoid future risks of overheating.
- 2.18. 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. Climate Change Resilience

- 3.1. Climate resilience measures have been considered in accordance with relevant national guidance and the Mid Sussex Design Guide SPD, with a focus on reducing overheating risk and improving resilience to future climate conditions.
- 3.2. 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.

Cooling hierarchy

- 3.3. In common with sustainable heating strategies, it is possible to apply a sustainable 'cooling hierarchy' which sets out the priorities to ensure overheating risk is minimised:
 - Minimise internal heat gain
 - Manage heat through internal thermal mass and design of spaces
 - Passive ventilation strategies
 - Mechanical ventilation systems
 - Active cooling systems
- 3.4. In line with the above hierarchy Passive design measures will be prioritised to enhance resilience to climate change impacts throughout the lifetime of the development.

Addressing overheating risk

- 3.5. 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.
- 3.6. Dwellings will be able to benefit from cross-ventilation wherever possible 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.
- 3.7. Ventilation will be provided through a combination of natural ventilation via openable windows and mechanical extract ventilation where required to ensure compliance with the requirements of Building Regulations Part F.

- 3.8. Heat build-up within the development will be mitigated through an appropriate site layout and landscaping strategy, including the provision of green space and consideration of surface materials, to support cooling and reduce the potential for overheating.

Approved Document O

- 3.9. In order to more robustly address overheating risk, the Government introduced a new Approved Document, 'Part O', into the Building Regulations.
- 3.10. 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.
- 3.11. This assessment will be undertaken at the start of detailed design and any mitigation measures that may be required will be built in.

4. Energy Consumption and CO₂ Emissions

- 4.1. 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.
- 4.2. As set out in the planning policy section of this statement, it is considered that Building Regulations form the minimum requirement for new dwellings in terms of energy performance.
- 4.3. As shown in Table 1, the CO₂ standards contained within Part L were increased in 2010 and 2013, reducing the TER by approximately 25% and a further 6% (9% for non-residential) respectively. Part L 2021 became mandatory from June 2023, constituting a much larger step change of a 31% reduction in emissions.

Table 1. CO₂ Emissions improvements from successive Part L editions

Building Regulations	CO ₂ emissions improvements preceding regulations
L1A 2006	-
L1A 2010	25%
L1A 2013	6%
L1 2021	31%

Energy Reduction Strategy – Fabric First

- 4.4. 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.

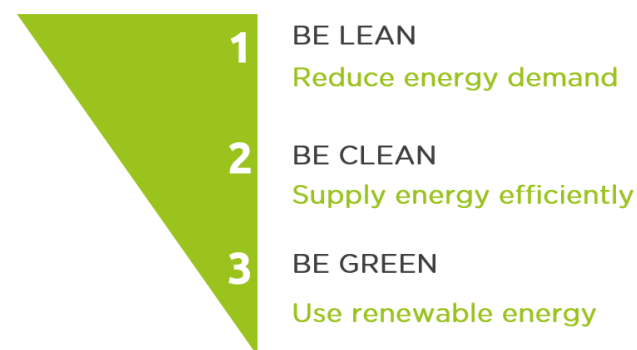


Figure 2. The Energy Hierarchy

Be Lean – reduce energy demand

- 4.5. 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

4.6. 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

4.7. 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 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

4.8. 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.

4.9. 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.

4.10. 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

4.11. 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.

4.12. 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.

4.13. 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.

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

- 4.14. In line with the guidance set out in the Mid Sussex Design Guide SPD, the development adopts a fabric-first approach to minimise energy demand prior to the integration of low-carbon technologies. Table 3 details the proposed fabric specification of the major building elements, with the first column in this table setting out the Part L1 limiting fabric parameters in order to demonstrate the improvements delivered.

