

BUILDINGS AND BUILT ENVIRONMENT

Richborough Estates Limited
Spencers Wood
Wokingham

Energy and Sustainable Design Statement

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EXECUTIVE SUMMARY

This Energy and Sustainable Design Statement has been produced in support of a planning application for the Proposed Development known as Spencers Wood, Wokingham in accordance with Wokingham Borough Council's adopted Core Strategy (2010) Policy CP1 (Sustainable development) and the Managing Development Delivery Document (2014) Policies CC04 and CC05, following the guidance detailed in the Sustainable Design and Construction SPD (2010), Developers Guidance Note for Renewable Energy Requirement (2010) and the Climate Change Interim Policy Position Statement (2022).

This Energy Statement sets a framework for the energy and sustainable design strategy for the development Site and outlines the Site's approach to energy efficiency, renewable energy generation and sustainable development incorporating climate change resilience and carbon management measures. It summarises the key planning policy which is pertinent at the time of writing and is aimed at satisfying both energy and sustainable design related requirements. The development will follow the new Part L (2021) standard to ensure the Proposed Development is future proofed for the longer term and ready to meet the Future Homes/Buildings Standard.

ENERGY SUMMARY

The Proposed Development will adopt the use of an energy hierarchy and a holistic approach to sustainability to meet National best practice guidance and Wokingham Borough Council's objectives for energy consumption reduction, carbon dioxide emissions [CO₂] reduction and sustainable design and construction. The energy hierarchy aims to reduce energy demand and carbon dioxide emissions through passive design measures and a 'fabric first' approach (Be Lean) before seeking to reduce the remaining demand by the cleanest means possible. This includes exploiting local energy resources/supplying energy efficiently and cleanly (Be Clean), and finally exploring the opportunities for producing, storing, and using renewable energy on-Site (Be Green).



Be Lean Summary: The Proposed Development envelope and services will be specified in accordance with the new Part L (2021) of the Building Regulations to ensure energy consumption via space heating and cooling is reduced. Passive solar consideration will also form an integral part of the Proposed Development design to ensure excessive solar gains and heating/cooling loads are reduced, hence providing a more comfortable internal environment for occupants. The final fabric specification, building services specification and provision of energy efficiency measures including measures to alleviate any potential risk of overheating will be confirmed at the Reserved Matters stage and via Part L 2021 energy modelling and Part O 2021 overheating assessment of the proposal.

Be Clean Summary: A feasibility study on connecting to a district heating network has been conducted for the Proposed Development site. The results show that there are no operational or planned district heat networks within 500m of the site. The suitability of a new site-wide heat network such as a Centralised Air Source Heat Pump Energy Centre can be considered for the Proposed Development site, however due to the size of the Proposed Development, this can be discounted as the proposed site is not large enough in scale to justify a new centralised heat network.

Be Green Summary: The feasibility of renewable energy generation concluded that the most appropriate recognised on-site renewable energy technologies with high to medium opportunities for the Proposed Development Site are Solar Photovoltaic (PV), Air Source Heat Pump, Solar Hot Water, Wastewater Heat Recovery, and Ground Source Heat Pump. Technologies with low opportunities such as Wind Turbine, Biomass, Water Source Heat Pump, Small Scale Hydro Power, Geothermal, Transpired Solar Air Collector, Waste Heat, Hydrogen Fuel and Wave/Tidal Power etc have been discounted at this stage based on a balanced consideration of the policy requirements, financial viability, and technical feasibility.

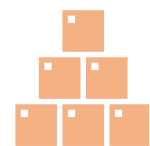
The specified technology/technologies in line with the recommendations of the feasibility study will be confirmed at the Reserved Matters stage and via Part L (2021) energy modelling of the proposal. The exact percentage reduction in terms of energy and/or CO₂ emissions will be in accordance with the National and the Local Authority (Wokingham Borough Council's) policy requirement/target. Energy storage will also be considered as part of the renewable energy technologies for optimising system performance and balancing surplus electrical/thermal energy production.

The above energy strategy has been developed in line with Policy CP1 (Sustainable development) of Wokingham Borough Council's adopted Core Strategy, Policies CC04 and CC05 of the Managing Development Delivery Document, and guidance detailed in the Sustainable Design and Construction SPD, ensuring a minimum 10% carbon emission reduction relative to the Part L Target Emissions Rates. It also details various strategies for the Proposed Development to deliver a sustainable and low carbon building design driven by innovative technologies at the Reserved Matters stage.

SUSTAINABLE DESIGN AND CONSTRUCTION SUMMARY

In addition to the energy and CO₂ emissions savings opportunities identified above, the Principal Contractor shall register with the 'Considerate Constructors Scheme' (CCS) and shall seek to achieve an excellent CCS overall score in all categories, including but not limited to:

Material: The aim of the Proposed Development will be for its overall environmental impact to be minimised through the specification of sustainable materials. This will include using sustainable building materials and products and ensuring all timber and timber-based products used on the project are legally harvested and traded timber.



Water: The Proposed Development will aim to reduce water consumption during occupation through a range of water efficiency measures such as dual flush WCs; water meter; low flow fittings and fixtures, etc. Water butt installation and the consideration of other rainwater harvesting measures will also be considered to further improve the overall water performance of the Proposed Development, as well as reduce surface run off.



Waste: The Development will ensure consideration is given to sustainable waste management options. In accordance with the principles of the waste hierarchy, the Site will make provision for the storage of non-recyclable waste and recyclable waste including dedicated storage to encourage the recycling of waste materials.



Sustainable Transport: The Proposed Development will ensure the principles of sustainable transport hierarchy have been met by prioritising sustainable modes of transport (walking, cycling and public transport) ahead of cars wherever feasible. As well as providing the infrastructure requirement for EV charging points.



Pollution: The Proposed Development will not result in a significant increase in pollution (into the air, soil, or any water body) by virtue of the emissions of fumes, particles, effluent, smell, heat, light, noise, or noxious substances.



Overheating: To minimise the risk of overheating, the Proposed Development will utilise appropriate overheating mitigation measures [including shading (overhang) and glazing with low g-value] and will also consider mechanical ventilation with heat recovery (MVHR) system where appropriate.



Biodiversity: The Proposed Development Site will incorporate measures to support and enhance the environment through consideration of the existing Site, including measures to mitigate the impact of the development and enhance the Site's biodiversity net gain.



BREEAM: The Proposed Development will adhere to Policy CC04 of the Managing Development Delivery Document, ensuring that non-domestic buildings will achieve BREEAM "Excellent" certification.



There are a host of other areas of sustainability which are considered within other discipline's reports.

This Energy and Sustainable Design Statement presents a vision for the Proposed Development as Spencers Wood, Wokingham to deliver a secure, sustainable, low carbon design driven by innovative technologies, enabling the Proposed Development to achieve the National and Local (Wokingham Borough Council's) carbon and sustainable design targets whilst reducing its reliance on the UK National Grid.

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1. INTRODUCTION

Instruction

- 1.1 BWB Consulting (BWB) was instructed by Richborough Estates Limited (the Client) to carry out an Energy and Sustainable Design Statement for the Proposed Development known as Spencers Wood, Wokingham.
- 1.2 The Development Framework Plan (**Appendix 1**) denotes the extent of the application, development description is as follows:

"Outline planning permission is sought with all matters reserved for future determination, save for the means of access via Basingstoke Road, for: up to 420 dwellings (Use Class C3), an 80 bed care home (Use Class C2), 1ha of employment land (Use Class E(g), primary school (Use Class F1), local centre (Use Classes E(a), (b), (c), (f)), GP Surgery (Use Class E(e)), sports pitch and changing facility, public open space, SANG provision and associated infrastructure"

Purpose of the document

- 1.3 The purpose of this Energy and Sustainable Design Statement is to demonstrate that climate change mitigation measures will be integrated into the scheme's design and that the proposed measures are appropriate to the Site environment and energy demands of the development.
- 1.4 This document will describe the policy context to which the Energy and Sustainable Design Statement responds, before demonstrating how it is proposed to reduce the Site's energy demand and CO₂ emissions through a: lean energy efficient design (Be Lean); clean energy supply (Be Clean); and green on-site renewable energy generation (Be Green).
- 1.5 Additionally, a summary of sustainable design measures demonstrating how the Proposed Development will holistically incorporate sustainable design principles to reduce energy demand and associated carbon dioxide emissions will be provided.

Modelling Methodology (SAP and DSM Calculations)

- 1.6 Energy models using the Standard Assessment Method (SAP) and Dynamic Simulation Modelling (DSM) will be produced to predict the primary energy demand and carbon dioxide emissions from the Proposed Development. SAP and DSM are the Government adopted methodologies for calculating the energy performance of domestic and commercial buildings within the UK. Its purpose is to provide accurate and reliable assessments of both residential / non-residential buildings that are needed to underpin energy and carbon dioxide policy initiatives.
- 1.7 The tool uses building geometry, construction details, specification of heating, cooling, ventilation, lighting equipment etc to calculate the regulated CO₂ emission and primary energy consumption of buildings in compliance with Part L (2021) of the Building Regulations.

2. POLICY BACKGROUND

Introduction

- 2.1 This section of the ES reviews relevant policy at the international, national, regional, and local levels and then discusses key issues for the Statement.

Climate Change

- 2.2 Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional, and global climates. These changes have a broad range of observed effects that are synonymous with the term.
- 2.3 Changes observed in Earth's climate since the early 20th century are primarily driven by human activities, particularly fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere, raising Earth's average surface temperature. These human-produced temperature increases are commonly referred to as global warming. Natural processes can also contribute to climate change, including internal variability (e.g., cyclical ocean patterns like El Niño, La Niña, and the Pacific Decadal Oscillation) and external forcing (e.g., volcanic activity, changes in the Sun's energy output, variations in Earth's orbit).
- 2.4 Scientists use observations from the ground, air, and space, along with theoretical models, to monitor and study past, present and future climate change. Climate data records provide evidence of climate change key indicators, such as global land and ocean temperature increases; rising sea levels; ice loss at Earth's poles and in mountain glaciers; frequency and severity changes in extreme weather such as hurricanes, heatwaves, wildfires, droughts, floods, and precipitation; and cloud and vegetation cover changes, to name but a few.

United Nations Framework Convention on Climate Change

- 2.5 The international mechanism for addressing climate change is the United Nations Framework Convention on Climate Change (UNFCCC). Signed in 1992 at the United Nations Conference on Environment and Development, the Convention constitutes the foundational climate agreement that has provided the platform for most subsequent international climate agreements.
- 2.6 The Kyoto Protocol, which was signed in 1997 and which entered into force in 2005, was the first implementation of measures under the UNFCCC until 31 December 2020. The protocol was superseded by the Paris Agreement. Its supreme decision-making body, the Conference of the Parties (COP), meets annually to assess progress in dealing with climate change.

The Paris Agreement

- 2.7 The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the 2015 United Nations Climate Change Conference in 2015 and entered into force in 2016. The 196 Parties to the UNFCCC reached a landmark

agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future.

- 2.8 The Paris Agreement builds upon the Convention and for the first time brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so. As such, it charts a new course in the global climate effort. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.
- 2.9 To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century. The Paris Agreement works on a 5-year cycle of increasingly ambitious climate action carried out by countries. Countries are required to submit their plans for climate action known as nationally determined contributions (NDCs).

