

Land South of Netherhampton Road

Vistry Homes Limited

Energy and Sustainability Statement

AES Sustainability Consultants Ltd

October 2025



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Revision	Author	Date	Comment
Initial issue	Megan Chiswell	11.04.2024	-
Rev 1	Megan Chiswell	12.04.2024	
Rev 2	Megan Chiswell	03.09.2025	Re-Plan
Rev 3	Megan Chiswell	27.10.2025	Updated to Gas + PV

Vistry

Housebuilding

This statement has been commissioned to detail the proposed approach to sustainable construction to be employed at the site known as Land South of Netherhampton Road. 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 Limited in support of the application for development of the site known as Land South of Netherhampton Road.

Development Description

- 1.2. The proposed development falls under the Wiltshire Council and will make up a larger site of 640no dwellings.
- 1.3. The development consists of 406no dwellings and provides a range of 1 to 5 bed residential units including apartments. The proposals would form part of a site that will deliver 640 dwellings (REF: 19/05824/OUT).
- 1.4. The proposal demonstrates 147no of the 406no dwellings would be classified as affordable homes, equating to over 30% of the development.

Purpose and Scope of the Statement

- 1.5. 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 Wiltshire Core Strategy. This statement also shows how this development aims to achieve higher standards listed in Wiltshire Core Strategy. using this document as a guidance.
- 1.6. This statement demonstrates that the development will be designed and constructed to meet current building regulations with the possibility of a portion of the site falling under the Future Homes Standard, providing a 75-80% CO₂ reduction compared with 2013 regulatory standards.
- 1.7. Sustainable construction considerations are additionally addressed, including overheating risk and climate resilience, sustainable and responsible materials usage, water consumption of the dwellings and Electric Vehicle Charging (EVC).

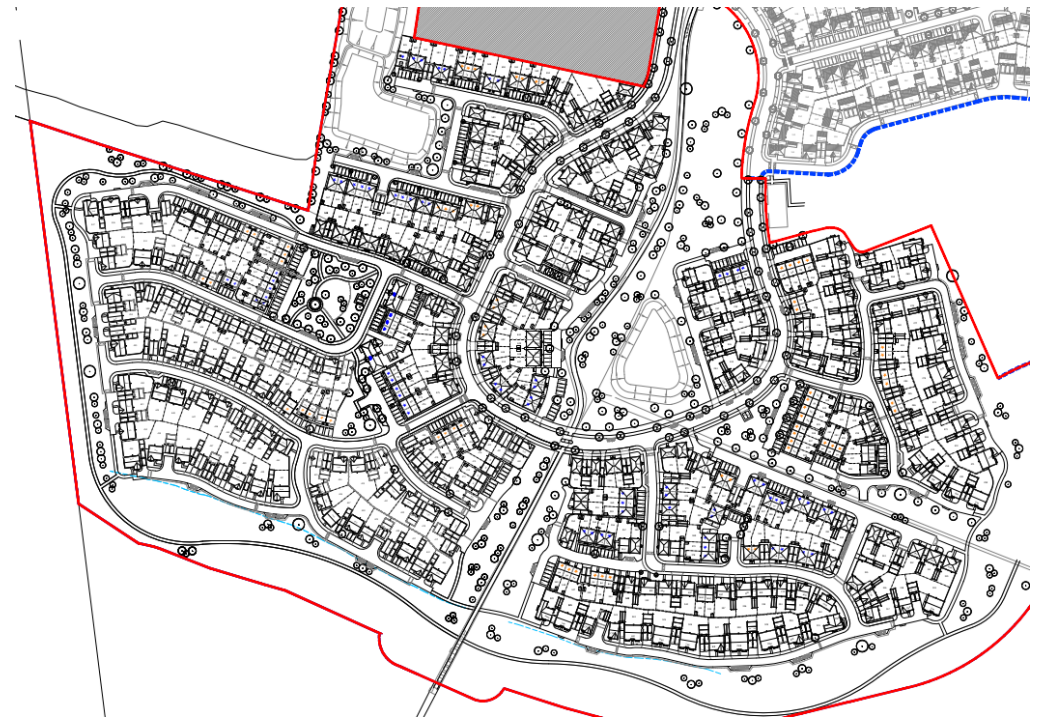


Figure 1. Proposed Site Plan – Land South of Netherhampton Road

2. Planning Policy

Wiltshire Core Strategy

- 2.1. Local policies relating to the sustainable design and construction of buildings is contained within the Wiltshire Core Strategy adopted in January 2015. The following extracts from this document are relevant to the energy strategy:

Core 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 achieved⁸⁶.

