

Barkham Square, Wokingham

Energy & Sustainability Statement

On behalf of Crest Nicholson

March 2026



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Executive Summary

This Energy & Sustainability Statement supports the outline planning application for Barkham Square, Wokingham, a residential-led development including new dwellings and elderly care accommodation, forming a new sustainable neighbourhood extending Arborfield Green. The report demonstrates how the scheme responds to national and local policy requirements, with particular emphasis on energy efficiency, carbon reduction and alignment with Wokingham Borough Council Policy CC05 and the trajectory of the Future Homes Standard.

At the outline stage, the proposed energy strategy is structured around the recognised hierarchy of Be Lean, Be Clean, Be Green and Be Seen, establishing a robust and future-ready framework. The primary focus is on reducing energy demand through a fabric-first design approach. Measures include optimised building form and orientation, high-performance insulation, enhanced airtightness, minimised thermal bridging and integrated shading strategies. Together, these interventions help reduce baseline energy demand and operational carbon emissions while improving thermal comfort and resilience to overheating.

The development is proposed as an all-electric, fossil fuel-free scheme in line with the Future Homes Standard. A suite of low-carbon heating and energy technologies has been reviewed for suitability, feasibility and policy compliance. At this stage, air source heat pumps are anticipated to be the primary heating solution, offering a highly efficient and practical approach aligned with Crest Nicholson's delivery model. However, the strategy retains flexibility to consider complementary or alternative options, such as ground source heat pumps or other low-carbon systems, subject to further technical assessment at Reserved Matters stage.

In relation to on-site renewable energy generation, the development is required to achieve at least a 10% reduction in regulated carbon emissions in accordance with Policy CC05. A range of renewable technologies has been assessed, with roof-mounted solar photovoltaic (PV) systems anticipated as the principal solution at this stage, due to their strong feasibility, efficiency and compatibility with residential roofscapes. Other technologies, including solar thermal, may be considered where appropriate as part of a balanced and site-responsive approach.

Indicative Predicted Energy Demand (PED) modelling has been undertaken to establish a baseline for regulated and unregulated energy demand, providing a framework against which technological interventions and carbon savings can be assessed as the design evolves.

The Sustainability Checklist provides a clear demonstration of how Barkham Square delivers a holistic approach to sustainable development, extending beyond energy performance to address wider environmental, social and wellbeing considerations. It evidences a coordinated response to key themes including water efficiency, sustainable drainage, biodiversity protection and enhancement, sustainable construction and materials sourcing, waste reduction, sustainable transport and healthy living environments. Together, these measures reinforce the robustness of the scheme by ensuring sustainability is embedded across the masterplan, design principles and long-term operation, supporting the creation of a high-quality, environmentally responsible new neighbourhood.



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1 Introduction

1.1 Introduction

This Energy & Sustainability Statement has been prepared by Aether on behalf of Crest Nicholson ('the Applicants' hereafter) to support the submission of an Outline Planning Application for the Site known as Barkham Square, Wokingham (the 'Proposed Development' hereafter).

The Outline application (with all matters reserved except for access) is for residential development (Use Class C3), plus elderly care dwellings (Use Class C2/C3), associated open space, allotments, green and blue infrastructure including the provision of Suitable Alternative Natural Greenspace (SANG) and other associated works.

The Site is located at the northern boundary of Arborfield Green, approximately 2 km south of Wokingham, and 1 km south of Barkham village. It is within the administrative boundary of Wokingham Borough Council (WBC). It covers an area of approximately 44.9 hectares in size. At present, the Site consists of primarily of undeveloped agricultural land. The Site would form a north-eastern urban extension to Arborfield Green.

The development is led by Crest Nicholson, a housebuilding company that places sustainability at the core of its approach. Their focus includes reducing both direct and indirect greenhouse gas emissions, lowering natural resource consumption, and managing waste through reuse and recycling. Crest Nicholson also designs homes and communities with water efficiency in mind and aims to deliver at least a 10% biodiversity net gain across new developments.

1.2 Purpose of this Report

WBC's validation checklist (September 2025)¹ states that major applications should be supported by a "Sustainability Statement / Appraisal (or Energy Statement)" to demonstrate the sustainability principles of the development, including positive environmental, social and economic considerations. The statement should show the predicted energy demand on the Proposed Development and the degree to which it meets current energy efficiency standards.

A key relevant target is set out in Policy CC05 (Renewable Energy and Decentralised Energy Networks) of the Adopted Managing Development Delivery Local Plan (February 2014)². This requires major schemes to deliver a minimum 10% reduction on carbon emissions through renewable energy or low carbon technology.

Additionally, Appendix 4 of WBC's Sustainable Design and Construction Supplementary Planning Document (SPD) (May 2010)³ contains a Sustainability Checklist which should be completed "... to help inform the final design and provide information for input into a Sustainability Statement."

This document addresses these various requirements within a single Energy & Sustainability Statement.

¹ [Validation Checklist \(September 2025\)](#)

² [Adopted Management Development Delivery Local Plan \(February 2014\)](#)

³ [Sustainable Design and Construction SPD \(May 2010\) - Appendix 4 Sustainability Checklist](#)

1.3 Report Structure

This Energy & Sustainability Statement responds to the validation requirements, Policy CC05 and the Sustainability Checklist, and is structured as follows:

- **Section 2: The Application Site and Proposed Development** provides a site description and an overview of the development proposals;
- **Section 3: Policy Context** gives an overview of the requirements of relevant national / local planning policy and building regulations.
- **Section 4: Energy Strategy Principles** sets out the overarching energy strategy based on the principles of Be Lean, Be Clean, Be Green and Be Seen.
- **Section 5: Energy Demand and Carbon Assessment** provides a preliminary assessment of the predicted energy demands and predicted CO₂e⁴ emissions of the Proposed Development.
- **Section 6: Low Carbon and Renewable Energy Technologies** offers a review of the suitability of renewable and/ or low carbon energy generations technologies at the Proposed Development, and presents a suite of options that could be considered at detailed design.
- **Section 7: Sustainability Checklist** provides a completed version of the Sustainability Checklist, where relevant referencing other technical work undertaken for this planning submission.
- **Section 8: Conclusion** provides a summary of the proposals that contribute to a sustainable development and concluding remarks.

⁴ Carbon dioxide equivalent

2 The Application Site and Proposed Development

2.1 The Application Site

The Site is located on the northern edge of Arborfield Green, approximately 2 km south of Wokingham and 1 km south of Barkham village. The Site extends to around 44.9 hectares and is defined as Barkham Square, within the redline boundary shown in **Figure 1**.

At present, the Site comprises undeveloped agricultural land. It also contains a range of natural features including mature trees, veteran trees, ancient woodland, and native hedgerows.

The Site benefits from strong transport connections including: to the south and east, it is bounded by Langley Common Road; and to the west, it is bounded by Commonfield Lane and Barkham Street. The majority of the Site falls within Flood Zone 1. A valley corridor associated with Barkham Brook crosses the Site and is designated as Flood Zone 3.

The Site is positioned to form a north-eastern extension to Arborfield Green. Its location allows it to benefit from nearby facilities within Arborfield Green, while also being in close proximity to Wokingham (approximately 2 km to the north).

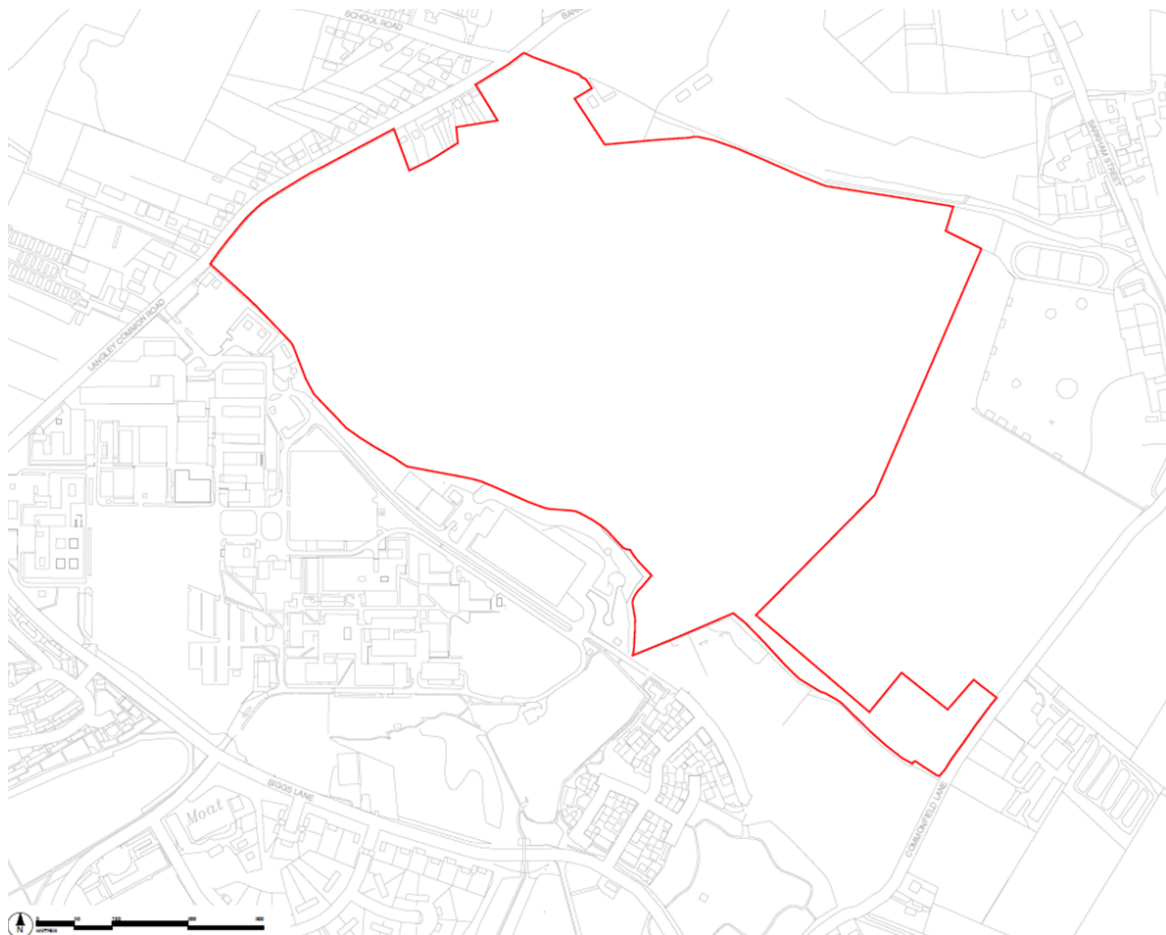


Figure 1. Site Location Plan (within redline boundary) - extract

2.2 Proposed Development

The development proposes a residential-led scheme that will create a sustainable new neighbourhood integrated with Arborfield Green. It will deliver a mix of housing types and tenures, alongside community infrastructure and high-quality open space.