The Paris Agreement and Nationally Determined Contributions

- 2.10 Through the Paris Agreement, Parties also agreed to a long-term goal for adaptation – to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change.
- 2.11 The Paris Agreement (Article 4, paragraph 2) requires each Party to prepare, communicate and maintain successive nationally determined contributions (NDCs) that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

United Kingdom's (UK's) Nationally Determined Contributions

- 2.12 The UK's target under the Paris Agreement of 2015, when it shared a common plan on emissions with the EU, was for a 53% cut by 2030. However, that was widely regarded as not stretching, and the UK also had a domestic carbon budget under the Climate Change Act requiring a 57% reduction on average from 2028 to 2032.
- 2.13 In December 2020, the UK announced that it will cut its carbon emissions by 68% compared with 1990 levels before 2030, a significant increase on the current target of about 57% reductions. This represents the UK's nationally determined contribution towards meeting the Paris Agreement.
- 2.14 The UK was already committed to reducing carbon emissions to zero by 2050, with an interim target of 53%. The ambitious target would see the UK cutting emissions faster than any major economy so far and follows the advice of the government's statutory advisers, the committee on climate change, which found the costs of cutting emissions had fallen rapidly in the past few years.
- 2.15 In April 2021 at the climate summit, the U.K. government confirmed its plan to put the U.K. on course to meet its target of reaching net zero carbon emissions by 2050.

Climate Change Act

- 2.16 The Climate Change Act (2008) sets a legally binding target for reducing UK CO₂ emissions by at least 80% on 1990 levels by 2050. It established the Committee on Climate Change, which is responsible for setting binding interim carbon budgets for the Government over successive five-year periods.
- 2.17 To meet these targets, the government has set five-yearly carbon budgets which currently run until 2032. The carbon budgets restrict the amount of greenhouse gas the UK can legally emit in a five-year period. The UK is currently in the fifth carbon budget period (2028 to 2032).
- 2.18 The Climate Change Committee (CCC) has published its recommendation on the level of the Sixth Carbon Budget in December 2020. It sets the path to the UK's Net Zero emissions target in 2050, as the first carbon budget to be set into law following that commitment.
- 2.19 For the first time, this Carbon Budget will incorporate the UK's share of international aviation and shipping emissions – an important part of the government's decarbonisation efforts that will allow for these emissions to be accounted for consistently.

Planning and Energy Act

- 2.20 The Planning and Energy Act (2008) allows local planning authorities' policies to impose reasonable requirements for a proportion of energy used in developments to be from renewable and low carbon sources in the locality of the development.
- 2.21 This means local planning authorities have the power to set local energy efficiency standards for new homes that go beyond the minimum standards set through the Building Regulations.
- 2.22 For example, the local council could require developers to source at least 10 per cent of any new building's energy from renewable sources, implementing the so-called 'Merton Rule', named after the sustainable planning policy, first adopted by the London Borough of Merton.
- 2.23 It is however expected that the new planning reforms (expected to come into force in 2025) will clarify the longer-term role of local planning authorities in determining local energy efficiency standards.

UK Sustainable Development Strategy

- 2.24 The UK Sustainable Development Strategy recognises that everybody has the right to a healthy, clean, and safe environment. In 2005, the government published an updated strategy for implementing sustainable development across the UK.
- 2.25 This strategy acts as an overarching document from which a range of specific policies and legislation was derived. Although published in 2005, the strategy has taken a

recently renewed focus in light of the government's definition of Sustainable Development in the National Planning Policy Framework (NPPF).

- 2.26 One of the keys aims of this strategy is to recognise the threats of climate change and ensure that the UK develops a strategy to mitigate and adapt to this phenomenon. The document established five key principles that will underpin the national sustainable development strategy:
- i. Living within Environmental Limits;
 - ii. Ensuring a Strong, Healthy and Just Society;
 - iii. Achieving a Sustainable Economy;
 - iv. Promoting Good Governance; and
 - v. Using sound science responsibly
- 2.27 The strategy will be implemented at a national level through the development of more specific strategies at a government department or sector level.
- 2.28 With regards to planning and the built environment, this document set the basis for the development of plans and policies that promote development that mitigates and adapts to climate change.

Directive 2009/28/EC of the European Parliament and of the Council

- 2.29 The Directive 2009/28/EC of the European Parliament and of the Council on renewable energy, implemented by Member States by December 2010, sets ambitious targets for all Member States.
- 2.30 The directive, which amends and repeals earlier Directives 2001/77/EC and 2003/30/EC, creates a common set of rules for the use of renewable energy in the EU so as to limit greenhouse gas (GHG) emissions.
- 2.31 The European Union Renewable Energy Directive (Directive 2009/28/EC) sets an overall target for 20% of the energy consumed in the European Union to come from renewable sources by 2020. This overall target is divided by country, with the UK's target being 15% by 2020.
- 2.32 The UK's departure from the European Union may have major implications for future UK and EU climate policy. Although the UK Government has signalled its intention to stick to its existing carbon reduction commitments, it remains to be seen how the withdrawal of the United Kingdom from the European Union (Brexit) may impact on this.

Building Regulations

- 2.33 Whilst not planning policy, the Building Regulations and specifically Approved Document Part L: Conservation of Fuel and Power has relevance to the requirements for energy efficiency and carbon emissions of new buildings.

- 2.34 The primary mechanism for reducing carbon emissions in new commercial development is progressive changes to Part L aiming to deliver zero carbon buildings.
- 2.35 On this basis, a minimum requirement for the reduction in carbon emissions to be delivered by new buildings' is set within the Building Regulations, with each update requiring lower carbon emissions than the previous version to achieve compliance.
- 2.36 The update in June 2022 required new residential and buildings other than dwellings to achieve 31% and 27% reduction in carbon emissions over the 2013 (with 2016 amendments) Regulations respectively. This uplift is regarded as a first step towards making all buildings 'net zero ready' from 2025 when the Future Homes/Buildings Standard comes into effect, mandating a 75% reduction in emissions.

Approved Document 2021 Part L Volume 1 and 2

- 2.37 This approved document takes effect on 15 June 2022 for use in England. It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for each building is started before 15 June 2023.
- 2.38 Part L amendments introduce a new principal performance metric measuring energy efficiency. 'Primary energy' will be used in combination with CO₂ metrics to assess compliance with Part L. Primary energy calculations take into account factors such as the efficiency of the building's heating system; power station efficiency for electricity; and energy used to produce fuel and deliver it to the building.
- 2.39 This change aims to strike a balance between the commitment to reducing carbon emissions and improving energy efficiency and ensuring that the overall effect of regulation does not stifle growth. These changing national regulations will drive energy efficiency and carbon reduction improvements in new buildings. The government has stated that developers will continue to have flexibility in how they meet carbon reduction targets; but that the emphasis is on using a fabric first approach.
- 2.40 The government also published its updated Building Regulations for England which includes amendments to Approved Documents Part F (ventilation), as well as the release of a new Approved Document for overheating (Part O). They are all viewed as a part of the country's journey towards net zero and are aimed at driving energy efficiency up and carbon emissions down in residential buildings.
- 2.41 The scope of the new regulations will affect both existing and new build properties and will change how heating and ventilation is specified.
- 2.42 All new residential buildings, including care and children's homes, and student accommodation, will have to be designed to reduce overheating under changes to Part F, and with the introduction of Part O. Higher standards of ventilation will be introduced to improve IAQ and reduce the spread of airborne viruses in new non-residential buildings, including additional standards for recirculating ventilation systems in new offices, along with the compulsory installation of CO₂ monitors.

- 2.43 Amendments to Part L are focused on measures that enable a building to produce less carbon emissions and will act as an interim uplift before the stricter demands of the Future Homes/Buildings Standard come into force in 2025.
- 2.44 The new edition raises the threshold for efficiency with new requirements for insulation, thermal bridging, primary energy targets and air leakage testing requirements. In addition, there has been a change in carbon factor of electricity, meaning the use of electrically powered heating systems (especially heat pumps) is especially incentivised.

The Future Homes/Buildings Standard

- 2.45 In the 2019 Spring Statement, the UK Government's made a commitment that by 2025 they will introduce a Future Homes/Buildings Standard for new buildings to be future-proofed with low carbon heating and world-leading levels of energy efficiency. The introduction of the Future Homes/Buildings Standard will achieve a considerable improvement in energy efficiency standards for new buildings.
- 2.46 The Future Homes/Buildings Standard consultation, launched in October 2019, represented a first step in incentivising these changes by providing a clear vision for implementation and setting an ambitious uplift to the energy performance requirements in the Building Regulations for new buildings.
- 2.47 On 19 January 2021, the government published the outcome of its 2019 consultation on the Future Buildings Standard. This consultation set out the government's plans for a new green Future Buildings Standard and sought views on changes to building regulations in England to improve energy efficiency and cut carbon emissions in new build buildings.
- 2.48 The government has confirmed that it will change building regulations so that from 2025 the Future Homes/Buildings Standard will deliver buildings that are zero-carbon ready. Buildings built under the Future Homes/Buildings Standard should produce 75-80% less carbon emissions compared with current levels and become net zero as the electricity grid continues to decarbonise.
- 2.49 The intention is that buildings built to the Future Homes/Buildings Standard will not need to be retrofitted with any additional measures or technology to become net zero. The Future Homes/Buildings Standard should see buildings fitted with low carbon forms of heating. The expectation is that heat pumps will become the main source of heating system for most new building.
- 2.50 A full technical specification for the Future Homes/Buildings Standard will be consulted on in 2023. Legislation will be introduced in 2024, ahead of implementation in 2025.
- 2.51 The government confirmed that once a new build has been built, no refurbishment will be necessary to reach zero-carbon as the electricity grid continues to decarbonise – and no new build built under the Future Homes/Buildings Standard will be reliant on fossil fuels.

Clean Growth Strategy

- 2.52 Clean Growth means growing the UK national income while cutting greenhouse gas emissions. The Clean Growth Strategy sets out the Government's proposals for decarbonising all sectors of the UK economy through the 2020s. It provides a route for the UK to take advantage of low carbon opportunities, while meeting national and international commitments to tackle climate change.

National Design Guide (2021)

- 2.53 Published in January 2021 the National Design Guide prepared by the Government sets out the characteristics of well-designed places and demonstrates what good design means in practice.
- 2.54 Sustainability is a key theme running through the Guide and Section 7, Resources in particular provides guidance on the delivery of efficient and resilient development. This includes development, which is designed in accordance with the energy hierarchy, utilises sustainable materials and maximise resilient to climate change.

National Planning Policy Framework

- 2.55 The updated National Planning Policy Framework (NPPF) published December 2024 sets out the Government's planning policies for England and how these should be applied. The National Planning Policy Framework introduced the presumption in favour of sustainable development. It states that:

"[...] The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- i. an economic objective: to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*
- ii. a social objective: to support strong, vibrant, and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*
- iii. an environmental objective: to contribute to protecting and enhancing our natural, built, and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising*

waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy. [...]"

- 2.56 The NPPF supports the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It helps to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy & associated infrastructure.
- 2.57 For the NPPF to support the move to a low carbon future, the local planning authorities should ensure new building developments are planned for in ways that:
- i. *"[...] 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 adaptation measures, including through the planning of green infrastructure; and*
 - ii. *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. [...]"*
- 2.58 For the NPPF to support the move to a low carbon future, the local planning authorities should ensure new development are planned to help increase the use and supply of renewable and low carbon energy and heat by:
- i. *"[...] Provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);*
 - ii. *Consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and*
 - iii. *Identify opportunities for development to draw its energy supply from decentralised, renewable, or low carbon energy supply. [...]"*
- 2.59 For the NPPF to support the move to a low carbon future, the local planning authorities should ensure new development:
- i. *"[...] Comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable); and*
 - ii. *Take account of landform, layout, building orientation, massing, and landscaping to minimise energy consumption. [...]"*
- 2.60 The key focus of the National Planning Policy Framework is to support local and regional planning authorities.

