Wickhurst Green

Vistry Homes Ltd

Energy Statement

AES Sustainability Consultants Ltd

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AES Sustainability Consultants

	Author	Date	E-mail address
Produced By:	Megan Chiswell	10.04.2025	Megan.Chiswell@aessc.co.uk
Reviewed By:	Eloise Utley	10.04.2025	Eloise.Utley@aessc.co.uk

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This statement has been commissioned to detail the proposed approach to sustainable construction to be employed at the site at Wickhurst Green. 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 Vistry Homes Ltd in support of the application for development of the site at Wickhurst Green.

Development Description

1.2. The proposed development site is located within the Horsham District.

1.3. The proposals would deliver 89 dwellings across a mix of one to four bed dwellings including apartments. The proposed site masterplan is shown in Figure 1.

Purpose and Scope of the Statement

1.4. This statement has been prepared to address relevant national and local policies relating to the sustainable design and construction of dwellings, including relevant policies within the Horsham District Planning Framework adopted in November 2015.

1.5. This statement demonstrates that the development will be designed and constructed to meet the Part L 2021 standards, equating to a circa 31% improvement over Part L 2013. This statement will also show how the site can limit water usage in line with Policy 37.

1.6. Additional sustainable construction considerations are additionally addressed, including overheating risk and climate resilience, sustainable and responsible materials usage and water consumption of the dwellings.

Figure 1. Wickhurst Green

2. Planning Policy

2.1. The current policy is contained within Horsham District Planning Framework, adopted in November 2015. The relevant policies are extracted below:

> Policy 35
>
> Strategic Policy: Climate Change
>
> Development will be supported where it makes a clear contribution to mitigating and adapting to the impacts of climate change and to meeting the district's carbon reduction targets as set out in the Council's Acting Together on Climate Change Strategy, 2009.
>
> Measures which should be used to mitigate the effects of climate change include;
>
> 1. Reduced energy use in construction;
>
> 2. Improved energy efficiency in new developments, including influencing the behaviour of occupants to reduce energy use;
>
> 3. The use of decentralised, renewable and low carbon energy supply systems;
>
> 4. The use of patterns of development which reduce the need to travel, encourage walking and cycling and include good accessibility to public transport and other forms of sustainable transport; and
>
> 5. Measures which reduce the amount of biodegradable waste sent to landfill.
>
> Development must be designed so that it can adapt to the impacts of climate change, reducing vulnerability, particularly in terms of flood risk, water supply and changes to the district's landscape. Developments should adapt to climate change using the following measures:
>
> 1. Provision of appropriate flood storage capacity in new building development;
>
> 2. Use of green infrastructure and dual use SuDS to help absorb heat, reduce surface water runoff, provide flood storage capacity and assist habitat migration;
>
> 3. Use of measures which promote the conservation of water and/or grey water recycling; and
>
> 4. Use of site layout, design measures and construction techniques that provide resilience to climate change (opportunities for natural ventilation and solar gain). If it is not possible to incorporate the adaption and mitigation measures proposed, an explanation should be provided as to why this is the case.

> Policy 37
>
> Sustainable Construction
>
> Proposals must seek to improve the sustainability of development. To deliver sustainable design, development should incorporate the following measures where appropriate according to the type of development and location:
>
> 1. Maximise energy efficiency and integrate the use of decentralised, renewable and low carbon energy;
>
> 2. Limit water use to 110 litres/person/day;
>
> 3. Use design measures to minimise vulnerability to flooding and heatwave events;
>
> 4. Be designed to encourage the use of natural lighting and ventilation;
>
> 5. Be designed to encourage walking, cycling, cycle storage and accessibility to sustainable forms of transport;
>
> 6. Minimise construction and demolition waste and utilise recycled and low-impact materials;
>
> 7. Be flexible to allow future modification of use or layout, facilitating future adaptation, refurbishment and retrofitting;
>
> 8. Incorporate measures which enhance the biodiversity value of development.
>
> All new development will be required to provide satisfactory arrangements for the storage of refuse and recyclable materials as an integral part of design.
>
> New homes and workplaces should include the provision of high-speed broadband access and enable provision of future technologies where available.