Table 3. Proposed construction specification – main elements

	Part L1 Limiting Fabric Parameters	Proposed Specification
External wall – u-value	0.26 W/m ² K	≤ 0.21 W/m ² K
Party wall – u-value	0.20 W/m ² K	0.00 W/m ² K
Plane roof – u-value	0.16 W/m ² K	≤ 0.10 W/m ² K
Ground floor – u-value	0.18 W/m ² K	≤ 0.11 W/m ² K
Windows – u-value	1.60 W/m ² K	≤ 0.93 W/m ² K
Doors – u-value	1.60 W/m ² K	≤ 1.20 W/m ² K
Air Permeability	8.00 m ³ /h.m ² at 50 Pa	< 4.50m ³ /h.m ² at 50 Pa

Thermal bridging

- 4.15. 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.
- 4.16. The specification will 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

- 4.17. 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 <4.50m³/h.m² at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

Fabric Energy Efficiency

- 4.18. Table 4 demonstrates that the dwellings will exceed the uplifted Fabric Energy Efficiency targets within Part L 2021 through the proposed specification.

Table 4. Fabric Energy Efficiency of sample dwellings

	Design Energy Efficiency (kWh/m ² /year)	Target Fabric Energy Efficiency (kWh/m ² /year)	Improvement %
1B Mais GF	67.62	71.85	5.89
1B Mais FF	30.06	33.45	10.14
2 Bedroom House	45.49	45.62	0.28
3 Bedroom House	31.30	34.98	10.52
4 Bedroom House	39.30	41.04	4.23
5 Bedroom House	39.82	41.71	4.54

Energy efficient heating and lighting

- 4.19. Heat generation and distribution systems will be designed to give the occupants a high level of control over their use, encouraging and allowing energy-efficient behaviour. Primary pipework should be fully insulated, and time and temperature zoning controls installed in all dwellings.

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 (2013) and with the intent of delivering compliance with the carbon reduction targets contained within Part L 2021.

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 several 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, including the significant amount of woodland on and around the development.
- 5.6. A preliminary examination of the BERR wind speed database indicates that average wind speeds at 10m above ground level are around 4.5 m/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 photo-voltaic (PV)
 - Air Source Heat Pumps (ASHPs)
 - Ground Source Heat Pump (GSHPs)
 - Hot water heat pumps

- 5.8. The advantages and disadvantages of these technologies are evaluated in Tables 5-10.

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

Table 5. 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
Estimated costs and benefits	
• Cost £2,000 upwards for a wood-pellet boiler, not including cost of fuel	
Conclusions	
Biomass heating is considered technically feasible in large dwellings provided sufficient space can be accommodated for fuel supply, delivery and management. Air quality concerns in addition to increased transport emissions for fuel delivery mean that it is not a preferred technology for the development.	

Table 6. Solar Thermal systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Mature and reliable technology offsetting the fuel required for heating water • 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	
• Cost £2,000 - 5,000 for standard installation • Ongoing offset of heating fuel, minimal maintenance requirements	
Conclusions	
Solar thermal systems are considered technically feasible on all buildings with suitable roof orientations, however the contribution to carbon reduction is expected to be low and therefore it is not a preferred technology.	

Table 7. Solar Photovoltaic systems feasibility appraisal

Potential Advantages	Risks & Disadvantages
- The technology offsets 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 - Service and maintenance requirement minimal, and 2-3 storey buildings should not require significant additional safety measures (fall protection 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	
- Cost £1,300 upwards (1kWp+) and scalable - 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 and limited additional impacts mean that PV is considered a feasible option for this development.	

Table 8. 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	- 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, requires good system design
Estimated costs and benefits	
Cost £5,000 - £7,000 for standard installation	
Conclusions	
Air source heat pumps are technically feasible for the buildings in this scheme and are considered a preferred technology.	

Table 9. 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	- 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 - 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	
- Cost circa £10,000+ - Estimated simple payback at circa 18 years (systems only) - Running cost linked to COP of heat pump, however likely to be 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 10. 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	
- Cost circa £2,500 - 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 a feasible technology for certain dwelling types; however, given the house type mix on this scheme, which comprises predominantly larger family homes, air source heat pumps with integrated hot water cylinders are considered the more appropriate and practical solution for all plots.	