Planning Policy Guidance (The Guidance)

- 2.61 The National Planning Practice Guidance (NPPG) published 2012 and as revised from time to time provides further advice on various planning issues associated with development, including those linked to sustainability and renewable energy and underpins the policies within the NPPF.
- 2.62 The PPG Guidance is an important material consideration in planning decisions and should generally be followed unless there are clear reasons not to. It sets out how local authorities should include policies that protect the local environment and strategies to mitigate and adapt to climate change and supports developments that are functional and adaptable for the future.
- 2.63 The PPG confirms Local Authorities have the option to set technical requirements exceeding the minimum requirements of the Building Regulations in respect of access, water, and space where sufficient evidence is produced to justify the target.
- 2.64 The Guidance also states that Local Authorities can set carbon reduction targets equivalent to a 19% reduction beyond the 2013 Building Regulations and renewable energy policies for non-domestic buildings. However, Local Authorities have the power to include policies imposing excess of the 19% requirements at their discretion.
- 2.65 The Guidance states that the distribution and design of new development, and the potential for servicing Sites through sustainable transport solutions, are particularly important considerations and that good design is an integral part of sustainable development to deliver a wide range of planning objectives.

Net Zero Strategy: Build Back Greener

- 2.66 Published in October 2021, this document sets out clear policies and proposals for the decarbonisation of all sectors of the UK economy to meet our net zero target by 2050, building on from the Prime Minister's Ten Point Plan for a Green Industrial Revolution.
- 2.67 The strategy follows a systems approach and sets out HMG plans for reducing emissions from each sector of our economy whilst absorbing any remaining emissions with greenhouse gas removals – either natural, like trees or technological, using carbon capture approaches. Being the first major economy to create a legally binding target to bring down greenhouse gas emissions to net zero by 2050, this strategy demonstrates how the UK is leading by example, with a clear plan for the future.

Heat and Buildings Strategy

- 2.68 Published in October 2021, this strategy sets out the Government's plans to cut emissions from the UK's 30 million homes and workplaces whilst ensuring that prices remain fair and affordable for households across the country. It will be a gradual transition which will start by incentivising consumers and driving down costs.
- 2.69 As well as allowing for the saving of money on energy bills and improving health standards through the reduction of carbon emissions, this strategy aims to boost the economic recovery by supporting up to 240,000 skilled green jobs by 2035.

- 2.70 In addition to clean heat, the strategy compiles the Government's work on energy efficiency and the requirement for better and smarter energy performance. Both will be paramount to the journey of a net zero future in the UK

Wokingham Borough Core Strategy (2010)

- 2.71 Adopted in January 2010, Wokingham Borough Council's Core Strategy (**Figure 2.1**) sets the overall vision for development in the district up to 2026 and includes policies relating to the scale and distribution of development across the borough.

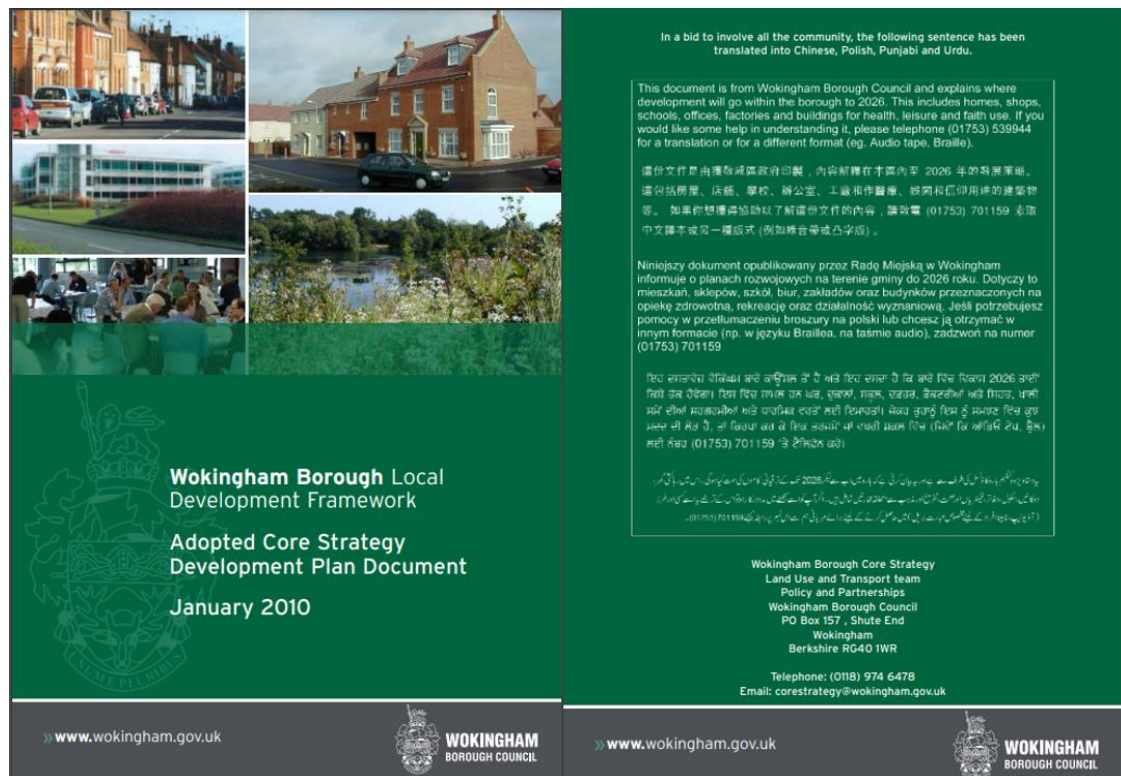


Figure 2.1: Wokingham Borough Council Adopted Core Strategy (2010)

- 2.72 With regards to energy and sustainable building design, the main applicable policy concerned is Policy CP1: Sustainable Development.

- 2.73 Policy **CP1** (Sustainable Development) states that:

“[...] Planning permission will be granted for development proposals that:

- i. Maintain or enhance the high quality of the environment; delivering development that seeks to minimise the need to travel
- ii. Minimise the emission of pollutants into the wider environment;
- iii. Limit any adverse effects on water quality (including ground water);
- iv. Ensure the provision of adequate drainage;
- v. Minimise the consumption and use of resources and provide for recycling;
- vi. Incorporate facilities for recycling of water and waste to help reduce per capita water consumption;

- vii. *Avoid areas of best and most versatile agricultural land;*
- viii. *Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;*
- ix. *Avoid increasing (and where possible reduce) risks of or from all forms of flooding (including from groundwater);*
- x. *Provide attractive, functional, accessible, safe, secure and adaptable schemes;*
- xi. *Demonstrate how they support opportunities for reducing the need to travel, particularly by private car in line with CP6; and*
- xii. *Contribute towards the goal of reaching zero-carbon developments as soon as possible by:*
 - a) *Including appropriate on-site renewable energy features; and*
 - b) *Minimising energy and water consumption by measures including the use of appropriate layout and orientation, building form, design and construction, and design to take account of microclimate so as to minimise carbon dioxide emissions through giving careful consideration to how all aspects of development form [...]*

Managing Development Delivery Document (2014)

2.74 Adopted in February 2014, the Managing Development Delivery Local Plan (MDD) adds extra detail to the policies within the Core Strategy. The document establishes its key policy direction and provides a framework for the development of appropriate indicators and targets for monitoring purposes.

2.75 With regards to energy and sustainable building design, the main applicable policies concerned are Policies CC04: Sustainable Design and Construction and CC05: Renewable Energy and Decentralised Energy Network.

2.76 Policy **CC04** (Sustainable Design and Construction) States:

"[...] Planning permission will only be granted for proposals that seek to deliver high quality sustainably designed and constructed developments by:

- i. *In respect of all new homes:*
 - a) *Seeking to achieve the requirements of the full Code for Sustainable Homes Level 4;*
 - b) *Meet internal potable water consumption targets of 105 litres or less per person per day (as part of the requirement to meet full Code for Sustainable Homes Level 4).*
- ii. *All new non-residential proposals of more than 100 sq m gross non-residential floorspace shall at least:*
 - a) *Achieve the necessary mandatory Building Research Establishment Assessment Method (BREEAM) requirements or any future national equivalent*
 - b) *Meet or exceed statutory requirements for water resource management*
- iii. *All development, including conversions, alterations and extensions shall incorporate suitable waste facilities, including on-site recycling [...]*

2.77 Policy **CC05** (Renewable Energy and Decentralised Energy Network) States:

“[...]

- i. *Local opportunities to contribute towards decentralised energy supply from renewable and low-carbon technologies will be encouraged*
- ii. *Planning permission will only be granted for proposals that deliver a minimum 10% reduction in carbon emissions through renewable energy or low carbon technology where the development is for:*
 - a) *Schemes of more than 10 dwellings (gross), or*
 - b) *Non-residential proposals of more than 1,000 sq m gross floorspace.*
- iii. *Proposals for renewable energy and decentralised energy works, including wind turbines, must demonstrate that:*
 - a) *They are appropriate in scale, location and technology type;*
 - b) *Are compatible with the surrounding area, including the impact of noise and odour;*
 - c) *Do not have a damaging impact on the local topography and landscape;*
 - d) *There is no significant impact upon heritage assets, including views important to their setting;*
 - e) *In the case of wind turbines, take account of their cumulative effect and properly reflect their increasing impact on the landscape and on local amenity [...]*”

Sustainable Design and Construction SPD (2010)

- 2.78 Adopted in May 2010, the Sustainable Design and Construction Supplementary Document provides a comprehensive approach considering sustainable design and construction in new development. It is a material planning consideration for all planning applications.
- 2.79 This SPD provides guidance to improve the performance of building from design to use, promoting the use of sustainable techniques including renewable energy technologies and materials. To maximise opportunities for creating more sustainable forms of development the SPD recommends that an energy hierarchy be applied.
- 2.80 The SPD further covers other sustainable design measures that will help to mitigate and adapt to climate change including waste, pollution, transport, water supply, biodiversity and health and safety.

Developers Guidance Note for the 10% Renewable Energy Requirement of South East Plan Policy NRM11 (2010)

- 2.81 The Developers Guidance Note for the 10% Renewable Energy Requirement of South East Plan Policy NRM11 is the companion document to the sustainable design and construction supplementary SPD, and forms part of the Wokingham Borough Development Plan.

- 2.82 Policy NRM11 (Development design for energy efficiency and renewable energy) of the South East Plan requires residential development of more than 10 dwellings and non-residential development of 1,000 m² or greater to secure at least 10% of their energy from decentralised, renewable, or low-carbon technologies.

Policy NRM11 of the South East Plan States:

"[...] Local authorities should:

- i. promote and secure greater use of decentralised and renewable or low-carbon technology energy in new development, including through setting ambitious but viable proportions of the new energy supply for new development to be required to come from such sources. In advance of local targets being set in development plan documents, new developments of more than 10 dwellings or 1000m² of non-residential floorspace should secure at least 10% of their energy from decentralised and renewable or low-carbon sources unless, having regard to the type of development involved and its design, this is not feasible.*
- ii. use design briefs and/or supplementary planning documents to promote development design for energy efficiency, low carbon and renewable energy.*
- iii. work towards incorporation of renewable energy sources including, in particular, passive solar design, solar water heating, photovoltaics, ground source heat pumps and in larger scale development, wind and biomass generated energy.*
- iv. actively promote energy efficiency and use of renewable and low carbon energy sources where opportunities arise by virtue of the scale of new development including regional growth areas, growth points and eco towns.*

Local authorities and other public bodies, as property owners and managers, should seek to achieve high levels of energy efficiency when refurbishing their existing stock [...]"

Climate Change Interim Policy Statement (2022)

- 2.83 The Interim Planning Policy Statement is not in itself a planning policy, rather an explanatory document setting out the position of Wokingham Borough Council (WBC) on the issue of climate change when assessing planning applications.
- 2.84 WBC declared a Climate Emergency on 18th July 2019. This statement confirms that climate emergency will be a key factor in assessing planning applications and that emphasizes that development proposals incorporate climate change mitigation and adaptation by applying adopted policies to their best effect.