Key components include:

- **Residential housing:** New dwellings (Use Class C3), providing a range of sizes and tenures plus elderly care dwellings (Use Class C2/C3).
- **Public open space:** A comprehensive network of open areas including play spaces and community green spaces.
- **Blue and green infrastructure:** Including Sustainable Drainage Systems (SuDS) integrated into the masterplan.
- **Biodiversity enhancements:** Retention of veteran and ancient trees, protection of woodland, and provision of approximately 13.23 hectares of Suitable Alternative Natural Greenspace (SANG) over the site area of 44.9 hectares.
- **Access and connectivity:** Vehicular, pedestrian, and cycle access from Langley Common Road and Commonfield Lane, with links into the wider transport network and connections to Arborfield Green and Wokingham.

The vision for the Site is to establish a distinctive, sustainable, and inclusive community. The development will respond sensitively to its landscape setting, deliver ecological enhancements, and provide accessible green spaces for both new and existing residents.

The formal development description is as follows: *Outline application (with all matters reserved except for access) for residential development (Use Class C3), plus elderly care dwellings (Use Class C2/C3), associated open space, allotments, green and blue infrastructure including the provision of Suitable Alternative Natural Greenspace (SANG) and other associated works.*

A parameter plan is provided in **Figure 2**.

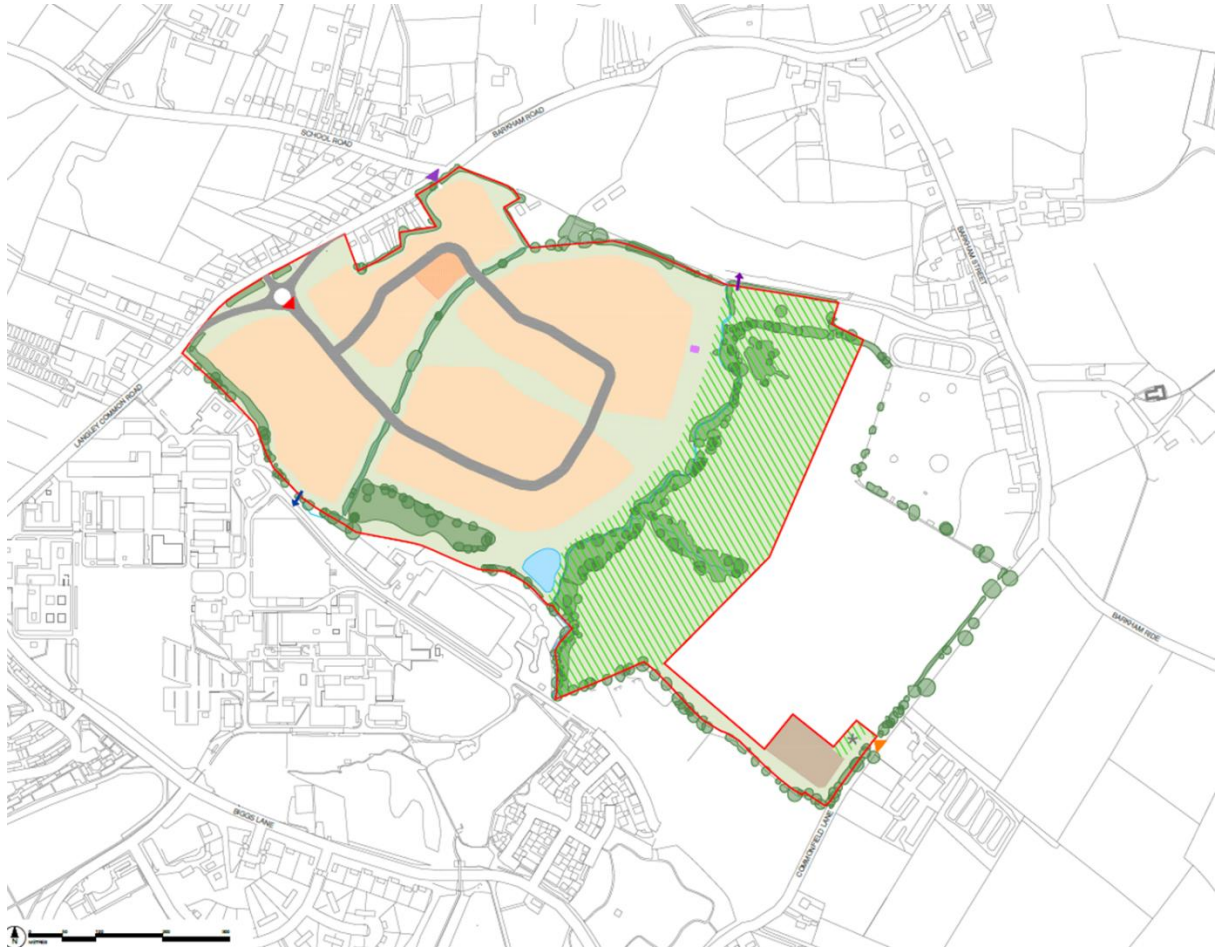


Figure 2. Parameter Plan (Land Use) - extract

3 Policy Context

3.1 Introduction

This section sets out the key policy and regulatory requirements that the Proposed Development must meet in regard to sustainable design.

3.2 National Planning Policy

3.2.1 National Planning Policy Framework (NPPF) (12 December 2024)

The revised National Planning Policy Framework (NPPF)⁵ was published in 2024 and sets out government's planning policies for England and how these are expected to be applied. This includes the presumption in favour of sustainable development, in Paragraph 11. Furthermore, Paragraph 8 states that to achieve sustainable development the planning system must aim to support economic, social and environmental objectives. This includes contributing towards a strong and competitive economy, supporting communities and protecting and enhancing our natural, built and historic environment.

3.2.2 Written Ministerial Statement – Energy Efficiency (13 December 2023)

The updated Written Ministerial Statement on Local Energy Efficiency Standards (WMS)⁶ indicates that Local Planning Authorities (LPAs) can set energy efficiency targets if they are well-reasoned and robustly costed in terms of development viability. If policies are not robustly costed they cannot set their own targets based on actual energy use in buildings. The WMS also noted any additional requirement is expressed as a percentage uplift of a dwelling's Target Emission Rate (TER) calculated using a specified version of the Standard Assessment Procedure (SAP).

3.3 Building Regulations

Several Parts of the Building Regulations are directly relevant to energy performance, sustainability, and occupant wellbeing in residential development. These establish the statutory baseline for new homes and specialist accommodation. A summary of relevant documents is provided below.

3.3.1 Part L – Conservation of Fuel & Power

The key energy- and carbon-related Building Regulation currently applicable to the Proposed Development is Approved Document Part L: Conservation of fuel and power, 2021 edition with 2023 amendments⁷.

Planned changes to energy requirements defined by the regulations during the built-out period are as follows:

The 2025 **Future Homes and Buildings Standards** (FHS) aim to build on the 2021 Part L uplift and set more ambitious minimum requirements for energy efficiency and heating for new homes and non-

⁵ [National Planning Policy Framework](#)

⁶ [WMS on Energy Efficiency](#)

⁷ [Part L - Conservation of Fuel & Power](#)

domestic buildings⁸. Whilst these regulations have not yet come into effect, key requirements aim to ensure:

- All new homes built from 2025 will produce 75-80% less carbon emissions compared to homes delivered under current 2021 regulations.
- All new homes will be required to be equipped with low-carbon heating (heat pumps, natural ventilation).
- Demonstrate compliance with FHS through Home Energy Model, when it comes into effect in 2025.
- All new homes will be 'zero-carbon ready'. This means they are designed for renewable energy sources, eliminating the need to achieve zero carbon emissions when the grid is fully decarbonised.

The previous Conservative Government was consulting on potentially banning gas boilers in new homes from 2025. However, the current status of this proposal is unclear. It is understood the new Labour Government is minded to take forward FHS Option 1 for the Notional building. This option includes solar PV panels, a wastewater heat recovery system, increased airtightness and a decentralised mechanical ventilation (dMEV) system.

Option 2 is the minimal approach to achieve 'zero-carbon ready homes that delivery at least 75% carbon savings compared to 2013 energy efficiency requirements. This is unlikely to be taken forward.