Policy 46

Strategic Policy: Appropriate Energy Use Energy hierarchy

All development will be required to contribute to clean, efficient energy in Horsham based on the following hierarchy:

1. Lean – use less energy – e.g. through demand reduction

2. Clean – supply energy efficiently – e.g. through heat networks

3. Green – use renewable energy sources

District Heating and Cooling

Commercial and residential developments in Heat Priority Areas or the strategic development locations will be expected to connect to district heating networks where they exist using the following hierarchy or incorporate the necessary infrastructure for connection to future network.

Development should demonstrate that the heating and cooling systems have been selected in accordance with the following heating and cooling hierarchy;

1. Connection to existing (C)CHP distribution networks

2. Site wide renewable (C)CHP

3. Site wide gas-fired (C)CHP

4. Site wide renewable community heating/cooling

5. Site wide gas-fired community heating/cooling

6. Individual building renewable heating

7. Individual building heating, with the exception of electric heating

All (C)CHP must be of a scale and operated to maximise the potential for carbon reduction. Where site-wide (C)CHP is proposed, consideration must be given to extending the network to adjacent sites.

Energy Statements

All applications for residential or commercial development must include an Energy Statement demonstrating and quantifying how the development will comply with the Energy Hierarchy.

Developments in Heat Priority Areas and strategic developments should demonstrate and quantify how the development will comply with the heating and cooling hierarchy. Horsham District Council will work proactively with applicants on major developments to ensure these requirements are met.

Renewable energy schemes

The Council will permit schemes for renewable energy (e.g. solar) where they do not have a significant adverse effect on landscape and townscape character, biodiversity, heritage or cultural assets or amenity value. Community initiatives which seek to deliver renewable and low carbon energy will be encouraged.

National Planning Policy Framework

2.2. In December 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.

2.3. 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.

2.4. Paragraph 164 sets out what is expected from new developments when considering strategies to mitigate and adapt to climate change:

> 164. New development impacts should be planned for in ways that:
>
> Avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaption measures, including through the planning of green infrastructure; and
>
> 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

2.5. The NPPF requires that "local planning authorities should …when setting any local requirement for a building's sustainability, do so in a way consistent with the Government's zero carbon buildings policy and adopt nationally described standards."[1]

2.6. 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 CO_2 emissions compared with the 2013 Building Regulations standard.

Proposed Strategy

2.7. This statement is intended to establish the proposed approach to sustainable construction and reduction in CO_2 emissions to be delivered at the development.

2.8. It is proposed that the development is designed to incorporate all applicable guidance contained within the Core Strategy in relation to renewable energy provision and the construction of highly efficient buildings which seek to minimise water demand and CO_2 emissions, as well as energy use.

2.9. This statement will demonstrate that through a combination of fabric efficiency measures and renewable energy, the development will achieve site wide CO_2 emission reductions of greater than 31% over 2013 Building Regulations standards, exceeding policy requirements and demonstrating a commitment to low carbon development which is affordable for residents.

2.10. The development design also considers the changing future climate and seeks to build in resilience through appropriate construction techniques and materials to avoid future risks of overheating.

2.11. 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.

[1] Department for Communities and Local Government, 2012, *NPPF, paragraph 95*

3. Climate Change Resilience

3.1. 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 able to adapt and reduce the risk of overheating with potentially higher summer temperatures and longer hot spells.

3.2. Key design decisions can affect the potential risk of overheating:

- Poor consideration of orientation of large glazed facades
- High density development contributing to urban heat island effects
- High glazing ratios contributing to excessive unwanted solar gain
- Inadequate ventilation strategies
- Very high levels of thermal insulation without considering heat build-up

3.3. Other factors which additionally contribute to heat build-up within homes and should be addressed where possible include:

- High levels of occupation
- Appliance use contributing to internal gains

Cooling hierarchy

3.4. 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:

- Reduce the amount of heat entering the building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure.
- Minimise internal heat generation through energy efficient design:
- Manage the heat within the building through exposed internal thermal mass and high ceilings
- Provide passive ventilation
- Mechanical ventilation systems
- Provide active cooling systems

Rising Temperatures and Overheating

3.5. 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

3.6. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, 'Part O', into the Building Regulations.