Wokingham Borough Local Plan Update 2023-2040

- 2.85 Once adopted the Wokingham Borough Local Plan Update 2023-2040 (**Figure 2.2**) will replace the Core Strategy (2010) and the Managing Development Delivery (2014) local plans. The plan will set out the objectives and strategy for managing development across Wokingham Borough up until 2040.
- 2.86 With regards to energy and sustainable building design, the main applicable policies concerned are Policies SS1 Sustainable development principles, CE2 Environmental

standards for non-residential development, and CE3 Environmental standards for residential development.

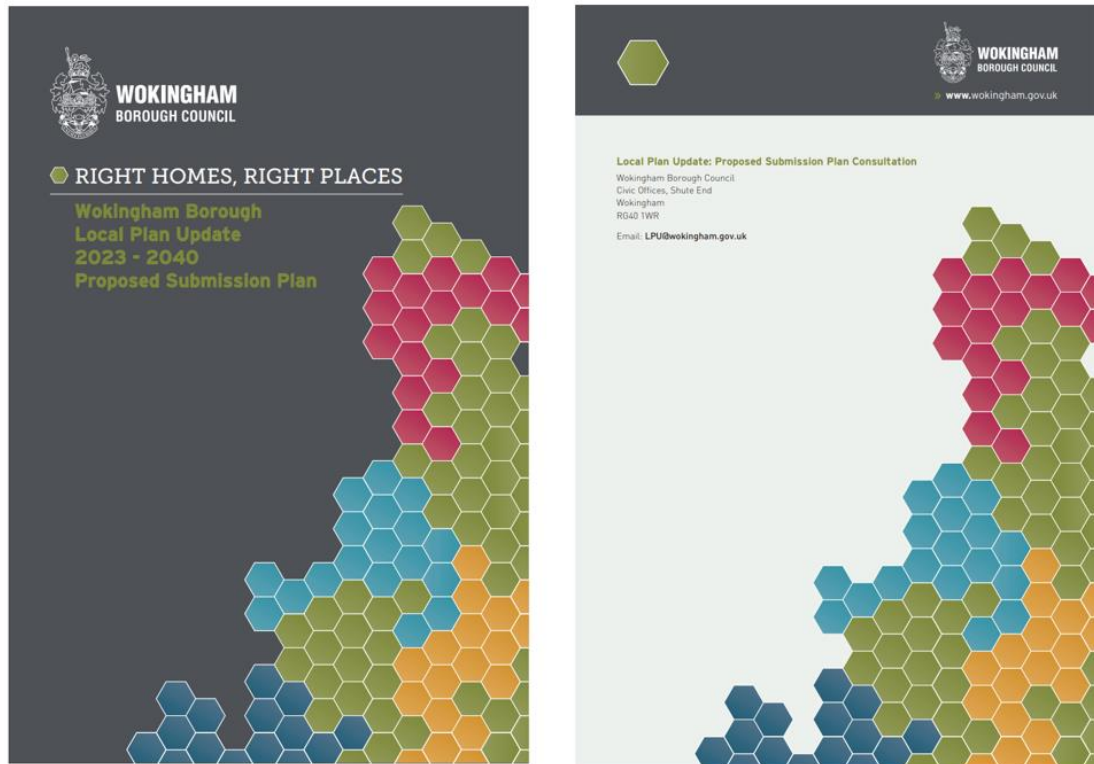


Figure 2.2: Wokingham Borough Local Plan Update 2023 - 2040 (2024)

2.87 Policy **SS1** (Sustainable development principles) States:

“[...] As appropriate to their nature, development proposals will be expected to:

- i. Contribute to meeting identified development needs;*
- ii. Be located so as to offer the choice of active means of travel and/or public transport, reducing the need to travel by private car for day-to-day activities;*
- iii. Make efficient use of land/buildings, especially suitable previously developed land;*
- iv. Maintain, enhance or create a high quality and safe environment which contributes positively to the character and identity of the area;*
- v. Promote healthy lifestyles, well-being and social inclusion;*
- vi. Maintain the separate identity of settlements and places, avoiding physical or perceived coalescence;*
- vii. Reduce energy demand in line with the principles of the energy hierarchy, considering the orientation, layout and design of development to maximise passive heating and cooling systems opportunities and implement a fabric first approach to construction;*
- viii. Respond to climate hazards, incorporating appropriate adaptation and resilience measures;*

- ix. *Avoid high risk flood areas, or where necessary provide appropriate mitigation measures;*
- x. *Avoid the unplanned loss of best and most versatile agricultural land, except in exceptional circumstances;*
- xi. *Avoid areas where pollution may impact upon the amenity of future occupiers;*
- xii. *Conserve and enhance the significance of heritage assets, including their wider settings;*
- xiii. *Conserve and enhance the landscape character of the area, with particular attention paid toward significant landmarks and toward landscape attributes and features;*
- xiv. *Conserve and enhance the biodiversity of the area, and deliver measurable net gain; and*
- xv. *Provide or contribute to the provision of social, physical, transport, and green and blue infrastructure to support communities. [...]"*

2.88 Policy **CE2** (Environmental standards for non-residential development) States:

"[...] Energy Standards

- i. *Contribute to meeting identified development needs; Non-residential development proposals involving new buildings must be supported by an Energy and Sustainability Statement which confirms that the proposals satisfy the following requirements:*
 - a) *The development proposal generates at least the same amount of renewable electricity on-site (and preferably on-plot) as it demands over the course of a year, such demand including all energy use (regulated and unregulated), calculated using a methodology proven to accurately predict a building's actual energy performance; and*
 - b) *To help achieve point a) above, non-residential development proposals are expected to achieve a site average space heating demand of around 15-20kWh/m2/year and a site average total energy demand of no more than 70 kWh/m2/year through a 'fabric first' approach to construction. No individual unit is to have a total energy demand in excess of 90 kWh/m2/year, irrespective of amount of on-site renewable energy production. (For the avoidance of doubt, 'total energy demand' means the amount of energy used as measured by the metering of that building, with no deduction for renewable energy generated on site).*
- ii. *The Energy and Sustainability Statement must include details of assured performance arrangements, calculated using a methodology proven to accurately predict a building's true energy performance, such as CIBSE TM54 or the PHPP, against 1 a) and b) above. As a minimum, this will require:*
 - a) *The submission of 'pre-built' estimates of energy performance; and*
 - b) *Prior to each building being occupied, the submission of updated, accurate and verified 'as built' calculations of energy performance. Such a submission should also be provided to the first occupier (including a Non-Technical Summary of such estimates).*

- iii. Proposals should demonstrate a deliverable commitment to on-going monitoring of energy consumption, post occupation, which has the effect, when applicable, of notifying the occupier that their energy use appears to exceed significantly the expected performance of the building, and explaining to the occupier steps they could take to identify the potential causes of such high energy use.

Exceptional Basis Clauses

- iv. In those circumstances where 1 a) and/or b) are not met (though in all cases the energy performance arrangements of points 2 a) and b) are still required), the development must be considered against the following exception clauses:

a) Clause 1 (technical or policy reasons): Where, on an exceptional basis, points 1 a) and/or b) cannot be met for technical (e.g. overshadowing), other policy reasons (e.g. heritage), or other technical reason linked to the unique purpose of the building (e.g. a building that is, by the nature of its operation, an abnormally high user of energy), then the Energy and Sustainability Statement must demonstrate both why they cannot be met, and the degree to which each of points 1 a) and b) are proposed to be met. A lack of financial viability will not be deemed either a technical or policy reason to trigger this exceptional basis clause. Where this exceptional basis clause is utilised, and where it the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more, then the applicant must either:

i. Enter into an appropriate legal agreement which will either provide renewable energy infrastructure offsite equivalent to at least offsetting the additional energy requirements not achieved on site; or

ii. Enter into an appropriate legal agreement to provide a financial contribution to the council's carbon offset fund to enable the offsetting of the remaining performance not achieved on site; or

iii. Demonstrate that the building/s will be connected to a decentralised energy network or combined heat and power unit.

b) Clause 2 (use of an accredited certification scheme):

To simplify (and hence speed up) the decision-making process, applicants are able to demonstrate, as an alternative to policy requirements 1 a) and b), that the development proposal achieves one of the following certifications:

i. BREEAM: Outstanding or Excellent;

ii. Passivhaus: Plus or Premium;

iii. Passivhaus Classic, provided this is supplemented with evidence to demonstrate how point 1 of this policy will also be met; or

iv. Any other recognised national independent accreditation scheme, provided such scheme is demonstrated to be consistent with the requirements of this policy

c) Clause 3 (viability):

It is acknowledged that for development proposals on previously developed land, the full delivery of requirements 1 a) and b) may not be possible in some cases for viability reasons. Consequently, in such circumstances, an Energy and Sustainability Statement will still be required, and, if full delivery of requirements 1 a) and b) are not proposed to be met, must set out the degree to which the requirements are proposed to be met in order to enable the development to become viable.

Water Standards

- v. *To minimise impact on the water environment, all non-residential development proposals must:*
 - a) *Incorporate greywater recycling and rainwater harvesting measures, where practicable;*
 - b) *Incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future-proofing;*
 - c) *Ensure external hard surfacing is permeable (unless there are technical and unavoidable reasons for not doing so in certain areas) thereby reducing energy demand on the water recycling network; and*
 - d) *Consider the potential to incorporate a green roof and/or walls as part of wider sustainable water management [...]"*

2.89 Policy **CE3** (Environmental standards for residential development) States:

"[...] Energy Standards

- i. *Residential development proposals involving new buildings must be supported by an Energy and Sustainability Statement which confirms that the proposals satisfy the following requirements:*
 - a) *The development proposal generates at least the same amount of renewable electricity on-site (and preferably on-plot) as it demands over the course of a year, such demand including all energy use (regulated and unregulated), calculated using a methodology proven to accurately predict a building's actual energy performance; and*
 - b) *To help achieve point 1 above, residential development is expected to achieve a site average space heating demand of around 15-20kWh/m2/year and a site average total energy demand of 35 kWh/m2/year, through a 'fabric first' approach to construction. No single dwelling is to have a total energy demand in excess of 60 kWh/m2/year, irrespective of amount of on-site renewable energy production. (For the avoidance of doubt, 'total energy demand' means the amount of energy used as measured by the metering of that home, with no deduction for renewable energy generated on site).*
- ii. *The Energy and Sustainability Statement must include details of assured performance arrangements, calculated using a methodology proven to accurately predict a buildings true energy performance, such as CIBSE TM54 or the PHPP, against 1 a) and b) above. As a minimum, this will require:*
 - a) *The submission of 'pre-built' estimates of energy performance; and*
 - b) *Prior to each dwelling being occupied, the submission of updated, accurate and verified 'as built' calculations of energy performance. Such a submission should also be provided to the first occupier (including a Non-Technical Summary of such estimates).*
- iii. *Proposals should demonstrate a deliverable commitment to on-going monitoring of energy consumption, post-occupation, which has the effect, when applicable, of notifying the occupier that their energy use appears to significantly exceed the expected performance of the building, and explaining to the occupier steps they could take to identify the potential causes of such high energy use.*

Exceptional Basis Clauses

- iv. In those circumstances where 1 a) and/or b) are not met (though in all cases the energy performance arrangements of points 2 a) and b) are still required), the development must be considered against the following exception clauses:

a) Clause 1 (technical or policy reasons): Where, on an exceptional basis, points 1 a) and/or b) cannot be met for technical (e.g. overshadowing) or other policy reasons (e.g. heritage), then the Energy and Sustainability Statement must demonstrate both why they cannot be met, and the degree to which each of points 1 a) and b) are proposed to be met. A lack of financial viability will not be deemed either a technical or policy reason to trigger this exceptional basis clause. Where Clause 1 is utilised, and where the proposal is of 10 or more homes, then the applicant must either:

i. Enter into an appropriate legal agreement which will either provide renewable energy infrastructure offsite equivalent to at least offsetting the additional energy requirements not achieved on site; or

ii. Enter into an appropriate legal agreement to provide a financial contribution to the council's carbon offset fund to enable the offsetting of the remaining performance not achieved on site; or

iii. Demonstrate that the residential units will be connected to a decentralised energy network or combined heat and power unit.

b) Clause 2 (use of accreditation certification scheme): To simplify (and hence speed up) the decision-making process, applicants are able to demonstrate that they have met the requirements of points 1 a) and b) if they provide certified demonstration of compliance that the development proposal achieved one of the following certifications:

i. Passivhaus Plus or Premium; or

ii. Passivhaus Classic, provided this is supplemented with evidence to demonstrate how point 1 of this policy will also be met;

iii. Home Quality Mark; or iv. Any other recognised national independent accreditation scheme, provided such scheme is demonstrated to be consistent with the requirements of this policy.

c) Clause 3 (viability): it is acknowledged that for development proposals on previously developed land the full delivery of requirements 1 a) and b) in this policy may not be possible in some cases for viability reasons. Consequently, in such circumstances, an Energy and Sustainability Statement will still be required, and, if full delivery of requirements 1 a) and b) are not proposed to be met, must set out the degree to which the requirements are proposed to be met in order to enable the development to become viable.