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.

Core Policy 41: Sustainable construction and low-carbon energy Continued

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

Renewable and low-carbon energy

All proposals for major development⁸⁷ 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 practice⁸⁸.

In all cases the impact of these requirements on the viability of development will be taken into consideration.

Core Policy 43: Providing affordable homes

Provision

On sites of five or more dwellings, affordable housing provision of at least 30% (net) will be provided within the 30% affordable housing zone and at least 40% (net) will be provided on sites within the 40% affordable housing zone. Only in exceptional circumstances, where it can be proven that on-site delivery is not possible, will a commuted sum be considered.

The provision of affordable housing may vary on a site-by-site basis taking into account evidence of local need, mix of affordable housing proposed and, where appropriate, the viability of the development. All affordable housing will be subject to an appropriate legal agreement with the council. This level of provision should be delivered with nil public subsidy, unless otherwise agreed by the council.

Tenure

Tenure will be negotiated on a site-by-site basis to reflect the nature of the development and local needs as set out in Core Policy 45 (Meeting Wiltshire's housing needs).

On site distribution and standards

Affordable housing units will be dispersed throughout a development and designed to a high quality, so as to be indistinguishable from other development. In determining the level of integration that can be achieved, consideration will be given to the practicalities of management and maintenance associated with the proposal whilst still ensuring affordability, particularly in developments of flats.

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 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 with a further amendment in February 2023. The new Building Regulations came into effect for buildings where construction commenced after 15th June 2023. The new standards require a 31% reduction in CO₂ emissions compared with Part L1a 2013 Building Regulations.

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

Future Homes Standard

- 2.7. In December 2023, the Government released the consultation on the forthcoming Future Homes Standard. The consultation presents two options aimed at delivering homes with carbon emissions at least 75% lower than Part L 2013 requirements.
- 2.8. 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.
- 2.9. At this stage it is not clear whether similar transitional arrangements will apply and when the regulations may be introduced, however it is expected that these standards will affect a proportion of the proposed development.

Proposed Strategy

- 2.10. This statement is intended to establish the proposed approach to sustainable construction and reduction in CO₂ emissions to be delivered at the development.
- 2.11. It is proposed that the development is designed to incorporate all applicable guidance contained within the Wiltshire Core Strategy. Specifically, in relation to renewable energy provision and the construction of highly efficient buildings which seek to minimise water demand and energy use, as well as CO₂ emissions.
- 2.12. This statement will demonstrate that through a combination of fabric efficiency measures and renewable energy, the development can achieve a site wide CO₂ emission reduction of 31% over 2013 Building Regulations standards, demonstrating a commitment to low carbon development which is affordable for residents.
- 2.13. This statement provides an indicative fabric specification and a strategy which would enable the dwellings to meet these higher standards, with the precise strategy to achieve this being subject to change as the scheme progresses.
- 2.14. Additional sustainable construction considerations are also addressed, including overheating risk and climate resilience, sustainable and responsible materials usage and water consumption of the dwellings.

3. Overheating Risk and Passive Design

- 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 temperature fluctuations.

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:
- Minimise internal heat gain
 - Manage heat through internal thermal mass and design of spaces
 - Passive ventilation strategies
 - Mechanical ventilation systems
 - Active cooling systems

Approved Document O

- 3.5. In order to more robustly address overheating risk, the Government has introduced a new Approved Document, 'Part O', into the Building Regulations.
- 3.6. This document requires a more in-depth assessment of the risk of overheating, considering site location, dwelling orientation, glazing proportions and openable window areas for natural ventilation.

- 3.7. 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

- 3.8. 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.
- 3.9. 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.
- 3.10. Where 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.
- 3.11. Window sizes have been optimised to maximise daylight and solar gain, but ensure overheating has been mitigated. TM59 dynamic overheating assessments shall be run on all designed house types to ensure no overheating occurs.

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 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 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.
- 4.4. Part L 2021 became mandatory from June 2023, which constitutes 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%
Future Homes Standard	75% - 80%

Energy Reduction Strategy – Fabric First

- 4.5. The proposed construction specification and sustainable design principles to be applied to the development will ensure that each dwelling meets and exceeds the fabric energy efficiency requirements of Part L1 2021.
- 4.6. 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.