3.3.2 Other Relevant Building Regulations

In addition to Part L, several other Parts of the Building Regulations are relevant to the sustainability and wellbeing performance of new residential-led developments.

Part O – Overheating (2021 edition, effective June 2022)⁹ was introduced to address overheating risk in new residential buildings. It requires evidence that homes can maintain safe internal temperatures without mechanical cooling, either through simplified glazing/ventilation limits or dynamic thermal modelling.

Part G – Sanitation, Hot Water Safety and Water Efficiency (2015 edition, with 2016 and 2024 amendments)¹⁰ sets standards for water system safety and efficiency, including a whole-dwelling consumption limit of 125 litres per person per day, with an optional 110 l/p/d standard where imposed by planning. It also includes requirements for safe hot water delivery and prevention of scalding.

Part F – Ventilation (2021 edition, effective June 2022)¹¹ defines requirements for adequate ventilation in new dwellings to ensure indoor air quality. It covers background, purge, and extract ventilation, and is closely aligned with airtightness and energy performance standards under Part L.

Part S – Electric Vehicle Charging Infrastructure (2021 edition, effective June 2022)¹² requires the installation of electric vehicle charging infrastructure in new residential development. For homes

⁸ [Future Homes Standard consultation](#)

⁹ [Part O - Overheating](#)

¹⁰ [Part G - Sanitation, Hot Water Safety and Water Efficiency](#)

¹¹ [Part F - Ventilation](#)

¹² [Part S - Electric Vehicle Charging Infrastructure](#)

with on-plot parking, a charge point must be installed. For flats and communal parking, a proportion of spaces must be equipped, with cable routes provided for future expansion.

3.4 Local Planning Policy

Local planning policies relevant to delivering a sustainable development within Wokingham Borough are summarised below.

3.4.1 Adopted Core Strategy Development Plan Document (January 2010)

The Wokingham Borough Core Strategy (2010)¹³ establishes sustainability standards by requiring all new development to minimise environmental impact, enhance local character and biodiversity, and support a shift towards low-carbon, resource-efficient, and well-connected communities. Key policy requirements include:

- **Core Policy 1: Sustainable Development** – Maintain and enhance environmental quality; minimise emissions; design for safety, accessibility, and adaptability; support reduced car use; contribute towards low-carbon development through renewables, energy/water efficiency, and climate-responsive layout/orientation.
- **Core Policy 3: General Principles for Development** – Deliver high-quality design that respects local character and identity; retain/enhance built and natural assets; relate well to neighbouring properties; ensure development is attractive, functional, accessible, safe, secure, and adaptable.
- **Core Policy 6: Managing Travel Demand** – Reduce reliance on private cars by prioritising walking, cycling, and public transport; integrate layouts that encourage sustainable travel choices; support measures such as travel planning and infrastructure for low-emission transport.
- **Core Policy 7: Biodiversity** – Protect and enhance biodiversity assets, including habitats and species of principal importance; safeguard designated ecological sites; deliver improvements through habitat creation, green corridors, and ecological enhancements.

3.4.2 Adopted Managing Development Delivery Local Plan (February 2014)

The Wokingham Borough Managing Development Delivery (MDD) Local Plan¹⁴ provides extra detail towards the policies within the core strategy, particularly in relation to their implementation.

A key policy of relevance from this plan is **Policy CC05: Renewable Energy and Decentralised Energy Networks**. This policy states the requirement for:

"Proposals to deliver a minimum 10% reduction on carbon emissions through renewable energy or low carbon technology in cases where the proposal is for schemes of more than 10 dwellings or for non-residential proposals of more than 1000 sqm gross floor space."

The Climate Change Interim Policy Statement (December 2022)¹⁵ clarifies that this 10% uplift is expected to be achieved in addition to the emissions improvements through the Building Regulations (as updated in June 2022).

¹³ [Wokingham Core Strategy \(January 2010\)](#)

¹⁴ [Wokingham MDD Local Plan \(February 2014\)](#)

¹⁵ [Climate Change Interim Policy Statement December 2022](#)

3.4.3 Sustainable Design and Construction Supplementary Planning Document (SPD) (May 2010)

This document¹⁶ outlines an approach to sustainable design and construction in new developments. It guides developers on key issues such as renewable energy and low-carbon technologies, waste, pollution, transport and access, water, biodiversity, and health and well-being. Planning applications must demonstrate compliance with these requirements through the Sustainability Checklist, which is addressed in this Energy and Sustainability Statement (see [Section 7](#)).

3.4.4 Emerging Local Plan Update

The emerging Local Plan Update (LPU)¹⁷ will replace the Core Strategy and MDD, setting policies on housing, infrastructure, climate, and biodiversity to 2040. According to the Local Development Scheme 2024–2027¹⁸, adoption is anticipated in May 2026.

3.4.5 Wokingham's Climate Emergency Action Plan

Wokingham Borough Council declared a climate emergency in July 2019¹⁹. In response to this, the Climate Emergency Action Plan (CEAP) was developed. This strategic plan identifies how the planning system can integrate responses to aid in the mitigation and adaptation to ongoing and future climate change. Key priorities of CEAP include reducing carbon dioxide emissions from transport, domestic property, and using planning policies to minimise emissions from new developments. Hence, highlighting a further background of local policy requirements for new developments to minimise emissions.

3.5 Crest Nicholson's Environmental Social Governance (ESG) Policies

Crest Nicholson's ESG framework²⁰ aligns with planning expectations by embedding sustainability into governance, design, and delivery. Policies on climate change, sustainable procurement, timber use, and human rights are applied across projects, supporting compliance with local and national planning requirements for ethical practice, responsible supply chains, and sustainable development. This structured approach provides assurance that sustainability objectives are not only stated but monitored and delivered at project level.

On the environmental side, Crest Nicholson's net-zero 2045 target, rising renewable energy use, and significant reductions in emissions, diesel, and construction waste demonstrate progress against policy requirements for low-carbon and resource-efficient development. Their focus on water efficiency, sustainable drainage systems, biodiversity enhancements, and high fabric performance in new homes directly reflects planning guidance on resilience, ecological value, and reduced environmental impact. Together, these measures show clear alignment with sustainability checklists and energy and environmental standards within the planning process. Further details on Crest Nicholson's ESG policies and targets can be found on their website ([link below](#)).

¹⁶ [Sustainable Design and Construction SPD \(May 2010\)](#)

¹⁷ [Local Plan Update](#)

¹⁸ [Local Development Scheme 2024-2027](#)

¹⁹ [Wokingham's Climate Emergency Action Plan](#)

²⁰ [Crest Nicholson's ESG framework](#)

3.6 Summary

The policy framework requires the Proposed Development to meet both national and local sustainability standards, with key local requirements set out in Policy CC05 and the Sustainability Checklist.

Policy CC05 (Renewable Energy and Decentralised Energy Networks) mandates that major schemes achieve at least a 10% reduction in carbon emissions through on-site renewable or low-carbon technologies. Complementing this, Wokingham's Sustainable Design and Construction SPD requires planning applications to demonstrate how proposals address a broad range of sustainability issues—energy, waste, water, transport, biodiversity, and health—through the Sustainability Checklist.

Together, these mechanisms ensure developments deliver measurable carbon reductions while embedding wider environmental and social benefits in line with planning policy.

4 Energy Strategy Principles

4.1 Introduction

This section outlines the principles of the proposed energy strategy for the scheme at the outline planning stage, ensuring alignment with Wokingham Borough Council's planning policies, including Policy CC05 (Renewable Energy and Low Carbon Development). The strategy has also been prepared with regard to the Government's emerging Future Homes Standard, which sets out a pathway towards highly energy-efficient, low-carbon buildings.

At this stage, the strategy establishes the overarching approach, with detailed measures to be confirmed at the Reserved Matters stage, when approval is sought for the final design of the buildings. At that point, specific proposals to reduce energy demand, improve efficiency, and integrate low-carbon solutions into the construction and operation of the development will be set out.

In line with best practice, the approach follows the energy hierarchy, ensuring that the scheme minimises carbon emissions, supports local policy objectives, and remains resilient to future regulatory change.

4.2 Energy Hierarchy

Crest Nicholson is committed to reducing the carbon emissions of their homes and developments. They are at the forefront of designing low carbon homes and sustainable advocacy, and are progressing towards FHS compliance in their designs.

As well as climate change mitigation, Crest Nicholson establishes project-specific adaptation methods on all developments to address climate change risk, including overheating and residents' thermal comfort.

The proposed dwellings will seek to reduce CO₂e emissions and enhance energy efficiency. The homes will comply with the relevant edition of the Building Regulations Part L, by being 'net zero carbon ready'.

The buildings will be designed in accordance with the **energy hierarchy**. The energy hierarchy classifies energy efficiency and energy supply options, setting out an order of preference that enables progress towards a zero carbon energy system. The energy hierarchy prioritises:

- **Be Lean:** Reducing energy demands, through spatial and plot design and building fabric specification;
- **Be Clean:** Energy efficiency and a sustainable heating strategy, using technologies such as smart meters and energy efficient appliances;
- **Be Green:** Maximising provision on-site renewable energy generation where appropriate to meet energy demand;
- **Be Seen:** Monitoring and verification of energy performance post-occupation.

4.3 Be Lean

Reducing energy demand in new homes is fundamental to achieving the UK's net zero objectives, as it minimises reliance on fossil fuels and significantly reduces operational carbon emissions. In line

with Crest Nicholson's "fabric first" approach and in anticipation of the Future Homes Standard (FHS), the proposed dwellings will be designed to passively reduce energy use and avoid uncontrolled heat loss wherever practicable.

This will be achieved through the following measures:

Compact and Efficient Building Form: Optimising the building form factor to reduce surface-area-to-volume ratios, thereby minimising heat loss.