Water Standards

- v. To minimise impact on the water environment, all residential development proposals must:

a) Meet the higher water efficiency standard of 105 litres or less per person per day (excluding allowance of up to five litres for external water consumption). Development proposals which go further than this (to, for example, 85 litres per day per person) are encouraged.

- b) Incorporate greywater recycling and rainwater harvesting measures, where practicable;*
- c) Incorporate measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve lower water consumption rates and to maximise future-proofing;*
- d) Ensure external hard surfacing is permeable (unless there are technical and unavoidable reasons for not doing so in certain areas) thereby reducing energy demand on the water recycling network;*
- e) Consider the potential to incorporate a green roof and/or walls as part of wider sustainable water management; and*
- f) Ensure, where possible, that residential garden areas include a rain harvesting water butt(s) of minimum 100 litre capacity [...]"*

3. THE PROPOSAL'S ENERGY AND SUSTAINABLE DESIGN STRATEGY

Energy Hierarchy Introduction

- 3.1 The energy strategy for the Proposed Development will be established to achieve the baseline for energy consumption and CO₂ emissions. All options considered in preparation of the energy strategy and subsequent detailed development of the scheme will ensure that the baseline energy/CO₂ emissions are achieved.
- 3.2 The key energy/CO₂ target is for the Proposed Development to achieve Part L 2021 compliance. To achieve this, the development will adopt an energy hierarchy (**Figure 3.1**) approach to meet the Wokingham Borough Council's objectives for CO₂ reduction and sustainable design and construction. The various economic, social, and environmental benefits are highlighted in this section and presented under the following headings:



Figure 3.1: Energy Hierarchy

Step 1: Be Lean (Minimising Energy Use)

- 3.3 Energy saving measures following the Fabric First Approach are encouraged. The Fabric First approach (Be Lean) provides protection against fluctuations in both gas and electricity supply tariffs by inherently reducing energy consumption, energy bills and expanding the number of suitable energy generation and delivery options. Further benefits include:
- i. Delivers carbon savings which are 'locked-in' the building for its lifetime (60 years or more) rather than the much shorter lifespan (around 25 years) of a renewable energy technology;
 - ii. Virtually no maintenance and/or replacement costs to maintain carbon reductions through improved fabric; and
 - iii. No reliance on an occupier's behaviour to deliver carbon reductions.
- 3.4 Based upon the energy hierarchy, the Proposed Development proposals will aim to reduce energy/CO₂ demand through a fabric first approach. At the Reserved Matters stage, energy modelling will be undertaken to demonstrate compliance with Part L Volumes 1 and 2 2021 Building Regulations demonstrating an improved performance where technically and commercially feasible.
- 3.5 The fabric first stage of the energy hierarchy will seek to minimise demand for heat and power from the outset through the optimisation of the building envelope. This includes ensuring suitable levels of fabric insulation (u-values), air tightness and thermal bridging, and the provision of energy efficiency measures.

- 3.6 The Proposed Development will target building element u-values and air tightness in accordance with Part L Volume 1 and 2 2021 of the Building Regulations standards, including high performance glazing with appropriate window u-values and g-values to reduce heat loss and optimise positive solar gain while reducing the potential for overheating.
- 3.7 Light and Solar Transmittance are factors that measure the amount of light and solar energy that pass through glazed openings. They are important as they affect the control of solar gains and availability of natural light into the building. Consequently, the development will target light and solar transmittance values in accordance with Part L Volume 1 and 2 2021 of the Building Regulations standards.
- 3.8 In addition to the Proposed Development improved envelope u-values, a key area of construction which could result in a significant reduction in heating demand are junction details where two elements of the development meet (thermal bridging). Consequently, the Proposed Development will be designed to make use of best practice design (such as construction joint details calculated by a suitably competent person following the guidance detailed in BR 497 and Paper 1/06 or from a reputable non-government database containing independently assessed thermal junction details) to minimise thermal bridging, energy losses, and reducing CO₂ emissions.
- 3.9 In addition to an improved fabric specification and energy efficiency, sustainable design measure has/will be maximised on the Proposed Development Site at all stages, and this will include the following measures, wherever feasible:
- i. Promotion of passive solar gains, maximising natural daylight, sunlight and ventilation whilst minimising the risk of summer overheating;
 - ii. Proportion and distribution of glazing to ensure good levels of daylight, helping to reduce electricity consumption through artificial lighting;
 - iii. Maximise the adaptability of design and internal arrangements to be sympathetic towards the council's relevant building standard;
 - iv. Maximise thermal mass allowing the Proposed Development to store and release heat gains from the sun and internal appliances;
 - v. Orienting roofs (wherever practicable), to be within 45° of south to allow for the incorporation of solar thermal or photovoltaic panels;
 - vi. Specifying high efficiency heating/cooling system such as heat pump, with appropriate controls to reduce energy consumption and CO₂ emissions;
 - vii. Incorporating 100% high efficiency LED light fittings with a minimum efficacy of 80 lm/W (residential) and 100 lm/W (non-commercial) to reduce energy consumption;
 - viii. Maximise reusing/recycling opportunities during construction;
 - ix. Use of high efficiency fabric insulation, including heating systems and controls;
 - x. Minimise pollution during the construction process and implement water conservation and recycling measures.
- 3.10 Through these energy efficiency measures; the Proposed Development will deliver energy and carbon savings beyond the requirements of the Building Regulations (2021).

Step 2: Be Clean (Supply Energy Efficiently)

- 3.11 The next stage in the energy hierarchy is exploiting local energy resources (such as secondary heat) and supplying energy efficiently and cleanly to reduce CO₂ emissions.

Heat Network

- 3.12 The growth of decentralised energy generation is a core component of decarbonising the energy supply. District heat networks are an important part of a sustainable and flexible energy system of which each building is a part, and which enables a more circular approach to energy use by storing, using, and re-using energy sources. This supports a more effective and efficient use of energy by reducing primary energy demand and minimising the amount of energy that is ultimately wasted within the system.
- 3.13 Heat networks (**Figure 3.2**) offer an efficient and competitive solution for heating buildings in areas with high heat density and provide the added benefit of enabling the use of secondary energy or waste heat sources. This allows useful, lower quality energy to be used and re-used within the system to meet lower quality energy demands, such as space heating and hot water, saving high quality energy sources and capacity to meet high quality energy demand. The inherent thermal storage capacity of heat networks helps to manage demand, supports balancing and the flexibility of the electricity network and the integration of renewable energy into the grid mix.

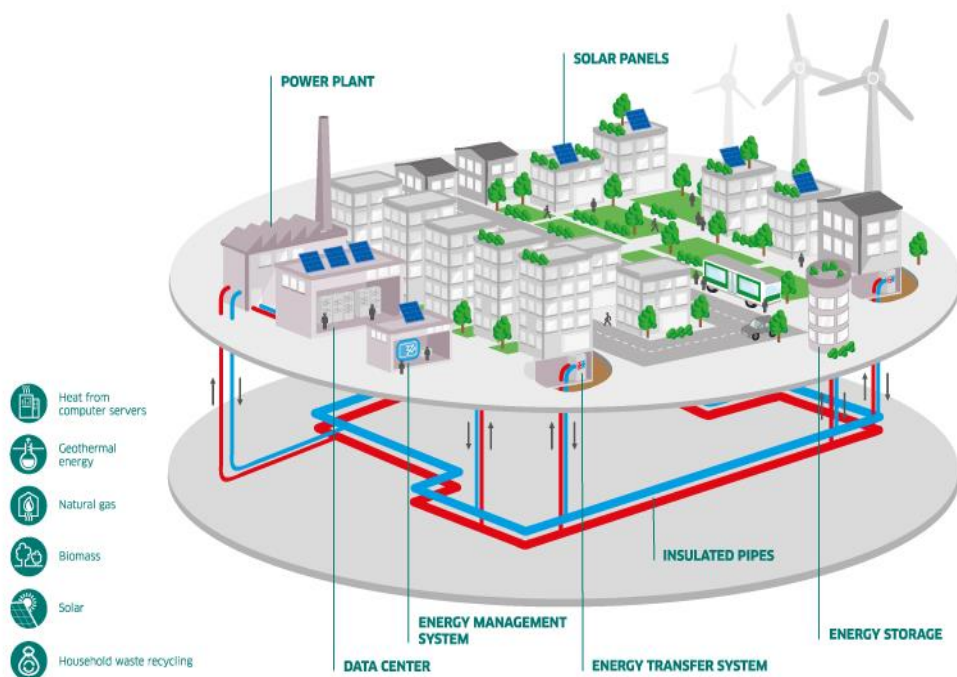


Figure 3.2: District Heating System Schematic (Engie, 2013)

- 3.14 By providing a system-level alternative to building-level solutions, heat networks help manage demand through their inherent storage provision whilst protecting existing capacity in the local electricity network to accommodate additional development and the integration of increasing volumes of renewable energy into the grid mix.

Existing Heat Network

- 3.15 Desktop study was undertaken to investigate whether an existing distribution network was in place close to the Site. However, there are no existing district heating networks within 500m of the Site, therefore, connection to an existing network is not feasible. As such, connection to an existing heat network is not proposed/recommended.

New Heat Network

- 3.16 A New network (such as a Centralised Air Source Heat Pump Energy) could be considered for the Proposed Development Site. However, due to the size of the Proposed Development, this can be discounted as the proposed site is not large enough in scale to justify a centralised heat network.

Combined Heat and Power (CHP)

- 3.17 CHP systems (**Figure 3.3**) generate electricity from burning fossil fuels and capture the heat generated in the process for heating purposes. CHP can be used where there is a significant year-round need for heating, in addition to the electricity generated.



Figure 3.3: Combined Heat and Power (CHP) Plant

- 3.18 CHP requires significant capital investment in plant and resources. Gas-engine CHP has been the primary technology for facilitating the development of district heat networks due to its high efficiency and better carbon performance compared to electrical systems utilising grid electricity. However, the rapid decarbonisation of the UK electricity grid means that technologies generating onsite electricity will not achieve the carbon savings they have to date.
- 3.19 However, considering the Proposed Development is situated in an Air Quality Management Area (AQMA), CHP is not a suitable option for the Proposed Development site due to the adverse impacts on air pollution. Moreover, the National Grid in the UK is decarbonising rapidly, thus CHP will not be proposed in favour of a low carbon renewable energy solution.