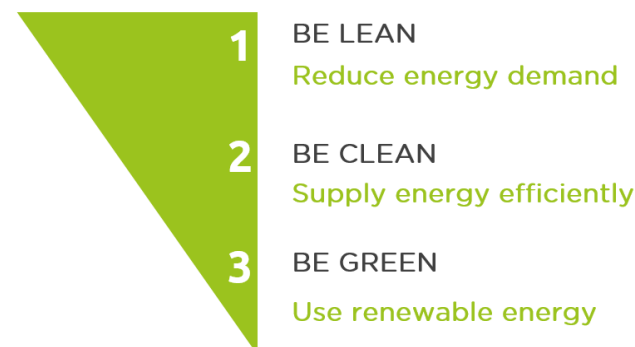


Figure 2. The Energy Hierarchy

Be Lean – reduce energy demand

- 4.7. 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

4.8. 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

4.9. 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

4.10. 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.

4.11. This approach has been widely supported by industry and government for some time, particularly in the residential sector, with the Zero Carbon Hub² and the Energy Savings Trust³ having both stressed the importance of prioritising energy demand as a key factor in delivering resilient, low energy buildings.

4.12. 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	✓	✗

Building Regulations Standards – Fabric Energy Efficiency

4.13. 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), expressed in kWh/m²/year.

4.14. 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.

4.15. The TFEE is calculated based on the specific dwelling being assessed with reference values for the fabric elements contained within Approved Document L1A. 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

- 4.16. 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/m ² K	0.21-0.24 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	0.09 W/m ² K
Ground floor – u-value	0.18 W/m ² K	≤ 0.12 W/m ² K
Windows – u-value	1.6 W/m ² K	1.30 W/m ² K
Doors – u-value	1.6 W/m ² K	1.10 W/m ² K
Air Permeability	8 m ³ /h.m ² at 50 Pa	4.50 m ³ /h.m ² at 50 Pa

Thermal bridging

- 4.17. 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.
- 4.18. 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

- 4.19. 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 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.

Passive Design Measures and Overheating Risk Mitigation

- 4.20. 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.
- 4.21. Due to these measures to reduce internal heat gain, natural ventilation provided through window openings and the opportunity for cross ventilation will allow sufficient air exchange rates to purge any heat build-up. Active cooling systems are therefore not proposed.
- 4.22. By following these principles, the development will be designed to build in resilience to a potentially changing climate over the lifetime of the buildings and minimise overheating risk, which can be exacerbated by the drive to build better insulated, more airtight homes if not considered within the design and construction process.

Provisions for Energy-Efficient Operation of the Dwelling

- 4.23. The occupant of the dwelling should be provided with all necessary literature and guidance relating to the energy efficient operation of fixed building services. Currently it is assumed that all dwellings will be provided with electric heating systems, fully insulated primary pipework, and controls including programmers, thermostats and Thermostatic Radiator Valves to avoid unnecessary heating of spaces when not required.

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 5.5m/s⁴. Wind turbines at this site are therefore unlikely to generate sufficient quantities of electrical energy to be cost effective⁵. For these reasons wind power is not considered feasible.

⁴ 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 4-9.

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

Table 4. 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.	

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.	

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 • 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 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 0.136kgCO₂/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	
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 0.136kgCO₂/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+ - 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 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
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 is 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 considered appropriate for this site:
- Solar Photovoltaic panels (PV)
- 5.11. It is currently proposed that the whole site will use gas boilers, WWHR and solar PV to meet Part L 2021.
- 5.12. Designs will be worked up for heating and renewable energy systems at the Design stage to meet the targets for primary energy and carbon to meet Part L 2021. If any plots do fall into FHS designs will ensure the dwellings meet FHS, subject to its final definition.

6. Total CO₂ reductions

- 6.1. Through following the strategy described, the dwellings will reduce energy demand and consequent CO₂ emissions beyond a Part L 2021 compliant level of performance through the dwelling fabric, gas boilers and PV systems.
- 6.2. To establish a suitable baseline position a sample of dwellings drawn from the Vistry range have been assessed. This exercise will establish baseline CO₂ emissions for the scheme under current regulations.
- 6.3. Using SAP10 software, a sample range of dwellings have also been assessed under Part L 2021 to build a representative site model and establish the predicted CO₂ emissions of the development, with the proposed fabric and renewable energy strategy applied to provide an overview of the typical as-designed CO₂ emissions. The results of these calculations are shown in Table 10.