Massing and Orientation for Seasonal Performance: Careful site planning to optimise orientation, maximising passive solar gains and daylight penetration during winter months, while limiting overheating risks in summer. Overshadowing, façade design and glazing specification will be assessed to balance solar benefits with energy efficiency.

Optimised Glazing Strategy: Window sizing and positioning will be designed to provide useful solar gains and daylighting benefits, while incorporating high-performance glazing with selective coatings to reduce overheating and maintain comfort.

High-Performance Insulation: All opaque external fabric elements (walls, roofs, floors) will be insulated to a standard that outperforms the limiting and notional U-values set out in Approved Document L1 (2021). Target performance will be aligned with — and where feasible exceed — the requirements of the Future Homes Standard, ensuring high Fabric Energy Efficiency (FEE).

Airtightness: High levels of airtightness will be achieved to minimise uncontrolled infiltration losses. Testing and detailing will follow best practice to deliver consistent performance across all dwellings.

Thermal Mass: Where appropriate, materials with inherent thermal mass will be incorporated to stabilise internal temperatures and reduce reliance on active heating and cooling.

Solar Shading and Dynamic Heat Control: A combination of fixed and adjustable shading devices will be introduced to control solar gains, reducing peak summer temperatures and enhancing occupant comfort.

Thermal Bridging: Robust detailing will eliminate thermal bridging wherever possible. Where unavoidable, accredited details such as those from the LABC Registered Construction Details database²¹, or equivalent high-performance junction specifications, will be adopted.

An enhanced fabric performance specification will be submitted at the Reserved Matters stage for each development phase, ensuring continued alignment with Crest Nicholson's sustainability commitments and the trajectory set by the Future Homes Standard.

4.4 Be Clean

Once energy demand has been balanced through the fabric-first measures outlined in **Section 4.3**, dwellings will adopt an all-electric, low carbon heating strategy to ensure a 100% fossil fuel-free site in line with the Future Homes Standard (FHS). The Proposed Development will not connect to the gas network.

The specific heating and hot water technologies will be confirmed at the detailed design stage. However, it is anticipated that heating will be provided by air source heat pumps (ASHPs), which

²¹ [LABC Registered Construction Details database](#)

reflect Crest Nicholson's established approach to delivering all-electric, low-carbon homes. ASHPs can be integrated efficiently within individual dwellings and provide a reliable solution consistent with Part L 2021 and the Future Homes Standard. This position is supported by the feasibility review in **Section 6**, which identifies ASHPs as one of the most appropriate and deliverable technologies for Barkham Square.

All systems will incorporate appropriate time and temperature zoning to optimise energy use and comfort.

By adopting 100% electric systems, the development will support the transition to net zero, aligning with the decarbonisation of the UK electricity grid.

All building services will be designed for energy efficiency and compliance with regulatory requirements. This will include:

- **HVAC systems** specified for low energy use, with mechanical ventilation with heat recovery (MVHR) considered where appropriate to enhance air quality and efficiency,
- **Lighting** provided entirely with low energy solutions (e.g. LEDs), supported by smart controls such as daylight dimming and PIR sensors,
- All **appliances** specified as electric to avoid fossil fuel dependency.

Crest Nicholson is committed to helping customers understand the sustainability features of their homes. Home User Guides will be provided to support residents in operating their systems effectively, thereby ensuring lower running costs, improved wellbeing, and maximum carbon savings.

4.5 Be Green

Compliance with relevant planning policy and Building Regulations Part L will be achieved primarily through the **Be Lean** and **Be Clean** strategies outlined above.

In line with Wokingham Borough Council's Core Strategy Policy CC05, the Proposed Development will also be required to secure at least 10% of its regulated energy demand from on-site renewable or low carbon technologies. In addition, Crest Nicholson will explore opportunities to integrate further renewable energy generation to reduce carbon emissions, provide resilience against future energy costs, and deliver wider community benefits.

As identified in the renewable and low carbon feasibility review (**Section 6** of this report), roof-mounted solar photovoltaic (PV) systems are currently considered the most promising option to help meet the Policy CC05 10% requirement. Final system selection, sizing and layout will, however, be confirmed at the detailed design / Reserved Matters stage.

The strategy for PV integration will include the following principles:

Roof Orientation and Layout – optimise roofscapes to maximise south and near-south facing planes for PV installation, minimising interruptions from roof furniture or other obstructions.

Roof Form and Space Utilisation – design roof structures with sufficient uninterrupted areas to accommodate meaningful PV capacity.

Minimising Shading – carefully consider building spacing, massing and landscape features to reduce shading losses.

System Performance and Reliability – specify high-quality panels and inverters from established suppliers, ensuring robust warranties and efficient long-term performance.

Maintenance and Accessibility – incorporate access strategies to enable safe inspection and maintenance of PV installations.

Grid Connection and Smart Integration – design connections to enable efficient export and use of renewable electricity, including compatibility with smart metering, demand-side management and potential future battery storage.

At the Reserved Matters stage, a full building-integrated renewable energy feasibility study will be undertaken to demonstrate compliance with Policy CC05, confirm how the 10% target will be achieved, and explore opportunities to exceed this baseline requirement where feasible. This approach ensures the Proposed Development remains flexible to evolving policy, market and technology conditions while delivering on Crest Nicholson's sustainability commitments.

4.6 Be Seen

The **Be Seen** principle requires developments to demonstrate and report on actual operational performance once occupied, closing the “performance gap” between design intent and in-use outcomes. This is critical to ensuring homes deliver the intended carbon and energy savings, while also informing continuous improvement in future schemes.

Crest Nicholson has an established track record of undertaking Post Occupancy Evaluation (POE) across its developments, enabling lessons learned to feed back into design, construction, and customer experience. At Barkham Square, Crest Nicholson will continue this approach, supporting the ambitions of the Future Homes Standard (FHS) and national policy direction on performance monitoring.

At this outline stage, the following measures are anticipated (to be confirmed and refined at Reserved Matters):

Monitoring and Data Collection – All homes will be provided with smart meters, and energy monitoring solutions will be considered to track electricity consumption, heating system performance and, where applicable, PV generation. This will allow Crest Nicholson to compare operational data against design stage predictions.

Resident Engagement and Feedback – Crest Nicholson will provide Home User Guides and conduct resident surveys to capture feedback on comfort, system usability and perceived efficiency, helping to identify practical improvements for both building design and customer support.

Performance Verification and Reporting – Independent or in-house assessments will be undertaken to compare predicted versus actual energy use and carbon emissions. Outcomes will be used to refine construction detailing, system specifications and commissioning processes on future phases and developments.

Continuous Improvement Loop – Findings will be reported internally within Crest Nicholson's sustainability and technical teams to inform best practice, and externally to the local authority where required.

4.7 Overheating Mitigation

Climate change is driving increasingly frequent and intense heatwaves in the UK, including the record over 37°C event in 2022²². Ensuring that new homes are resilient to overheating is therefore essential to protect resident comfort, health and wellbeing.

At this outline stage, only parameter plans are being fixed. As such, Crest Nicholson has:

- Ensured that the masterplan layout and orientation principles do not create undue risk of excessive solar exposure to habitable rooms, particularly those facing west.
- Allowed flexibility within building heights and spacing to enable cross-ventilation potential to be considered at detailed design.
- Identified the opportunity for landscape-based shading, such as deciduous street trees, which can be incorporated at Reserved Matters to provide seasonal shading benefits.

These early design moves ensure that the site is capable of accommodating detailed overheating mitigation measures later on.

At the Reserved Matters stage, a full overheating assessment will be undertaken in accordance with Part O. This will confirm compliance using either the simplified method (glazing and ventilation standards) or dynamic thermal modelling (CIBSE TM59). At that point, Crest Nicholson will:

- Specify glazing performance and shading measures appropriate to each dwelling type.
- Demonstrate ventilation strategies, including purge ventilation, with alternatives where noise, air quality or security are constraints.
- Consider the role of thermal mass and internal layout in moderating internal temperatures.
- Follow the cooling hierarchy, prioritising passive and low-carbon design measures over energy-intensive active cooling.

This staged approach ensures that overheating mitigation is addressed consistently from the outline masterplanning principles through to detailed dwelling design, providing compliance with Part O and resilience to future climate change.

4.8 Summary

The energy strategy for Barkham Square has been developed in line with the energy hierarchy of Be Lean, Be Clean, Be Green and Be Seen. At this outline stage, the focus is on establishing the overarching principles: minimising energy demand through a fabric-first approach, adopting all-electric low-carbon heating solutions, and safeguarding capacity for on-site renewable energy. This ensures the scheme aligns with the Government's Future Homes Standard trajectory and anticipates the need for resilient, low-carbon development.

In accordance with Wokingham Borough Council Policy CC05, the development will deliver at least 10% of regulated energy demand from on-site renewable or low-carbon technologies. While the precise technologies and performance standards will be confirmed at the Reserved Matters stage, including through a renewable energy feasibility review, these outline principles demonstrate Crest Nicholson's commitment to a policy-compliant and climate-resilient energy strategy.

²² At the Reading University Atmospheric Observatory—the closest official Met Office station to Wokingham—the highest recorded temperature is 37.6 °C, observed on 19 July 2022.

5 Energy Demand and Carbon Assessment

5.1 Introduction

WBC's validation requirements (September 2025) state that major applications must include an energy statement demonstrating the predicted energy demand of the proposed development and the extent to which it meets current energy efficiency standards.

At this outline stage, calculations are based on compliance with the trajectory towards the Future Homes Standard (FHS). In addition, Policy CC05 requires that at least 10% of regulated energy demand is delivered through on-site renewable or low-carbon energy generation.