3.7. 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.

3.8. This assessment will be undertaken at the start of detailed design and any mitigation measures that may be required will be built in.

Addressing Overheating Risk

3.9. The development is proposed to use traditional masonry 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.

3.10. 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.

3.11. 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.

4. Energy Consumption and CO_2 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 within the policy review 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 CO_2 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.

4.4. Part L 2021 constitutes a much larger step change of a 31% reduction in emissions.

Table 1. CO_2 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

4.5. 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

4.6. 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 overshading 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

4.7. 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

4.8. 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

4.9. 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.

4.10. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub[2] and the Energy Savings Trust[3] having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

4.11. 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

4.12. In addition to the CO_2 reduction targets, the importance of energy demand reduction was further supported by the introduction of a minimum fabric standard into Part L 2013, based on energy use for heating and cooling a dwelling. This is referred to as the 'Target Fabric Energy Efficiency' (TFEE), expressed in kWh/m^2/year.

4.13. This standard enables the decoupling of energy use from CO_2 emissions and serves as an acknowledgement of the importance of reducing demand, rather than simply offsetting CO_2 emissions through low carbon or renewable energy technologies.

4.14. 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.

[2] Zero Carbon Hub, Zero Carbon Strategies for tomorrow's new homes, Feb 2013

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

Proposed Fabric Specification

4.15. 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 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 Part L 2021
External wall – u-value	0.26 W/m²K	0.24 W/m²K
Party wall – u-value	0.20 W/m²K	0.00 W/m²K
Plane roof – u-value	0.16 W/m²K	0.09 W/m²K
Ground floor - u-value	0.18 W/m²K	≤0.12 W/m²K
Windows – u-value	1.60 W/m²K	1.30 W/m²K
Doors – u-value	1.60 W/m²K	1.10 W/m²K
Air Permeability	8 m³/h.m² at 50 Pa	4.50 m³/h.m² at 50 Pa

Thermal Bridging

4.16. 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 CO_2 reduction targets.

4.17. 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

4.18. 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 4.50 $m^3/h.m^2$ at 50Pa, with pressure testing of all dwellings to be undertaken on completion to confirm that the design figure has been met.

5. Low Carbon and Renewable Energy Systems

5.1. A range of technologies have been assessed for potential incorporation into the scheme 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 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, 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 4.6m/s [4]. Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective[5]. For these reasons wind power is not considered feasible.

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 4-9.

[4] NOABL Wind Map (http://www.rensmart.com/Weather/BERR)

[5] CIBSE TM38:2006. Renewable energy sources for buildings.

Table 4. Individual Biomass Heating feasibility appraisal

Potential Advantages	Risks & Disadvantages
• Potential to significantly reduce CO_2 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.	

Table 5. 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	
• 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.	

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Table 6. 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 (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 • 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 • Occupiers could benefit from Smart Export Guarantee payments for electricity exported to the grid.	
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 7. 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 • Very low carbon heating source based on Part L 2021 carbon factor of 0.136kgCO_2/kWh	• Air source heat pumps are powered by electricity, potentially increasing fuel bills for residents compared with 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	
• Cost £5,000 - £7,000 for standard installation • Running cost linked to COP of heat pump, however may be higher than mains gas	
Conclusions	
Air source heat pumps are technically feasible for the buildings in this scheme.	

Table 8. 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 • Very low carbon heating source based on Part L 2021 carbon factor of 0.136kgCO_2/kWh	• 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, potentially increasing fuel bills for residents compared with 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	
• Cost circa £10,000+ • 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, 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 mean that they are not considered a preferred low carbon technology at this stage.	

Table 9. 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 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 NOx 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

5.11. It is currently proposed that this site will use gas and PV to meet Part L 2021.

5.12. Full PV designs will be carried out at design stage once detailed design SAP calculations have been completed and the system size required to achieve the necessary carbon reductions has been determined.

5.13. Presently the exact introduction of Future Home Standard is unknown, as such this report has been written to comply with Part L 2021. If any plots on this site fall under the future regulations, these plots will use ASHPs, which will only increase the carbon and energy savings site wide.