Step 3: Be Green (Renewable Energy Generation)

- 3.20 The next stage in the energy hierarchy is investigating opportunities for producing, storing, and using renewable energy on-Site. Generating low carbon energy on Site can reduce reliance on fossil fuels & minimises energy lost through transmission, contributing to security of supply and better connections between energy demand and generation.
- 3.21 An initial renewable energy options assessment has been undertaken using the Renewable Energy Sources Estimation Tool (RESET) – **Figure 3.4** which accompanies the CIBSE TM38 'Renewable Energy for Buildings' guidance document. This toolkit is intended for use at the earliest stages of design, when ideas are being considered and the outline direction of the design is developed, to identify the most promising renewable technology options for a given development or building. This is the key stage for some of the most important decisions relating to overall appearance, orientation, building mass and ventilation strategy, which can also influence decisions about renewable energy sources.

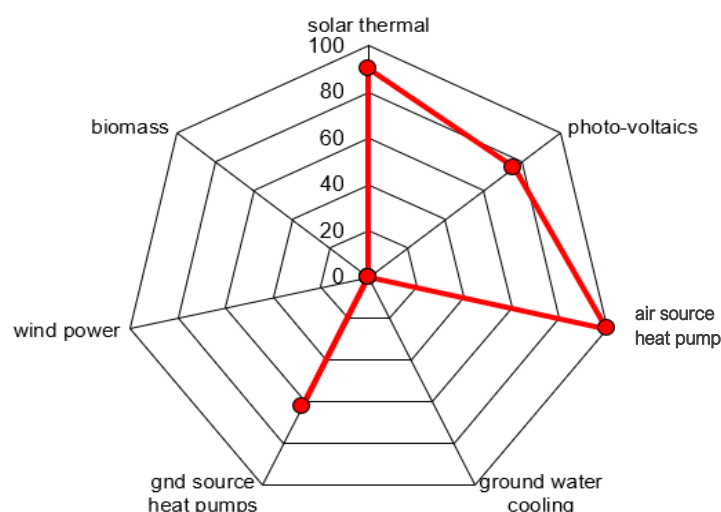


Figure 3.4: Initial Renewable Energy Feasibility

- 3.22 The initial assessment has been undertaken to judge the feasibility of renewable energy technologies from the outset, enabling viable technologies to be promoted and others to be ruled out from further consideration. The initial assessment demonstrates that Solar Thermal, Photovoltaic Panels, Ground Source Heat Pumps and Air Source Heat Pumps are all feasible technologies for the Proposed Development Site.
- 3.23 A further detailed review (**Table 3.1**) of potential low carbon renewable energy technologies has also been carried out to determine potential technologies which could be incorporated into the Proposed Development Site.
- 3.24 The detailed assessment further demonstrates that renewable technologies with high to medium opportunities include PV, Solar Thermal, ASHP, Wastewater Heat Recovery, and GSHP. Technologies such as WSHP, Wind Turbine, Small Scale Hydro Power, Geothermal, Biomass, Transpired Solar Air Collector, Hydrogen Fuel and Wave/Tidal Power have been discounted at this stage based on a balanced consideration of the policy requirements, financial viability, and technical feasibility.

Table 3.1: Renewable Energy Feasibility Matrix

TECHNOLOGY	PRE-FEASIBILITY
TECHNOLOGY	OVERVIEW
Solar Photovoltaic	Solar Photovoltaic or Photovoltaic Panels (PV) utilise energy in the form of rays of light from the sun and are therefore required to be mounted on either a south facing unobstructed roof or wall to ensure energy output is maximised. Photovoltaic systems convert energy from the sun into electricity through semiconductor cells. Systems consist of semiconductor cells connected and mounted into modules. Modules are connected to an inverter to turn their direct current (DC) output into alternating current (AC) electricity for use in buildings. Photovoltaics supply electricity to the building they are attached to or to any other load connected to the electricity grid. Excess electricity can be sold to the national grid when the generated power exceeds the local need. PV systems require only daylight, not sunlight to generate electricity (although more electricity is produced with more sunlight), so energy can still be produced in overcast or cloudy conditions. Ideally photovoltaics should face between south-east and south-west, at an elevation of about 30-40°. However, in the UK even flat roofs receive 90% of the energy of an optimum system. PV arrays do not create a nuisance from noise, vibration, odour, or fumes and do not impact on air quality. The effectiveness of PV can be maximised with battery technology at a community level and within an individual house. By storing the energy generated in the day rather than exporting unused electricity back to the national grid, the electricity can be used when it is needed, avoiding distribution losses. This technology is becoming more cost effective and is considered suitable for the development Site with no adverse impact on the landscape and thus can be considered/explored further at the Reserved Matters stage of the proposal.
Solar Thermal	Solar Thermal or Solar Water Heating Systems use the energy from the sun to heat water, most commonly in the UK for domestic hot water needs. The systems use a heat collector, generally mounted on the roof in which a fluid is heated by the sun. This fluid is used to heat up water that is stored in either a separate hot water cylinder or a twin coil hot water cylinder inside the building. The systems work very successfully in all parts of the UK, as they can work in diffuse light conditions. Ideally the collectors should be mounted on a south-facing roof, although south-east/south-west will also function successfully, at an elevation of between 10 and 60°. The panels can be bolted onto the roof or integrated into the roof with lead flashings. Solar water heating systems are suitable for any building type that has sufficient year-round hot water needs (ideally during the day). They require small amount of maintenance and do not create a nuisance from noise, vibration, odour, or fumes and do not impact on air quality. This technology is becoming more cost effective and is considered suitable for the development Site with no adverse impact on the landscape and thus can be considered/explored further at the Reserved Matters stage of the proposal.

Ground Source Heat Pump	Ground source heat pumps are used to extract heat from the ground to provide space and water heating to either individual houses or any type of non-domestic building. Heat pumps take in heat at a certain temperature and release it at a higher temperature, using the same process as a refrigerator. As the ground stays at a fairly constant temperature throughout the year heat pumps can use the ground as the source of heat. The ground temperature is not necessarily much higher than ambient air temperature in winter, but it is more stable whereas air has a vast temperature range. This makes system design more robust. The measure of efficiency of a heat pump is given by the Coefficient of Performance (CoP), which is defined as the ratio of the heat output, divided by quantity of energy put in. A CoP of 4 or more should be achievable with ground source heat pump systems, giving good energy and running cost savings. For ground source systems, the ground pipe system can be horizontal or vertical. For horizontal systems, a coiled or linear pipe network is buried at around two metres depth below ground level, thus requiring a large area of open space depending on the size of the system. For vertical systems, the pipes are placed in holes bored straight into the ground to a depth of 80 to 150 metres depending on ground conditions and size of system. Vertical systems thus require very little ground space but do require access for the drilling rig at the construction stage, though this is unlikely to be greater than for normal construction vehicles. Ground source heat pump systems can be used in almost any size of building. A particular use is where natural gas is not available making the ground source heat pump more economic. Ground source heat pumps cannot be seen from the outside of the building, so aesthetic design is not an issue. This technology may be suitable for the Proposed Development Site given that there is adequate ground space available and could be considered and explored further at the Reserved Matters stage of the proposal.	Opportunity: Medium. Technology can be explored further at the Reserved Matters stage
Air Source Heat Pump (ASHP)	Air source heat pumps (ASHP) operate in a similar manner to ground source heat pumps but use the heat in external air rather than the ground to release heat at a higher temperature. A water heat pump is where heat from the air generates heat for water, which is then pushed around traditional heating systems like radiators and underfloor heating. As underfloor heating runs better with lower water temperatures than radiators (approx. 45 degrees), air to water heat pumps are considered ideal for the purpose. Air to water systems work by hoovering the air from outside into its body. This air is used to heat a liquid refrigerant, similar to the way a fridge works but in reverse. The liquids temperature is then increased via compression, which is powered by an internal pump. The compressed (now heated) liquid releases its stored heat and can be transferred around the home throughout the normal heating systems such as radiators and underfloor heating. Air source heat pumps systems can provide heating, cooling including DHW to the development Site at a very high efficiencies by using the heat from areas where is not needed to the areas where there is a demand. There are no technical feasibility restraints to this technology and only a suitable exterior location is required for the condenser; this can be wall/ground mounted. Thus, this technology is considered suitable for the development Site with no adverse impact on the landscape and can be considered and explored further at the Reserved Matters stage of the proposal.	Opportunity: High. Technology can be explored further at the Reserved Matters stage

Water Source Heat Pump (WSHP)	Water source heat pumps (WSHPs) move heat from a source of water into a building in an extremely efficient manner, especially if the water temperature is around 5 to 8 degrees Celsius. As such, there are numerous advantages of installing heat pumps. Depending on the type of heat pump, either the water from a river or small stream is pumped through the heat pump, or a special refrigerant fluid is pumped through pipes laid in the body of water. While both have their own advantages, the latter type requires less maintenance and an easier application process, making it a cheaper option. Water source heat pumps have been in use since the late 1940s. They use a rather constant temperature of the water as an exchange medium instead of extracting the heat from the outdoor air temperature. Thus, water source heat pumps can reach reasonably high efficiencies (300% to 600%) even on the coldest winter nights, in comparison to 175% to 250% for air-source heat pumps on cool days. However, there are no potential hydro resource within the Site boundary. Moreover, this technology will be cost prohibitive for this scheme and will not be explored further at this stage.	Opportunity: Low. Technology not suitable for the Proposed Site
Geothermal	Geothermal energy is the heat that comes from the sub-surface of the earth. It is contained in the rocks and fluids beneath the earth's crust and can be found as far down to the earth's hot molten rock, magma. To produce power from geothermal energy, wells are dug a mile deep into underground reservoirs to access the steam and hot water there, which can then be used to drive turbines connected to electricity generators. There are three types of geothermal power plants; dry steam, flash & binary. Dry steam is the oldest form of geothermal technology and takes steam out of the ground & uses it to directly drive a turbine. Flash plants use high-pressure hot water into cool, low-pressure water whilst binary plants pass hot water through a secondary liquid with a lower boiling point, which turns to vapour to drive the turbine. This technology may be suitable for the Proposed Development Site and could be considered and explored further at the Reserved Matters stage of the proposal. However, this technology will be cost prohibitive for the proposed scheme.	Opportunity: Low. Technology not proposed but may be explored further at the Reserved Matters stage
Wind Turbine	Wind turbines are an established means of capturing wind energy and converting it into usable electricity. Wind turbines come in various sizes depending on requirements. A wind turbine usually consists of a nacelle containing a generator connected, sometimes via a gearbox, to a rotor consisting of three blades. Wind turbines harness the power of the wind and use it to generate electricity. For the Proposed Development Site, this would be to use to offset the energy used in the energising of equipment and lighting. Excess electricity generated from the wind turbine could be exported to the grid or could be stored in batteries and used when there is no wind. Considering the Site location and provided the average wind speed in the area of the Proposed Development Site is 4.7m/s at 10m hub height (<5.0 m/s minimum required for further investigation), wind turbine will not be suitable for the Proposed Development Site and will not be explored further at the Reserved Matters stage of the proposal.	Opportunity: Low. Technology not suitable for the Proposed Site