The detailed approach to meeting these requirements will be confirmed at the Reserved Matters stage.

The predicted energy demand (PED) assessment for Barkham Square has been prepared on this basis.

5.2 Methodology

At outline stage, full SAP (Standard Assessment Procedure) or NCM (National Calculation Methodology) calculations cannot be undertaken as detailed design information is not yet available. Instead, a Predicted Energy Demand (PED) model has been produced using the development schedule, BSRIA benchmarks and the BRE Domestic Energy Model (BREDEM) to establish indicative demand profiles.

Energy demand has been categorised as:

- Regulated demand – space heating, hot water, fixed lighting, fans and pumps (covered by Part L); and
- Unregulated demand – cooking, appliances and other small power (not regulated under Part L).

The energy modelling is based on the development meeting the proposed Future Homes Standard through a fabric first approach.

5.3 Results

The predicted energy demands assuming the delivery of the Future Homes Standard are presented in **Table 1**.

Table 1. Predicted Regulated Energy Demand For the Site

	Quantity	Hot Water (MWh/year)	Spacing Heating (MWh/year)	Regulated Electricity (MWh/year)	Regulated Total CO ₂ emissions (tonnes)
Residential	660	880	930	2000	270
Non-residential	1	200	315	80	80

To achieve 10% predicted energy demand via use of renewables or low carbon sources, the Proposed Development would need to target 80 kWh of solar PV across the development site.

Table 2. Solar Energy Provision

Solar Provision for Regulated Electricity (kWh)	Solar Provision -Regulated Total CO ₂ emissions (tonnes)
260	35

5.4 Summary

The Proposed Development will reduce energy demand, and deliver carbon emissions reductions by following the energy hierarchy. Key to this will be the use of passive design principles such as specifying building fabric to Building Regulations Part L.

The Proposed Development will deliver 10% predicted regulated energy demand via use of renewables or low carbon sources by pursuing a solar photovoltaic (PV) and/ or air source heat pump strategy.

Final SAP/NCM calculations and a detailed strategy for demand reduction and renewable integration will be confirmed at the Reserved Matters stage, building on the Be Lean / Be Clean / Be Green principles established in [Section 4](#).

6 Low Carbon and Renewable Energy Technologies

6.1 Introduction

Wokingham Borough Council's Policy CC05 (Renewable Energy and Low Carbon Development) requires major developments to demonstrate how at least 10% of regulated energy demand will be met through on-site renewable or low carbon technologies.

This section reviews the suitability of different options for Barkham Square, in support of Crest Nicholson's commitment to deliver a low carbon, all-electric development in line with Part L 2021 and the trajectory towards the Future Homes Standard (FHS). A more detailed review is provided in [Appendix A](#).

6.2 Key Feasibility Considerations

In assessing potential technologies, the following site-specific factors are relevant:

- **Environmental** – the site is greenfield, with sensitive ecology and established landscape buffers; intrusive technologies must be carefully managed.
- **Resource** – there is good solar exposure across the masterplan, but no river or large water bodies to support hydro or water-source heat pumps.
- **Social/visual** – Barkham Square borders Arborfield Green; large or visually intrusive systems (e.g. turbines) would be unsuitable in this residential setting.
- **Infrastructure** – the site is not adjacent to a district heat network, and national policy requires no new gas connections.

6.3 Technology Feasibility Appraisal

As outlined in [Section 4.4](#), all buildings will be designed to accommodate low carbon heating technologies.

A review has been undertaken to ascertain which low carbon and renewable energy technologies might be appropriate for the Proposed Development. A summary of the results are provided below, with a more detailed review of potential options in [Appendix A](#).

Table 3. Summary of feasibility of low carbon and renewable energy technologies

Technology	Technology Risk	Energy Availability	Appropriate	Comment
Photovoltaic (PV) panels	Low	Intermittent	Potentially suitable	Excellent solar resource across the site; roof-mounted PV on south-facing pitches is ideal, with frame-mounted systems on flat roofs.
Solar water heating (solar thermal)	Low	Intermittent	Potentially suitable	Feasible for pitched roofs for hot water support, though less efficient and cost-effective than PV. Suitable for selective deployment.
Air source heat pumps (ASHPs)	Low	Baseload	Potentially suitable	Crest Nicholson's standard — can be visually integrated, fitted within gardens or rear facades; user education will support efficient operation.
Ground source heat pumps (GSHPs)	Medium	Baseload	Potential to be explored further	The local geology (Mercia Mudstone and Bagshot Formation) may support GSHPs, but viability depends on geotechnical survey; higher capital cost and space demand could limit deployment.
District (communal) heat networks	Medium	Baseload	Not suitable	No existing network serves Arborfield Green or Barkham Square. A new heat network is not the preferred heating solution for the Proposed Development on the basis of cost.
CHP (Combined Heat & Power)	Medium	Baseload	Not suitable	Incompatible with all-electric, gas-free approach mandated by Future Homes Standard.
Water-source (groundwater) heat pumps	Medium	Baseload	Not suitable	No accessible aquifers or sufficient groundwater resources on or near site.

River/lake-source heat pumps	Medium	Baseload	Not suitable	No proximate watercourses or open water bodies to support such systems.
Hydropower	Low	Baseload	Not suitable	No significant flowing water available on or adjacent to site.
Building mounted wind energy (micro)	High	Intermittent	Not suitable	Low wind speeds regionally, and residential setting unsuitable due to potential noise and aesthetics.

6.4 Summary

The review of low carbon and renewable technologies for Barkham Square highlights a suite of suitable options. Roof-mounted photovoltaic (PV) panels are the most feasible, with potential for both pitched and flat roofs. Air source heat pumps (ASHPs) are also well suited, aligning with Crest Nicholson's standard housing approach and providing a reliable low-carbon heat source. Solar thermal may offer supplementary hot water, while ground source heat pumps (GSHPs) could be explored subject to geological investigations and cost.

Other technologies were found unsuitable, including CHP, water-source heat pumps, hydropower and micro-wind, all limited by policy or site conditions. There is no existing heat network serving Arborfield Green that the development could connect to; a new heat network is not the preferred heating solution.

7 Sustainability Checklist

7.1 Introduction

This section presents the completed Sustainability Checklist, prepared in accordance with Wokingham Borough Council's Sustainable Design and Construction SPD (Appendix 4). The Checklist draws on evidence from the project team to demonstrate how the development proposals and masterplan respond to the Council's sustainability requirements. Where specific criteria cannot be fully met, clear justification is provided. The Checklist should be read alongside the technical work submitted with this application, which provides further detail on the measures adopted to deliver a sustainable development.

7.2 Measuring and demonstrating sustainability, sustainable design and energy efficiency

Sustainability standard	Summary response	Relevant documents and/or sections
Has the development been designed to optimise the use of energy from the sun?	The development aims to optimise energy from the sun. The massing, orientation and the glazing strategy will be designed to take advantage of passive solar gains and natural daylight during winter months, while limiting overheating risks in summer. Where feasible and necessary to achieve the carbon targets, solar renewable energy systems may be provided. This would most likely comprise roof mounted solar photovoltaic systems, as well as potentially solar water heating, with final specifications being confirmed at the detailed design/Reserved Matters stage.	Energy and Sustainability Statement, Section 6.
Has the development been designed to optimise natural ventilation?	At this outline stage, Crest Nicholson has allowed flexibility within building heights and spacing to enable cross-ventilation to be considered at detailed design. A full overheating assessment in accordance with Part O will be undertaken at the detailed design/ Reserved Matters stage. Ventilation systems will be considered in accordance with the cooling hierarchy, prioritising passive and low-carbon design measures (like natural ventilation) over energy-intensive active cooling.	Energy and Sustainability Statement, Section 4.7.
How will the design of the building make efficient use of energy?	The development will be designed to be energy efficient, through application of the energy hierarchy, specifically the implementation of the "Be Clean" principle. The development will likely integrate air source heat pumps as the primary	Energy and Sustainability statement, Section 4.

	heating system, alongside high efficiency HVAC systems, lighting using low energy solutions and smart controls, and all appliances will be specified as electric. Additional specific heating and hot water technologies will be confirmed at the detailed design stage.	
Has the development met the necessary mandatory Code for Sustainable Homes/ BREEAM level requirements?	The Code for Sustainable Homes was withdrawn in 2015, following the Housing Standards Review, with standards consolidated into the building regulations. Therefore, it is not applicable to the Proposed Development. The Proposed Development is primarily residential. However, opportunities for using the BREEAM standard for any non-domestic uses will be considered at the detailed design/ Reserved Matters stage.	Energy and Sustainability Statement, Section 3.3 (updated Building Regulations), 4 (Energy Efficiency), 6 (Renewable and Low Carbon technology), 4.7 (Overheating mitigation).
Has the development considered being built to a level above the mandatory Code for Sustainable Homes/ BREEAM requirements?	As noted above, the Code for Sustainable Homes was withdrawn in 2015 and is not applicable to the Proposed Development. Opportunities for using the BREEAM standard for any non-domestic uses will be considered at the detailed design/ Reserved Matters stage. The dwellings will strive to improve upon the requirements of the current Approved Document L1 (2021) 'Conservation of fuel and power' and meet the emerging Future Homes Standard.	Energy and Sustainability statement, Section 3.3 (updated Building Regulations), 4 (Energy Efficiency), 6 (Renewable and Low Carbon technology), 4.7 (Overheating mitigation).
For mixed use developments, have you contacted the BRE who could help produce a bespoke assessment?	The Proposed Development is primarily residential. However, opportunities for using the BREEAM standard for any non-domestic uses will be considered at the detailed design/ Reserved Matters stage. Where necessary, the BRE will be contacted at this later stage.	N/A