6. Overall Energy and Carbon Reduction

6.1. Through a combination of the described fabric first approach to sustainable construction and the installation of PV, the development will deliver carbon and energy demand reductions greater than required for Part L 2021.

6.2. Calculations undertaken at this stage indicate that approximately 15.20% of the development's energy demand will be delivered from electricity generated by PV.

6.3. Table 10 demonstrates the energy from renewables.

Table 10. Percentage of the energy delivered by renewables.

	Energy (kWh/year)
Energy demand	344,993
Energy from renewables	61,846
	%
Percentage	15.20

6.4. The predicted total site wide reduction in CO_2 emissions achieved by the proposed development is shown in table 11.

Table 11. Total site-wide carbon dioxide reduction achieved.

	CO_2 emissions ($kgCO_2$/year)
Part L compliant	51,639
Designed	49,151
Savings	2,488
	%
Percentage over Part L 2021	4.82

6.5. Carbon dioxide savings will equate to an estimated 2,488$kgCO_2$/year, a saving of 4.82% above the Part L 2021 baseline.

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.

Materials

7.2. 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.

7.3. Within the development choices will be made in order to reduce the consumption of primary resources and use 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

7.4. 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

7.5. 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.

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

7.7. 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 center to the Application site.

Construction Waste

7.8. 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., <5 m^3 of waste per 100m^2 / tonnes waste per m^2.

7.9. 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. A target to divert 85% by weight/volume of non-hazardous construction waste will be applied.

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 2021 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,
>
> 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 Part G provides a water efficiency calculation methodology. This assesses the whole house potable water consumption in new dwellings. The calculation methodology is to be used to assess compliance against the water performance targets in Regulation 36 to ensure that all new dwellings meet the water efficiency requirement.

8.5. The references provided in Part G Table 2.1 will be considered to ensure that efficient fittings are installed to each dwelling. Each new dwelling will minimise water usage to at least 85 litres/person/day.

Table 12. Water Calculation

Installation Type	Unit of measure	Capacity/ flow rate	Litres/Person/Day
WC (dual flush)	Full flush (l)	4	5.84
	Part flush (l)	2.6	7.70
Taps (excluding kitchen taps)	flow rate (l/min)	2.6	5.69
Bath	Capacity to overflow (l)	95	10.45
Dishwasher	Litres/place setting	Not specified	17.16
Washing machine	Litres/kg	Not specified	4.50
Shower	Flow rate (l/min)	5	21.85
Kitchen sink taps	Flow rate (l/min)	3	11.68
Calculated Use			87.9
Normalisation Factor			0.91
Total Internal Consumption (L)			80
External Use			5.0
Building Regulations 17.K			85

9. Conclusions

9.1. This Energy and Sustainability Statement has been prepared on behalf of Vistry Homes in support of the application for development of the site at Wickhurst Green.

9.2. This statement has been prepared to address relevant national and local policies relating to the sustainable design and construction of dwellings, including relevant policies within the Horsham District Planning Framework.

9.3. The statement sets out a fabric first approach to sustainable construction, demonstrating that improvements in insulation specification, a reduction in thermal bridging, unwanted air leakage paths and further passive design measures will ensure that energy demand and consequent CO_2 emissions are minimised.

9.4. A range of potentially appropriate low carbon and renewable energy technologies have been assessed for feasibility in delivering a further reduction in CO_2 emissions, concluding that PV is considered the most appropriate technology for this site.

9.5. The exact requirements for the Future Homes Standard are not yet confirmed, however, it is likely that all plots falling under this regulation will be fitted with ASHPs, further reducing the carbon emissions. At this stage, the exact requirements of the Future Homes Standard are not known and so the exact quantity of plots under FHS will be determined once the regulations are finalised.

9.6. Calculations demonstrate that PV would deliver circa 15.20% of the development's energy demand and a projected 4.82% carbon reduction over Part L 2021, far exceeding any policy requirements.

9.7. 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.

9.8. Water calculations show this development will reduce water usage to 85 litres/person/day.

9.9. Appropriate provision for internal waste and recycling storage will be provided to ensure that recycling can be split into the appropriate streams for collection.