Table 10. Sample dwelling as-designed CO₂ emissions after renewables (Part L 2021)

House Type	Part L 2021 Target CO ₂ Emissions	As-Designed CO ₂ Emissions	Reduction %
Cypress Detached	11.02	11.39	3.25
Magnolia Semi	10.61	11.61	8.61
Chestnut Detached	9.96	10.23	2.64
Sunflower Detached	10.84	11.36	4.58
Forget me not Semi	10.69	11.29	5.31
Lupin Detached	9.12	9.55	4.50
Lime Detached	8.17	8.28	1.33
Dalia Semi	10.64	10.94	2.74
Maple Detached	9.40	9.43	0.32

- 6.4. Table 11 demonstrates the site-wide savings over and above the Part L 2021 compliant baseline that will be delivered.

Table 11. Site-wide CO₂ emission reductions achieved

	CO ₂ Emissions (kgCO ₂ /yr)	
Part L 2021 compliant baseline	453,961	
As designed calculated emissions	435,122	
Savings	18,839	4.15%

- 6.5. 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 standard and calculation methodology to accurately represent the final CO₂ emissions of the development.
- 6.6. All dwellings will be recalculated again at the recalculated at construction drawing stage to make sure policies and Building Regulations are met.

7. Embodied Carbon

- 7.1. Through a whole life carbon assessment of house types, areas in which the amount of embodied carbon in our homes can be reduced have been established
- 7.2. A review of the whole life global warming impact of building components identified that tufted carpet flooring and facing brickwork as the non-structural building components with the greatest impact
- 7.3. Action has been taken to lower carbon intensive products. Vistry will also explore products such as low carbon cement and the use of recycled content within materials.
- 7.4. In the similar house types calculated to date across Vistry, the whole life global warming impact(kgCO₂e) of the building over a 60-year period, excluding benefits beyond systems boundaries, was calculated to be 40,757kgCO₂e, which equates to a whole life carbon intensity of 428kgCO₂e/m².
- 7.5. The global warming impact of the development to practical completion was calculated to be 28,274kgCO₂e, which equates to a whole life carbon intensity of 297kgCO₂e/m².

8. Electric Vehicle Charging

- 8.1. 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.
- 8.2. The development will therefore provide EVC infrastructure in accordance with the technical requirements of Approved Document S: infrastructure for charging electric vehicles.

9. Efficient Use of Natural Resource

Resource Efficiency and Materials

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

Materials

- 9.2. 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.
- 9.3. 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

- 9.4. 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

- 9.5. 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.

Construction Waste

- 9.6. 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 m³ of waste per 100m² / tonnes waste per m².
- 9.7. 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.

10. Water Efficiency

- 10.1. 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.
- 10.2. 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,

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

- 10.3. 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.
- 10.4. 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.

- 10.5. 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 110 litres/person/day..

- 10.6. Table 12 shows a typical water demand calculation, and shows how the development could achieve the required 110 litres/occupier/day

Table 12. Typical Water Demand 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)	5	9.48
Bath	Capacity to overflow (l)	181	19.91
Dishwasher	Litres/place setting	Not specified	17.16
Washing machine	Litres/kg	Not specified	4.50
Shower	Flow rate (l/min)	8	34.96
Kitchen sink taps	Flow rate (l/min)	3.8	12.03
Calculated Use			111.6
Normalisation Factor			0.91
Total Internal Consumption (L)			101.5
External Use			5.0
Building Regulations 17.K			106.5

11. Conclusions

- 11.1. This Energy and Sustainability Statement has been prepared on behalf of Vistry Homes Limited in support of the application for development of the site known as Land South of Netherhampton Road.
- 11.2. The development consists of 406no dwellings with 147 being affordable and provides a range of 1 to 5 bed residential units including apartments.
- 11.3. 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 Wiltshire Core Strategy adopted in January 2015.
- 11.4. 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 CO₂ emissions are minimised.
- 11.5. A range of potentially appropriate low carbon and renewable energy technologies have been assessed for feasibility in delivering a further reduction in CO₂ emissions, concluding that gas boilers, WWHR and solar PV systems are considered the appropriate technology for this site.
- 11.6. It is expected that some dwellings might be constructed beyond the implementation of the Future Homes Standard, which is expected to be introduced in 2026, therefore will meet a 75-80% reduction in CO₂ emissions compared with Part L1a 2013 regulatory standards.
- 11.7. The approach presented delivers a reduction of 18,839 kgCO₂/year over Part L 2021 equating to an improvement of 4.15%.
- 11.8. 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.
- 11.9. Water usage will be reduced in accordance with the requirements of Building Regulations Part G, with flow restrictors and low use appliances being selected where applicable to ensure that the calculated daily water demand is 110 litres/person/day.
- 11.10. 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, in accordance with the requirements of Approved Document S.