Summary

- 5.9. Following this feasibility assessment, a number of low and zero carbon technologies have been considered for the proposed development. Whilst several technologies are technically feasible, some are considered less appropriate due to operational constraints, site considerations, or reduced overall system efficiency.
- Biomass heating systems would require significant storage space for fuel and regular deliveries to the site. In addition, concerns regarding local air quality impacts from particulate and NO_x emissions mean that this technology is not considered 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. Based on the assessment undertaken, the following technologies are considered to provide the most appropriate low carbon solution for the development:
- Air Source Heat Pumps (ASHP) for space heating and hot water to all 198 houses
 - Photovoltaic (PV) panels to all 198 dwellings
- 5.11. The proposed energy strategy is based on an all-electric approach across the development. All dwellings will be served by air source heat pumps (ASHPs) to provide space heating and hot water, offering an efficient and low carbon heating solution at a dwelling scale, well suited to the layout and house type mix of the scheme. All dwellings will also be provided with roof-mounted photovoltaic (PV) panels to reduce regulated carbon emissions and contribute towards the direction of travel established by emerging local planning policy. Detailed SAP assessments will be undertaken at the design stage to confirm the final system specifications and demonstrate compliance with the requirements of Building Regulations Part L (2021).
- 5.12. Roofs will be designed, where practicable, to accommodate photovoltaic (PV) panels. All 198 dwellings will be served by heat pump technology with no fossil fuel heating installed.

6. Indicative As Designed CO₂ Emissions

- 6.1. The development is to be designed and constructed to meet the requirements of Part L 2021, therefore compliance with this standard forms the first stage in the sustainable construction approach.
- 6.2. Part L1 compliance is assessed through the Standard Assessment Procedure (SAP), which uses the 'Target Emission Rate' (TER) – expressed in kilograms CO₂ per metre 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.
- 6.3. Calculations have been undertaken to an indicative sample of house types to assess the carbon emissions of the development. The proposed 2021 compliant calculated baseline carbon emissions are reported in Table 11.

Table 11. Part L compliant CO₂ emissions by house type

House type	DER CO ₂ emissions (kgCO ₂ /m ² /yr)	TER CO ₂ emissions (kgCO ₂ /m ² /yr)	% Reduction
1B Mais GF	5.27	26.07	79.79
1B Mais FF	2.84	11.94	76.21
2 Bedroom House	2.99	10.36	71.14
3 Bedroom House	2.53	10.44	75.77
4 Bedroom House	2.80	9.49	70.50
5 Bedroom House	2.49	8.20	69.63

Table 12. Estimated site-wide CO₂ emissions

	Part L 2021 CO ₂ emissions (kgCO ₂ /yr)	
Part L compliant	257,032	
As Designed	71,646	
	kgCO ₂ /yr	%
Total savings	185,386	72.1

7. Resource Efficiency and Materials

- 7.1. This section sets out details of additional resource efficiency and sustainable design principles to be applied at the development.
- 7.2. The proposed approach to material specification and waste reduction has been developed in accordance with relevant national guidance and local planning policy, including the Mid Sussex Design Guide SPD, which promotes resource efficiency and sustainable construction practices.

Materials

- 7.3. 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.
- 7.4. Within the development choices will be made 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.
 - All insulating materials will have a Global Warming Potential (GWP) of < 5 in manufacture and installation.
 - All materials used in construction will be responsibly sourced, with certification obtained wherever possible. Materials with a low environmental impact as per the BRE Green Guide will be preferred.

Waste

- 7.5. 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

- 7.6. 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.
- 7.7. Dedicated bin storage space will be provided on plot to accommodate the relevant collection boxes.
- 7.8. 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.

Construction Waste

- 7.9. 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. m³ of waste per 100m² / tonnes waste per m².
- 7.10. 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.

Electric Vehicle Charging

- 7.11. Electric vehicle (EV) charging infrastructure will be provided in accordance with the requirements of Building Regulations Part S.

8. Water Efficiency

- 8.1. The UK Climate Change Risk Assessment 2017 identified risks of shortages in water supply as a future climate change impact. Therefore, the efficient use of water is an important factor when considering future resilience to climate change.
- 8.2. As well as aiming to minimise water usage through the materials used, water consumption of the end user will be considered in line with current national policy. Building Regulations 2013 Part G require water efficiency measures for all new dwellings:

Water Efficiency

G2. Reasonable provision must be made by the installation of fittings and fixed appliances that use water efficiently for the prevention of undue consumption of water.