Small Scale Hydro Power	Small Scale Hydropower or hydroelectricity (typically 100 kW - 30 MW) refers to the conversion of energy from flowing water into electricity. It is considered a renewable energy source because the water cycle is constantly renewed by the sun. Historically, one of the first uses of hydro power was for mechanical milling, such as grinding grains. Today, modern hydro plants produce electricity using turbines and generators, where mechanical energy is created when moving water spins rotors on a turbine. This turbine is connected to an electromagnetic generator, which produce electricity when the turbine spins. However, there are no potential hydro resource within the Site boundary. Moreover, this technology will be cost prohibitive for this scheme and will not be explored further at this stage.	Opportunity: Low. Technology not suitable for the Proposed Site
Wave and Tidal Power	Wave and tidal energy harvesting have been around for a few decades. But it has only been in recent years that it has started to become more realistic due to advance in research and technology. Some speculates that wave and tidal energy can supply at least 10 percent of the world's energy consumption. How much power can be harvested is determined mainly on the wave activity. However, the Proposed Development Site is not located within reasonable distance to a coastal location. Thus, this technology is not considered feasible and will not be explored further at this stage.	Opportunity: Low. Technology not suitable for the Proposed Site
Biomass	Biomass can be burnt directly to provide heat in buildings. Wood from forests, urban tree pruning, farmed coppices or farm and factory waste, is the most common fuel and nowadays is used commercially in the form of wood chips or pellets, although traditional logs are also used. Biomass is normally considered a carbon neutral fuel, as the carbon dioxide emitted on burning has been (relatively) recently absorbed from the atmosphere by photosynthesis and no fossil fuel is involved. The wood is a by-product of other industries and the small quantity of energy for drying, sawing, pelleting and delivery are discounted. Biomass from coppicing is likely to have some external energy inputs, for fertiliser, cutting, drying etc. and these may need to be considered in the future. Biomass heating is theoretically applicable to any building requiring heat; however practical constraints suggest that it is currently most applicable to lower density situations due to fuel supply and storage issues. The most common application of biomass is as one or more boilers in a sequenced (multi-boiler) installation particularly where there is a communal i.e., block or district heating system. There must be a local and adequate supply of appropriate biomass fuel (normally wood chips or pellets) and room for delivery and storage. Biomass boilers can replace conventional boilers and have no aesthetic impact. Given the location of the Proposed Development, biomass boilers could be considered feasible as West Oxfordshire has an adequate supply of biomass. However, considering the adverse effect on local air quality, biomass boilers are not considered feasible due to the site being located in an Air Quality Management Area (AQMA) for Nitrogen Oxides (NOx) emissions.	Opportunity: Low. Technology not suitable for the Proposed Site

Waste Heat Including Waste Water Heat Recovery System (WWHRS)	Waste heat is the unused heat given to the surrounding environment (in the form of thermal energy) by a heat engine in a thermodynamic process in which it converts heat to useful work. Waste heat is inevitable for any heat engine and the amount it produces compared to the amount of input heat are factors that make up its thermal efficiency. Harnessing Waste Heat is mostly seen in industrial processes where more than half of the input energy is turned into waste heat. Capturing waste heat enables it to be redirected to a function that would otherwise be using energy from the grid, and this in turn prevents consumption of power used to counteract the very effects of the waste heat itself. WWHRS is the process in which heat from the water used in showers or baths is extracted as it goes down the drain. The extracted heat is the used to heat incoming water, reducing the energy required to heat water. The system consists of a vertical copper pipe positioned alongside cold water so that heat can be exchanged. The Proposed Development will include bath and/or showers in the homes therefore WWHRS is considered feasible and could be considered and explored further at the Reserved Matters stage of the proposal.	Opportunity: High. Technology can be explored further at the Reserved Matters stage
Transpired Solar Air Collectors	Transpired Solar Collectors (TSCs) are solar air heating systems made of pre-finished perforated steel skins. Treated to enhance its absorbance of solar energy, the steel skins are installed onto south-facing walls or roofs creating a cavity between the metal skin and the walls or roofs. The most common application of a TSC is for preheating ventilation air, where the ventilation air supply is heated as it passes through the TSC perforated sheet. The heated air is then generally heated further as it passes through the building's HVAC system to reach the desired delivery temperature. In summer, when there may be no requirement to heat the ventilation air supply, TSC systems have a means of bypassing the absorber. Transpired solar collectors could be used to pre-heat the building. However, the Proposed Development is not expected to incorporate a Transpired Solar Air Collectors at this stage.	Opportunity: Low. Technology not proposed for the Proposed Site
Hydrogen Fuel Cell	Fuel cells are electrochemical energy conversion devices that process oxygen and hydrogen to produce electricity, heat, and water. They operate much like a battery, but rather than running down and requiring re-charging or replacement, they can be refuelled. Fuel cells generate electrical power quietly and efficiently and are virtually pollution-free at the point of use. The by-products from a fuel cell system are water and heat. Whilst more traditional combustion technologies typically have an efficiency of around 35%, fuel cells can achieve double this, extracting more energy from the same amount of fuel. However, fuel cells are not necessarily 'clean' in relation to the fuel source they use. Hydrogen is an energy storage medium and environmental benefits are only found where hydrogen is generated from renewable energy sources. However, there is limited market available, high capital and maintenance costs and life expected from fuel stacks is less than 10 years. Hence, at this stage, the Proposed Development Site is not expected to incorporate hydrogen fuel.	Opportunity: Low. Technology not proposed but may be explored further at the Reserved Matters stage

4. SUSTAINABLE DESIGN AND CONSTRUCTION MEASURES

Adapting to Climate Change

- 4.1 One of the main challenges facing the UK and new development is the need to mitigate and adapt to a changing climate. The Government is committed to tackling climate change and has an ambitious long-term goal of reaching net zero carbon emissions by 2050.
- 4.2 Climate change will cause the UK to become warmer, winters will become wetter, and summers will become drier. Adapting to this changing climate will impact on the design, construction, location, cost, and operation of all new buildings in the next few decades. One of the NPPF's core planning principles is to encourage development to consider climate change adaptation and mitigation during the planning process.
- 4.3 The following section outlines the key climate change mitigation and adaptation measures considered appropriate for this development based on the latest national guidance that include but is not limited to:
- i. Energy and Carbon Emission Reduction;
 - ii. Overheating; and
 - iii. Water Efficiency etc.

Energy and Carbon Emission Reduction

- 4.4 Developing energy efficient, low carbon buildings is a key objective of national/local policy, enforced through progressive changes to the Building Regulations which require the achievement of a target carbon performance for compliance.
- 4.5 Building performance is determined by a variety of factors including the efficiency of heating, cooling, DHW, ventilation, and lighting systems as well as building fabric performance, plant efficiencies, air permeability and the avoidance of overheating.
- 4.6 The Proposed Development is proposed to be compliant with Part L (2021) of the Building Regulations. It is anticipated that this performance will be achieved from a combination of passive design, energy efficiency and renewable technologies as described in the energy strategy (Chapter 3) above.
- 4.7 The anticipated all-electric, combustion-free operational energy strategy for on-site regulated energy demand recommended for the scheme will not only help to continuously reduce the development's operational emissions in line with the ongoing decarbonisation of the UK electricity grid but will also ensure that there will be no adverse effect on local air quality from local combustion.
- 4.8 The integration of a highly thermal efficient building envelope with Solar PV, Solar Thermal or Heat Pump etc will ensure potential occupants are protected against the high energy prices. Essentially, the fabric first approach provides protection against



fluctuations in both gas and electricity supply tariffs by inherently reducing energy consumption and expands the number of suitable energy generation & delivery options.

Overheating



- 4.9 Increasing summer temperatures increase the risk of overheating in new development, particularly in development with high standards of fabric efficiency and glazing.
- 4.10 To minimise the risk of overheating, the Proposed Development will utilise appropriate overheating mitigation measures (including thermal mass, glazing with low g-value, etc) and if required mechanical ventilation with heat recovery (MVHR) system to supplement or assist natural ventilation. Sufficient window opening area will also be provided in order to deliver additional means of ventilation when required to maintain the internal operative temperature.
- 4.11 An overheating assessment in accordance with Part O of the Building Regulations will be carried out at the Reserved Matters stage to assess the risk of overheating and ensure this aligns with both Air Quality and Acoustic Report findings.

Water Efficiency



- 4.12 Potable water is an increasingly important natural resource and with majority of the UK classes being in an area of moderate or severe water stress, the conservation of water is becoming a more significant sustainability metric.
- 4.13 Water usage on the Proposed Development construction Site will be identified and where water is being wasted, behaviours and/or technologies will be introduced to reduce water wastage.
- 4.14 The Proposed Development Site will aim to reduce water consumption during occupation through a range of water efficiency measures such as:
- i. Water metering to enable the monitoring of water consumption; and
 - ii. Dual flush WC, low flow fittings, fixtures, and appliances (if applicable)
- 4.15 An indicative water efficiency calculation (**Appendix 2**) has been carried out to establish the predicted water consumption for the residential element of the Proposed Development. This shows an estimated water consumption of 104 litres/person/day (l/p/d) which exceeds both the local target and Part G of the Building Regulations requirement of no greater than 105 l/p/d and 125 l/p/d respectively.
- 4.16 Rainwater harvesting offers a sustainable solution to water shortages. Water butt is a form of harvesting water, where water from drain pipes and/or natural rainfall is collected and stored in an over-ground container and is mainly used for the watering of garden plants. Homeowners with gardens are expected to see a reduction in the amount of mains water used. Pairing the water tank with a rainwater filter can further improve the quality of the harvested rainwater.



- 4.17 Water butt installation and the consideration of other rainwater harvesting measures will also be considered to further improve the overall water performance of the Proposed Development, as well as reduce surface run off. This will range from a simple rainwater collection/water butts for external use to rainwater collection for internal use such as WC flushing with details to be confirmed at the Reserved Matters stage.

Responsible Construction

- 4.18 In the first instance, the Principal Contractor shall register with the 'Considerate Constructors Scheme' (CCS) and shall seek to achieve an excellent CCS overall score in all categories.
- 4.19 This shall ensure the Proposed Development construction Sites shall be managed in an environmentally, socially considerate, responsible, and accountable manner. This is also a national scheme to raise standards in the industry and waste management is also a key consideration.
- 4.20 The Principal Contractor shall have an appropriate environmental management system (EMS) covering their main operations. The EMS could either third party certified to ISO 14001/EMAS or equivalent. During the construction phase, all areas of concern will be managed, including waste reduction strategies, noise and dust pollution, construction traffic and protection of any and all ecology features identified on the Site.
- 4.21 All waste materials during the construction phase will be managed in accordance with a Project Waste Management Plan and in accordance with all applicable waste legislation and the recommendations of the local authority. Contractors will furthermore monitor and set targets for, and monitor, energy usage, water usage and construction waste related to the Site for the duration of the works stage to encourage transparency and accountability.



Material

- 4.22 The use of materials is relevant to both the construction and operational phases of development. The aim of the Proposed Development is to minimise its overall environmental impact through the specification of sustainable materials that can be recycled at the end of their lifetime.
- 4.23 Using sustainable building materials and products promotes conservation of dwindling non-renewable resources. In addition, integrating sustainable building materials (including the use of recycled materials) into Proposed Development can help reduce the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these source materials.
- 4.24 All timber and timber-based products used on the project shall be Legally harvested and traded timber. The use of products with responsible sourcing certifications such as FSC and BES 6001 shall be actively encouraged. All materials shall also be responsibly sourced and where practical and feasible, materials shall be sourced from local suppliers, reducing the environmental impacts and CO₂ emissions associated with transportation to the Site. Scope for increased recycling will be incorporated wherever feasible by specifying recycled materials and materials with a high recycled content.



Waste and Recycling

- 4.25 The Proposed Development Site will ensure the minimisation of waste and maximisation of recycling of any waste generated during construction, and operation of Site.



Construction Waste Management

- 4.26 The Proposed Development will ensure consideration is given to sustainable waste management options in accordance with the principles of the waste hierarchy. Prior to the construction phase a Construction Environmental Management Plan (CEMP) will be developed to ensure the use of measures to minimise waste during the construction phases of the development, including the use of a scheme for recycling/disposing of waste arising from and construction works.
- 4.27 A Site Waste Management Plan (SWMP) could also be used to encourage reuse of materials, reduction of waste and recycling. The SWMP will include targets for resource efficiency and avoidance of materials for landfill, records shall be kept throughout construction to monitor progress against these targets.
- 4.28 The reduction, reuse and recycling of construction waste is to be prioritised through measures such as avoidance of over-ordering, supervision of deliveries, use of secure materials storage facilities and reuse of materials on site where feasible. In addition, the Proposed Development will be registered with the CSS and achieve certification against the Code of Considerate Practice.