7.3 On site renewable/energy generation

Key Consideration	Comment	Relevant documents and/or sections
How has the generation of energy from decentralised, renewable or low carbon technologies been considered?	A technology feasibility appraisal has been carried out considering appropriate low carbon and renewable energy technology implementation at the Proposed Development. This has highlighted multiple opportunities for the generation of energy from low carbon and renewable sources, including the potential for using PV panels, solar water heating, and air source heat pumps.	Energy and Sustainability Statement, Section 6.
How will the development (where viable) incorporate decentralised, low carbon or renewable energy technologies to satisfy the at least 10% requirement (for major development) of Policy NRM11 of the South East Plan?	The South East Plan was abolished in February 2013. The Wokingham Borough Managing Development Delivery (MDD) Local Plan (2014) instead contains Policy CC05: Renewable Energy and Decentralised Energy Networks, stating the requirement for “proposals to deliver a minimum 10% reduction on carbon emissions from renewable and low carbon technology”. To ensure that the development meets this requirement, a PED assessment has been conducted, hence demonstrating the baseline energy demand for Barkham square against which compliance with Policy CC05 can be measured. Alongside the technology feasibility appraisal, the detailed design/Reserved Matters stage will consider specific low-carbon and renewable technologies, enabling an accurate assessment of how the 10% requirement will be met.	Energy and Sustainability Statement, Section 3.4.2 (Relevant Policy), Section 5 (Energy Demand Assessment), Section 6 (Renewable energy and low carbon technology).
Has an energy statement been produced to satisfy the requirements of the Developers Guidance note for the 10% renewable Energy requirement of the South East Plan policy NRM11? The Energy Statement could form part of a wider sustainability statement or the	The South East Plan was abolished in February 2013. The Wokingham Borough MDD Local Plan (2014) contains Policy CC05: Renewable Energy and Decentralised Energy Networks, stating the requirement for “proposals to deliver a minimum 10% reduction on carbon emissions from renewable and low carbon technology”. In response to this, an Energy & Sustainability Statement (this document) has been produced, considering how the proposed development will implement the energy hierarchy (including onsite renewable and low carbon energy generation) to achieve these targets.	Energy and Sustainability Statement.

design and Access
statement.

7.4 Water resource management

Sustainability Standard	Summary Response	Relevant documents and/or sections
How will the development incorporate the use of water saving devices to achieve water efficiency?	Crest Nicholson ensures their homes are designed to use less than 105 litres per person per day ²³ . This is typically achieved through homes incorporating water-saving features such as dual-flush toilets, low-flow taps and showers and water meters, helping to reduce household water consumption. Details of specific water saving devices will be confirmed at the Reserved Matters stage.	Protecting the Environment webpage, Crest Nicholson
Has the development considered incorporating water efficiency measures to achieve internal potable water consumption of 105 litres per person per day?	Yes, the Applicant aims to achieve less than 105 litres per person per day. Water efficiency calculations have not yet been completed at this outline planning stage. These calculations will be provided once residential housing designs have been developed.	Protecting the Environment webpage, Crest Nicholson
How will the development incorporate harvesting and reuse of rainwater?	Rainwater harvesting and reuse opportunities on site will be explored at the Reserved Matters stage. This may, for example, include the use of water butts, which save mains water by collecting and storing rainwater for garden and outdoor use.	N/A
How will the development incorporate the reuse, collection and treatment of grey water?	As above, it is likely the primary strategy would be to use rainwater recycling systems such as water butts. Grey water recycling opportunities on site will be explored at the Reserved Matters stage, where appropriate.	N/A
Has the design considered the use of SUDs and how will they be incorporated	The Flood Risk Assessment and Drainage Strategy applies the drainage hierarchy, incorporating SuDS measures such as living roofs, rain gardens,	Flood Risk and Drainage Strategy, Ardent Consultants

²³ [Protecting the Environment | Crest Nicholson](#)

and maintained in the development?

and permeable paving to sustainably manage surface water runoff.

7.5 Flood risk management

Sustainability Standard	Summary Response	Relevant documents and/or sections
Is the development designed to be resilient to flooding?	Flood risk for the development has been assessed, with most sources of flooding assessed as low, hence minimal measures for resilience are needed. A sustainable drainage system has been designed to incorporate permeable paving (subject to Master Planning), basins and manage surface water runoff, increasing the developments resilience to pluvial flooding, and reducing the risk of pluvial flooding to low.	Flood Risk Assessment and Drainage Strategy, Ardent Consultants
Has the development considered the change in flood risk over the lifetime of development because of climate change?	Yes, for relevant locations within the site which are within Flood Zones 2 and 3 associated with the Barkham Brook. Peak rainfall and peak river flow based on future projections under climate change (CC) have been calculated and considered in determining what level of allowance surrounding potential flood zones should be required within the proposed development. Hydraulic model data obtained from the Environment Agency confirms that the development will not be within the flood extent for the 100 year + CC extent for the central or higher central allowances.	Flood Risk Assessment and Drainage Strategy, Ardent Consultants
Have all sources of flood risk been considered?	Yes, as examined in the Flood Risk Assessment and Drainage Strategy: tidal, fluvial, pluvial, sewer, groundwater and artificial flooding. The Environmental Impact Assessment further considers water and flood risk, identifying no significant risks to or due to the proposal.	Flood Risk Assessment and Drainage Strategy, Ardent Consultants Environmental Impact Assessment, Environmental Statement, Rapleys
Where required, has a FRA or Surface Water Drainage Strategy been produced?	Yes – a Flood Risk Assessment and Drainage Strategy has been produced due to the presence of Barkham Brook.	Flood Risk Assessment and Drainage Strategy, Ardent Consultants

Has appropriate consideration been given to surface water and drainage issues – including SUDs and green roofs?	The Flood Risk Assessment and Drainage Strategy follows the drainage hierarchy, incorporating SuDS such as living roofs (subject to Master Planning), rain gardens, and permeable paving (subject to Master Planning) to manage surface water sustainably. The Environmental Impact Assessment and Masterplan Framework Document also notes incorporation of attenuation basins and Conveyance Swale in the proposal to manage drainage.	Flood Risk Assessment and Drainage Strategy, Ardent Consultants Environmental Impact Assessment, Environmental Statement, Rapleys Masterplan Framework Document, Crest Nicholson
How will the design ensure that run-off from the site will not increase, or where possible be reduced, as a result of the development?	There has been assessment of existing drainage provided by the site, alongside surface water management proposed as part of the surface water management strategy. These measures help to ensure that run-off is not altered due to the development.	Flood Risk Assessment and Drainage Strategy, Ardent Consultants

7.6 Biodiversity

Sustainability Standard	Summary Response	Relevant documents and/or sections
How have the wildlife habitats and natural features on and adjacent to the site been considered and how will they be retained, protected and enhanced?	Wildlife, habitats and natural features on and around the Proposed Development have been considered via a range of ecological surveys of habitats, reptiles, dormouse, bats, invertebrates, breeding birds, great crested newt, white-clawed crayfish, and riparian mammals. Buffers have been incorporated into the masterplan of 15 m from woodland edge with no development near ancient woodland. An Arboricultural Implications Report has also been conducted to further consider and assess the impacts of the proposals on ancient woodland and existing trees. This has identified that there are negligible incursions into existing ancient woodland buffer zones, and no impact on existing trees of notable or high biodiversity value. Root Protection Areas of trees to be retained have also been considered, and	Preliminary Ecological Appraisal, CSA Environmental Consultants and species specific surveys by RPS as per Technical Appendices 8.2 – 8.10 of the Environmental Statement Arboricultural Implications Report, SJA trees Suitable Alternative Natural Greenspace (SANG) Landscape

	measures recommended in a Tree Protection Plan to prevent long term damage. As the area falls within the Thames Basin Heaths SPA, the Site has, as required, incorporated SANG into the masterplan that would provide the necessary walking routes and nature. In regards to ponds and hedgerows, which are Habitats of Principal Importance (HPI) , the existing pond has been incorporated into the SANG along with much of the hedgerow being retained. Additional to this, the Barkham Brook watercourse will be retained within the Proposed Development. Maintenance of the SANG is further supported as part of the proposal by the Suitable Alternative Natural Green Space (SANG) Landscape Management Plan. The Proposed Development also has the potential to provide a number of ecological opportunities, including more structured ecology surrounding the brook and ancient woodland, incorporating additional features of ecological value as part of the SANG, and to use one or both of site parcels B/C as ecological enhancement. This has been assessed through a Biodiversity Net Gain Assessment, indicating the potential for the development proposals to deliver net gains for habitats, hedgerows and watercourses.	Management Plan, RPS
Has an ecological assessment, where a significant impact on biodiversity is likely or probable, been carried out?	There has been a preliminary Ecological Appraisal undertaken.	Preliminary Ecological Appraisal, CSA Environmental Consultants