Water Efficiency of New Dwellings

36. (1) The potential consumption of wholesome water by persons occupying a new dwelling must not exceed the requirement in paragraph (2)

(2) The requirement referred to in paragraph (1) is either –

(a) 125 litres per person per day; or

(b) in a case to which paragraph (3) applies, the optional requirement of 110 litres per person per day,

- 1.1. As measured in either case in accordance with a methodology approved by the Secretary of State.

- 8.3. Water efficiency measures are met under Part G if: The estimated consumption of wholesome water resulting from the design of cold and hot water systems (calculated in accordance with the methodology set out in Appendix A) is not greater than the standard set by the Secretary of State of 125/litres/person/day, or the optional standard of 110 litres/person/day.
- 8.4. Appendix A of Approved Document G sets out the water efficiency calculation methodology, which assesses the whole house potable water consumption for new dwellings. This methodology will be used to demonstrate compliance with the applicable water efficiency

target, including achievement of a consumption rate of 110 litres per person per day, in line with the objectives of Adopted Policy DP42 of the Bolney Neighbourhood Plan.

- 8.5. Water efficiency measures including the use of efficient dual flush WCs, low flow showers and taps and appropriately sized baths will be installed with the aim to limit the use of water during the operation of the development to limit water use.
- 8.6. Table 13 shows a typical specification to achieve a result less than the optional requirement for 110 litres/occupier/day calculated in accordance with Building Regulations 17.K methodology.

Table 13. Typical Water Demand Calculation.

Installation Type	Unit of measure	Capacity/ flow rate	Litres/occupier/ day
WC (dual flush)	Full flush (l)	4.5	6.57
	Part flush (l)	3	8.88
Taps (excluding kitchen taps)	flow rate (l/min)	5	9.48
Bath	Capacity to overflow (l)	156	17.16
Shower	Flow rate (l/min)	9	39.33
Kitchen sink taps	Flow rate (l/min)	4	12.12
Washing Machine	Litres/kg dry load	8.17	17.157
Dishwasher	Litres/place setting	1.25	4.50
Calculated Use			115.20
Normalisation Factor			0.91
Total Internal Consumption (L)			104.83
External Use			5.0
Building Regulations 17.K			109.8

9. Conclusions

- 9.1. This Energy and Sustainability Statement has been prepared by AES Sustainability Consultants on behalf of CALA Homes in support of the reserved matters planning application for 198 dwellings at Land at Foxhole Farm, Foxhole Lane, Bolney, West Sussex.
- 9.2. The statement demonstrates how the proposed development responds to the relevant requirements of the Mid Sussex District Plan 2014–2031, in particular Policy DP39 – Sustainable Design and Policy DP42 – Water, the Mid Sussex Design Guide SPD, the Bolney Neighbourhood Plan, and the National Planning Policy Framework. Regard has also been had to the direction of travel established by the emerging Mid Sussex District Plan 2021–2039.
- 9.3. The statement sets out a fabric-first approach to sustainable construction, demonstrating that improvements in insulation, airtightness, glazing specification and thermal bridging will reduce energy demand beyond the minimum requirements of Building Regulations Part L (2021).
- 9.4. Following a feasibility assessment of a range of low and zero carbon technologies, air source heat pumps (ASHPs) have been selected to provide space heating and hot water to all 198 dwellings, supplemented by roof-mounted photovoltaic (PV) panels across the whole site. This all-electric approach delivers a Zero Carbon Ready standard of construction, in line with the direction established by the Future Homes Standard and emerging local planning policy.
- 9.5. Water efficiency will be addressed through the specification of efficient fixtures and fittings, with all dwellings targeting a consumption of no more than 110 litres per person per day in accordance with the optional requirement of Policy DP42 and Part G of the Building Regulations.
- 9.6. The development will additionally consider the longer-term impacts of a changing climate, building in resilience through passive design measures, appropriate glazing ratios, natural ventilation strategies and compliance with Approved Document O to minimise overheating risk.
- 9.7. A range of additional sustainability measures have been incorporated, including responsibly sourced materials with low embodied carbon, construction waste management, dedicated household recycling provision, and electric vehicle charging infrastructure in accordance with Building Regulations Part S.
- 9.8. Overall, the proposed development demonstrates a comprehensive and policy-compliant approach to sustainable design, delivering meaningful reductions in carbon emissions and resource consumption in a manner consistent with both adopted and emerging planning policy requirements for the district.