7.7 Waste, recycling and composting facilities

Sustainability Standard	Summary Response	Relevant documents and/or sections
How will the development provide, or have access to appropriate facilities	The Proposed Development will include appropriate facilities and storage to align with WBC's established waste collection practices, ensuring effective and sustainable waste	N/A

for the storage and collection of waste?	management. Further details will be provided at the Reserved Matters stage. At present, these comprise fortnightly general waste collections using black wheeled bins (or blue bags for properties without bin access), fortnightly recycling collections via green recycling bags, and weekly food waste collections using kitchen caddies and outdoor bins. In addition, residents may opt into a chargeable garden waste service, collected fortnightly through brown bins or sacks.	
How will the development incorporate provision for on-site composting, green waste and sink macerators?	As noted above, WBC provides weekly food waste collections using kitchen caddies and outdoor bins. Residents may also opt into a chargeable garden waste collection service. Sufficient space and facilities will be provided to accommodate these waste collection practices. Opportunities for other measures, such as composting bins in private gardens, could be considered at the Reserved Matters stage.	N/A
Has an audit of the materials present on the site been conducted with an assessment of the extent to which materials could be reused?	The site comprises undeveloped agricultural land, therefore there is limited opportunity for building material reuse.	N/A
How will the development make the maximum use of construction and demolition waste?	The development will optimise construction and demolition waste in line with the waste hierarchy. Efficient design and procurement will minimise waste, with suitable materials such as soils and aggregates reused on site where possible. Remaining waste will be segregated and sent to licensed recycling facilities, with contractors required to follow a Site Waste Management Plan to ensure effective monitoring and recovery of resources. Further details will be provided at the Reserved Matters stage.	N/A
How will the development make maximum use of recycled materials?	The development will promote the use of recycled materials by specifying products with high recycled content, such as aggregates, concrete, insulation and finishes where possible.	N/A

	Procurement will prioritise responsible suppliers, and where feasible, materials recovered from construction and demolition will be reused on site to reduce reliance on virgin resources and minimise environmental impact. Further details will be provided at the Reserved Matters stage.	
How will provision be made for the storage and recycling of waste for all users of the site?	Provision will be made for the storage and recycling of waste for all users of the site through well-designed, accessible and clearly designated storage areas. These will accommodate general waste, recycling, food waste and, where appropriate, garden waste in line with WBC's collection system. Facilities will be conveniently located to encourage recycling, with sufficient capacity for the scale of development and unobstructed access for collection vehicles, ensuring effective and sustainable waste management. Further details will be provided at the Reserved Matters stage.	N/A

7.8 Sustainable transport

Key Consideration	Comment	Relevant documents and/or sections
Requirement for developments to provide or have existing access to appropriate facilities for secure and covered cycle storage and changing / drying facilities	There will be appropriate cycle parking facilities provided. The details of cycle parking will form part of the Reserved Matters application/s. As the development is primarily residential, there will not be dedicated provision for showering/drying (beyond that provided within private dwellings). The design and provision will align with the standards set out in the Wokingham Borough Council Parking Standards Study Report.	Barkham Square Masterplan Framework Document, Crest Nicholson

7.9 Health, Safety and well-being

Key Consideration	Comment	Relevant documents and/or sections
How will the development address issues of air, noise and light pollution to minimise their impact?	Potential air quality impacts have been considered in an Air Quality Impact Assessment completed by Create Consulting. This highlights the potential for air quality impacts during construction due to fugitive dust emissions. To mitigate this, good practice dust control methods are recommended, which would lead to negligible air quality impacts. Additional mitigation methods for both the construction phase and operation phase have also been highlighted in the Air Quality Impact Assessment to help reduce air pollution. Further details will be specified at the Reserved Matters stage. To address noise pollution, Create Consulting has undertaken a baseline background noise survey / noise risk assessment. From this survey noise level change due to the development have been identified alongside potential mitigation measures to be considered at the Detailed Design/Reserved Matters Stage. Details on light pollution are to be considered at the Reserved Matters stage.	Noise Impact Assessment, Create Consulting Air Quality Impact Assessment, Create Consulting
Has evidence been provided on the measures that will enable developers to meet their obligations in respect of land affected by contamination?	The Site has been assessed for potential land contamination, including both general and specific contaminants, as well as risks associated with historical landfill and past land uses. Based on these findings, a ground investigation has been conducted to inform appropriate remediation measures.	Phase 1 Desk Study, GRM
Has an assessment of existing levels of pollution been produced, where significant impacts from pollution to or from the proposed development is likely or probable?	Yes – an assessment has been undertaken of existing pollution levels, including historical pollution incidents, as well as the potential risks of pollution arising from the proposed development during both construction and operational phases.	Phase 1 Desk Study, GRM

How has the design and layout incorporated measures to reduce the need to travel, especially by car, and promoted alternative and sustainable modes of transport such as walking, cycling and the use of public transport?	The Proposed Development has been designed to integrate into and enhance the existing walking, cycling and public transport routes. This includes connections to the existing local public right of way network for leisure journeys. The development is located in proximity to existing and future bus services and is within walking and cycling distance of local facilities and services within Arborfield Green. For journeys further afield to nearby towns including Wokingham and Reading, these will be encouraged by public transport. The internal site layout will be designed to suitably and safely accommodate pedestrian and cycle movements, which will be developed as part of the detailed design/ Reserved Matters stage.	EIA scoping submission, Rapley's Consultants Barkham Square, Wokingham: TA Scoping Note, i-Transport Consultants
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7.10 Sustainable construction

Sustainability Requirement	Summary Response	Relevant documents and/or sections
Will the development use responsibly sourced and recycled materials?	Crest Nicholson's supply chain policy ²⁴ functions in combination with their sustainability policy to ensure responsibly sourced and recycled material use throughout their supply chains. Further development specific details will be confirmed at the Reserved Matters Stage.	Supply Chain Code of Conduct, Crest Nicholson Sustainability Policy, Crest Nicholson
Will the development use locally sourced materials, preferably within 35 miles?	To be confirmed at the Reserved Matters Stage.	N/A
Will the development achieve a minimum target of 25-30% of roads, pavements, public spaces and car parks to be from locally reclaimed or recycled materials in line with good practice?	To be confirmed at the Reserved Matters Stage.	N/A
Will the development ensure that any	Yes. Materials will be sourced from verified sustainable sources such as the Forest	Crest Nicholson's Sustainable Timber

²⁴ [Supply Chain Code of Conduct](#)

timber comes from certified sources, with a minimum target of 75% expected to be achieved in line with good practice?	Stewardship Council (FSC), the Programme for the Endorsement of Forest Certification (PEFC) and BES 6001 Framework Standard for Responsible Sourcing ²⁵ .	Policy, Crest Nicholson
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²⁵[Sustainable Timber Policy](#)

8 Conclusions

The Barkham Square development presents a coherent and policy-compliant energy strategy that supports the transition to a low-carbon residential environment, aligning with national planning objectives, Wokingham Borough Council requirements and the emerging Future Homes Standard.

The adoption of the energy hierarchy ensures that energy demand is first minimised through a fabric-first approach, before being met through efficient and low-carbon systems. While a range of heating and renewable technologies has been appraised, air source heat pumps and roof-mounted photovoltaic panels are anticipated as the primary solutions at this stage, forming the backbone of the scheme's low-carbon strategy. At the same time, the approach remains flexible, allowing for refinement and optimisation at Reserved Matters stage, including consideration of other complementary technologies where viable.

The integration of on-site renewables is expected to enable the development to meet, and potentially exceed, the 10% carbon reduction requirement set out in Policy CC05. This will be supported by detailed SAP modelling and further feasibility assessment as the design progresses.

The Sustainability Checklist confirms that Barkham Square adopts an integrated and comprehensive sustainability framework that complements its energy strategy. It demonstrates how the development addresses key sustainability considerations, including water efficiency, SuDS, biodiversity net gain, sustainable materials, waste management, climate resilience and sustainable transport. This coordinated approach ensures that environmental performance and long-term sustainability are embedded throughout the development, supporting the delivery of a resilient and policy-aligned residential community.

Overall, Barkham Square represents a robust, adaptable and forward-looking low-carbon development, balancing technical feasibility, policy compliance and long-term environmental responsibility.

Appendix A: Review of Renewable and Low Carbon Technologies

Introduction

Renewable and low carbon technologies can provide heat or power to buildings. Compared with conventional systems, renewable technologies offer GHG reductions because they displace the use of fossil fuels or grid electricity. Low carbon technologies do not necessarily use renewable energy but reduce GHG emissions because they are much more efficient and/or because they utilise waste heat.

Solar photovoltaics (PV)

Description: Photovoltaic (PV) panels convert solar energy into electricity at a relatively low efficiency conversion rate of 6 to 24%. PV can be installed as a standalone, ground-mounted system, or integrated into the built environment as part of a roof, façade, streetlight or other structure. They operate optimally when installed in a southerly orientation, at 15° to 45°. Electricity generated by PVs will be directly connected to dwellings.

PV only generates electricity intermittently when the sun is shining. The electricity that is produced can be used on-site to power lights, heating systems and other appliances. Alternatively, it can be stored in batteries or exported to the grid. Roof-mounted PV typically provides power to an individual building; ground-mounted arrays could supply electricity to multiple plots. PV panels require low maintenance, and zero-carbon electricity, which offsets the grid electricity, providing considerable carbon savings.

Individual building solution?	Yes	Multi-plot solution?	No
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Space requirements: PV can in principle be installed on any unshaded surface, but the amount of electricity generated per year depends on the orientation and angle of the array. In the UK, the output per panel is highest when the panels face due south and are tilted at 30-35 degrees from horizontal. However, it is possible to generate much more electricity on a building of the same footprint by adjusting the roof geometry and increasing the panel area.

A south-facing mono pitched roof that is designed for maximum PV could generate up to twice the amount of electricity of a dual pitched roof, and three or four times as much as a flat roof that is overshadowed by a parapet. PV can be co-located with solar water heating (SWH) technologies (see below) although will compete for roof space. Roofscapes also need to respond to local character, streetscape and street design.

Solar water heating (SWH), sometimes referred to as 'solar thermal'

Description: Solar water heating (SWH) technologies convert solar energy into heat, which in turn can provide hot water and/or space heating to a building. It is a mature technology which is widely used throughout the world, although less common in the UK.

Solar collectors in a SWH system contain a fluid (typically a mix of water and glycol) which is warmed by the sun. The fluid is then pumped through a coil within a water cylinder, where it heats the water that supplies hot water and/or space heating.

As with PV, SWH systems can be ground-mounted, but are more commonly installed on roofs. The output depends on how much sunlight is received, so they produce heat intermittently and only during daylight hours. Hot water can be stored in a water cylinder on a timescale of hours/days, but

unlike electricity, which can be exported in times of surplus, it typically must be used on-site. The technology is therefore particularly suitable for commercial or industrial applications where there is demand for hot water around the time when the sun is shining brightest.

Individual building solution? **Yes**

Multi-plot solution? **Not typically**

Space requirements: Systems are usually sized to meet around 50% of domestic hot water demand. For a typical house, this could be achieved with c. 4m² of solar collectors which would be located on a south-facing roof slope. SWH can be co-located with PV although will compete for roof space. Internally, there would need to be space for a hot water cylinder, requiring a suitable cupboard or loft.

Heat pumps

Description: Heat pumps are not a renewable technology per se, but they can make use of renewable electricity, and they offer much greater efficiencies than traditional heating systems, so they are considered low carbon heating solutions.

In a traditional boiler, a fuel (such as natural gas) is burned to heat water. During this process, some energy will be lost to the surroundings. Only about 85-90% of the energy used by the boiler is converted to useful heat within the house; this is referred to as the efficiency. Heat pumps, on the other hand, can provide 2 to 4 times more useful heat to the house than the amount of energy they need to run. This ratio is called the seasonal coefficient of performance (SCOP). A heat pump with a SCOP of 2.0 can be thought of as being 200% efficient, a SCOP of 4.0 would be 400% efficient, and so on.

Buildings constructed to the FHS will have significantly lower GHG emissions than those constructed today. Once those standards are introduced, heat pumps are expected to be the most common form of heating in new builds, as they are so efficient.

Heat pumps can be used within individual buildings or provide heat to a communal or district heating system.

Individual building solution? **Yes**

Multi-plot solution? **No**

There are a range of heat pump technologies which have different characteristics, benefits, and applications. These are discussed below.

Air source heat pumps (ASHPs)

Description: ASHPs extract heat from the surrounding air and transfer this to water, which can then be used in a central heating system with radiators or underfloor heating. Alternatively, they can transfer the heat to air, which can then be conveyed around the building through a ventilation system.

ASHPs typically have coefficient of power (energy saving ratio) of 2.5-3.5. This means that for every 1kWh of electricity that they use, they supply 2.5-3kWh of useful heat.

The benefits of heat pumps over conventional gas and electric heating relates to the coefficient of power they have where 1 unit of electricity produces 2.5-3.5 units of heat, therefore being more efficient.

Space requirements: To install an ASHP, there needs to be sufficient outdoor space for a fan unit to be installed, either on the roof or adjacent to the building. They look similar to air conditioning units. For a domestic property, these are usually around 1-1.5m high and 0.5-1m wide. When the ASHP is in operation, the fan makes a low noise that will require consideration at detail design.

Ground source heat pumps (GSHPs)

Description: GSHPs extract heat that is stored underground and transfer this to water, which can then be used in a central heating system with radiators or underfloor heating.

There are different types of GSHPs, which can be simplified into horizontal or vertical systems. In a horizontal GSHP, pipes are laid within shallow trenches. This is an inconvenient option for retrofits, as it would require digging up a large area of garden but can be successfully adopted in new build developments as part of the site preparation work. An alternative, which is particularly useful where space is constrained, is to run the pipework vertically through a borehole. This solution is generally more expensive and specialist surveys must confirm that the underlying geological conditions are suitable.

GSHPs typically have SCOPs of 3.5-4.0. This means that for every 1kWh of electricity that they use, they supply 3.5-4kWh of useful heat. Both GSHPs and ASHPs offer radical improvements in efficiency compared with gas boilers, but the difference in their performance is still significant, as a GSHP could reduce the energy consumption for heating by 25-50% compared with an ASHP. Despite the higher cost of individual GSHP systems, this is still an important benefit to consider.

Although the upfront costs of GSHPs are higher than ASHPs, they provide occupants with even lower energy bills because of their higher efficiencies.

Space requirements: The space requirements of GSHPs depend on the heat demand of the property and the underlying geological conditions. A horizontal loop system will require several hundred square meters of land to heat a single house. A general rule of thumb for existing properties is that a GSHP would require 2.5-3 times as much land area as the floor area of the property itself, but for modern, energy efficient homes, this ratio could be much less.²⁶ For vertical GSHPs, a typical borehole might be 110-150mm in diameter with a depth of 60-100m. Larger houses may require multiple boreholes.²⁷

Unlike ASHPs, GSHPs do not require a unit to sit outside of the property, and there is no noise from fans. The indoor GSHP unit will typically include the hot water cylinder. They are roughly the size of a large (American style) refrigerator.

In terms of site layout of loops or boreholes, a feasibility assessment would need to be undertaken to assess the thermal conductivity of the mudstone bedrock measures the site resides under the site.

²⁶ <https://energysavingtrust.org.uk/air-source-heat-pumps-vs-ground-source-heat-pumps/>

²⁷ Note that, depending on ground conditions, there may be a limit to the number of boreholes that can be installed in a given area, to avoid thermal interference with aquifers.

Water source heat pumps (WSHPs)

To install a WSHP in a new development, the site must include (or be in close proximity to) a suitable water body, such as a river, canal, or lake. The higher the heat demand, the larger the body of water that is required.

District heat network (DHN)

Description: In a DHN, multiple properties are connected to one or more heat sources via a network of insulated pipes, which provide energy for space heating and/or hot water. DHNs in the UK most commonly use biomass or gas-fired boilers or combined heat and power (CHP) systems, although they could also be connected to large-scale heat pumps. Alternatively (or additionally), they can utilise waste heat from commercial or industrial facilities, waste incineration facilities, wastewater treatment plants, crematoria, and so on.

Over the past 15 years, the Government has supported the use of gas-fired DHNs because they could provide lower carbon heat and power when compared with grid electricity. However, carbon emissions from grid electricity have decreased substantially during that time, due to the phase-out of coal and uptake of renewables. Therefore, gas-fired systems no longer offer carbon savings compared with electric lead technologies, which is reflected in the updates to the Government's Standard Assessment Procedure.

Low temperature heat networks supplying heat from centralised heat pump systems are technically available to new home developments. Such networks are best suited to high density development such as apartments. If future plans include high density development an appraisal of the use of community scale low temperature heat networks would be required.

No existing network serves Arborfield Green or Barkham Square. A new heat network is not the preferred heating solution for the Proposed Development on the basis of cost.

Individual building solution?

No

Multi-plot solution?

No

Space requirements: A typical heat network scheme would include a dedicated building (often called an 'Energy Centre') to house the heating equipment. The heat would then be piped around the network. Within each property, a heat interface unit (HIU) acts as a link between the DHN and the heating system. HIUs are roughly the same size as boilers and allow users to control their heating and hot water in the same way.

Wind

Description: Wind turbines convert kinetic energy into electricity. The stronger the wind, and the larger the turbine, the more electricity is produced. Wind turbines are usually mounted on a pole in a standalone location, although smaller turbines can be mounted on the roof of a building. Because they are raised off the ground, wind turbines are highly visible; some people consider this undesirable or unsuitable in certain settings.

Wind turbines work best when the flow of wind is laminar (i.e. smooth). Buildings and trees disrupt the flow of wind, which means that wind turbines work best when they are sited away from such obstacles. As a result, they are not generally integrated into new developments, but tend to be sited in windy locations such as exposed hill sides. This is primarily due to concerns about cost effectiveness, rather than physical or technical constraints.

The electricity generated by wind turbines can be used to power an individual building or multiple plots.

Individual building solution?

No

Multi-plot solution?

No

Commercial-scale wind energy (along with solar PV) is the cheapest form of electricity generation in most countries. However, since 2015, large-scale wind turbines are only permitted in areas that are designated in a local development plan as being 'suitable'.²⁸

For occupants, wind turbines offers multiple financial benefits:

- When the electricity is used on-site, they save money on energy bills; and
- When electricity is exported to the grid, households (or businesses) can receive payment from electricity suppliers as part of the Smart Export Guarantee (SEG).

Space requirements: Wind turbines come in a range of scales, from small turbines with blades half a meter across, to ones that reach more than 150m into the air.

Biomass

Biomass heating system sections generate heat from sustainably sourced biomass, such as wood pellets, chips, or logs. These systems can be fully automated or semi-automated, and may use direct combustion, gasification, combined heat and power (CHP), anaerobic digestion, or aerobic digestion to produce heat.

A biomass boiler uses a wood-burning stove to heat the wood fuel, which is either manually or automatically fed in depending on the system. The heat produced can be used to warm a single room or to power central heating and hot water boilers. Some systems may also be fitted with a back boiler to provide water heating. These systems represent a combination of our earliest heating systems with modern-day technology, offering a renewable and lower carbon option for heating.

Due to transport impacts from deliveries and air quality impacts, whole site use of biomass may not be preferential. Further detailed air quality modelling and transport assessment would be needed to assess if required at detail design.

Hydropower

There are no significant waterbodies in the area, so this technology is assumed to have no potential. It has not been considered further.

²⁸ <https://www.parliament.uk/globalassets/documents/commons-vote-office/June-2015/18-June/1-DCLG-Planning.pdf>



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