Operational Waste Management

- 4.29 In accordance with the principles of the waste hierarchy the Proposed Development Site will make provision for the storage of non-recyclable waste and recyclable waste including dedicated storage to encourage the recycling of waste materials.
- 4.30 Full consideration will be given to the Council's waste management infrastructure and services to ensure that occupants have the necessary infrastructure to participate in any kerbside recycling services. The proposed strategy is also expected to include designated bin areas as the future occupier see fit. Wheelie bins will be clearly marked to identify recyclable waste and general waste.

Pollution

- 4.31 The Proposed Development will not result in a significant increase in pollution (into the air, soil, or any water body) by virtue of the emissions of fumes, particles, effluent, smell, heat, light, noise, or noxious substances. During the construction phase, all potential areas of concern will be managed including waste reduction strategies, noise and dust pollution, and construction traffic.



- 4.32 The impact of noise, particularly in residential developments (if required), may be minimised by the inclusion of high-performance acoustic materials and acoustic ventilation, or similar.

- 4.33 All external lighting will also be energy efficient, and suitable controls such as daylight detection and time-switches will be considered to minimise inappropriate use and light pollution.

Sustainable Transport

- 4.34 The Proposed Development will ensure the principles of sustainable transport hierarchy have been met to encourage sustainable modes of transport (walking/cycling/public transport). Designated pedestrian and cycle routes will be incorporated into the Proposed Development as shown in the Development Framework Plan (**Appendix 1**).
- 4.35 There are existing public transport facilities in proximity to the Proposed Development. Local bus routes operate near to the development site, along Basingstoke Road to the west of the site and along Hyde End Road to the north of the site.
- 4.36 To encourage cycling as a mean of transport, appropriate provision will be made for the movement of cyclists through the Proposed Development Site, as well as secure and covered cycle storage.
- 4.37 The Proposed Development will also provide infrastructure requirement for Electric Vehicles in accordance with Part S 2021 of the Building Regulations. Full details will be provided at the Reserved Matters stage.



Biodiversity

- 4.38 The Proposed Development Site will incorporate measures to support and enhance the environment through consideration of the existing site, including measures to mitigate the impact of the development and enhance the site's biodiversity net gain.



BREEAM

- 4.39 The BREEAM (Building Research Establishment Environmental Assessment Method) assessment, is a widely used sustainability rating system for buildings. The Proposed Development will adhere to Policy CC04 of the Managing Development Delivery Document, ensuring that non-domestic buildings achieve BREEAM "Excellent" certification. A comprehensive BREEAM assessment will be conducted at the Reserved Matters stage.



Flooding

- 4.40 The Proposed Development Site lies within Flood Zone 1 (**Figure 4.1**) of the Environment Agency's Risk Flood Map, which is defined as having a low probability of flooding.

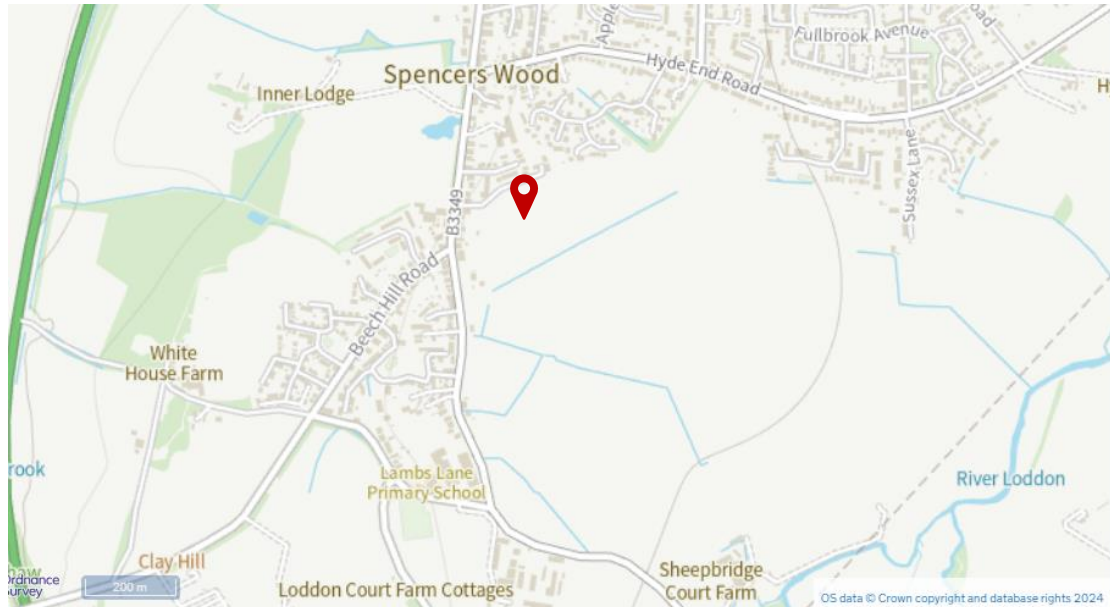


Figure 4.1: Proposed Development Site Flood Map (Flood Map for Planning)

5. CONCLUSION

- 5.1 This Energy and Sustainable Design Statement has been produced in support of a planning application for the Proposed Development known as Spencers Wood, Wokingham in accordance with Wokingham Borough Council's adopted Core Strategy (2010) Policy CP1 (Sustainable development) and the Managing Development Delivery Document (2014) Policies CC04 and CC05, following the guidance detailed in the Sustainable Design and Construction SPD (2010), Developers Guidance Note for Renewable Energy Requirement (2010) and the Climate Change Interim Policy Position Statement (2022).
- 5.2 This Energy and Sustainable Design Statement sets a framework for the energy and sustainable design strategy for the development Site and outlines the Site's approach to energy efficiency, renewable energy generation and sustainable development incorporating climate change resilience and carbon management measures. It summarises the key planning policy which is pertinent at the time of writing and is aimed at satisfying both energy and sustainable design related requirements. The development will follow the new Part L (2021) standard to ensure the Proposed Development is future proofed for the longer term and ready to meet the Future Homes/Buildings Standard.

ENERGY SUMMARY

- 5.3 The Proposed Development will adopt the use of an energy hierarchy and a holistic approach to sustainability to meet National best practice guidance and Wokingham Borough Council's objectives for energy consumption reduction, carbon dioxide emissions [CO₂] reduction and sustainable design and construction. The energy hierarchy aims to reduce energy demand and carbon dioxide emissions through passive design measures and a 'fabric first' approach (Be Lean) before seeking to reduce the remaining demand by the cleanest means possible. This includes exploiting local energy resources/supplying energy efficiently and cleanly (Be Clean), and finally exploring the opportunities for producing, storing, and using renewable energy on-Site (Be Green).
- 5.4 Be Lean Summary: The Proposed Development envelope and services will be specified in accordance with the new Part L (2021) of the Building Regulations to ensure energy consumption via space heating and cooling is reduced. Passive solar consideration will also form an integral part of the Proposed Development design to ensure excessive solar gains and heating/cooling loads are reduced, hence providing a more comfortable internal environment for occupants. The final fabric specification, building services specification and provision of energy efficiency measures including measures to alleviate any potential risk of overheating will be confirmed at the Reserved Matters stage and via Part L 2021 energy modelling and overheating assessment of the proposal.
- 5.5 Be Clean Summary: A feasibility study on connecting to a district heating network has been conducted for the Proposed Development site. The results show that there are no operational or planned district heat networks within 500m of the site. The suitability of a new site-wide heat network such as a Centralised Air Source Heat Pump Energy Centre can be considered for the Proposed Development site, however due to the size of the

Proposed Development, this can be discounted as the proposed site is not large enough in scale to justify a new centralised heat network.

- 5.6 Be Green Summary: The feasibility of renewable energy generation concluded that the most appropriate recognised on-Site renewable energy technologies with high to medium opportunities for the Proposed Development Site are Solar Photovoltaic (PV), Air Source Heat Pump, Solar Hot Water, Wastewater Heat Recovery, and Ground Source Heat Pump. Technologies with low opportunities such as Wind Turbine, Biomass, Water Source Heat Pump, Small Scale Hydro Power, Geothermal, Transpired Solar Air Collector, Waste Heat, Hydrogen Fuel and Wave/Tidal Power etc have been discounted at this stage based on a balanced consideration of the policy requirements, financial viability, and technical feasibility.
- 5.7 The specified technology/technologies in line with the recommendations of the feasibility study will be confirmed at the Reserved Matters stage and via Part L (2021) energy modelling of the proposal. The exact percentage reduction in terms of energy and/or CO₂ emissions will be in accordance with the National and the Local Authority (Wokingham Borough Council's) policy requirement/target. Energy storage will also be considered as part of the renewable energy technologies for optimising system performance and balancing surplus electrical/thermal energy production.
- 5.8 The above energy strategy has been developed in line with Policy CP1 (Sustainable development) of Wokingham Borough Council's adopted Core Strategy, Policies CC04 and CC05 of the Managing Development Delivery Document, and guidance detailed in the Sustainable Design and Construction SPD, ensuring a minimum 10% carbon emission reduction relative to the Part L Target Emissions Rates. It also details various strategies for the Proposed Development to deliver a sustainable and low carbon building design driven by innovative technologies at the Reserved Matters stage.

SUSTAINABLE DESIGN AND CONSTRUCTION SUMMARY

- 5.9 In addition to the energy and CO₂ emissions savings opportunities identified above, the Principal Contractor shall register with the 'Considerate Constructors Scheme' (CCS) and shall seek to achieve an excellent CCS overall score in all categories, including:
- 5.10 Material: The aim of the Proposed Development will be for its overall environmental impact to be minimised through the specification of sustainable materials. This will include using sustainable building materials and products and ensuring all timber and timber-based products used on the project are Legally harvested and traded timber.
- 5.11 Water: The Proposed Development will aim to reduce water consumption during occupation through a range of water efficiency measures such as dual flush WCs; water meter; low flow fittings and fixtures, etc. Water butt installation and the consideration of other rainwater harvesting measures will also be considered to further improve the overall water performance of the Proposed Development, as well as reduce surface run off.
- 5.12 Waste: The Development will ensure consideration is given to sustainable waste management options. In accordance with the principles of the waste hierarchy, the Site

will make provision for the storage of non-recyclable waste and recyclable waste including dedicated storage to encourage the recycling of waste materials.

- 5.13 Sustainable Transport: The Proposed Development will ensure the principles of sustainable transport hierarchy have been met by prioritising sustainable modes of transport (walking, cycling and public transport) ahead of cars wherever feasible. As well as providing the infrastructure requirement for EV charging points to each property.
- 5.14 Pollution: The Proposed Development will not result in a significant increase in pollution (into the air, soil, or any water body) by virtue of the emissions of fumes, particles, effluent, smell, heat, light, noise, or noxious substances.
- 5.15 Overheating: To minimise the risk of overheating, the Proposed Development will utilise appropriate overheating mitigation measures [including shading (overhang) and glazing with low g-value] and will also consider mechanical ventilation with heat recovery (MVHR) system where appropriate.
- 5.16 Biodiversity: The Proposed Development Site will incorporate measures to support and enhance the environment through consideration of the existing Site, including measures to mitigate the impact of the development and enhance the Site's biodiversity net gain.
- 5.17 BREEAM: The Proposed Development will adhere to Policy CC04 of the Managing Development Delivery Document, ensuring that non-domestic buildings achieve BREEAM "Excellent" certification.
- 5.18 There are a host of other areas of sustainability which are considered within other discipline's reports.
- 5.19 This Energy and Sustainable Design Statement presents a vision for the Proposed Development as Spencers Wood, Wokingham to deliver a secure, sustainable, low carbon design driven by innovative technologies, enabling the Proposed Development to achieve the National and Local (Wokingham Borough Council's) carbon and sustainable design targets whilst reducing its reliance on the UK National Grid.

APPENDICES

APPENDIX 1: Spencers Wood Development Framework Plan



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KEY

	SITE BOUNDARY		PRIMARY AVENUE		KEY FOOTPATHS		AREAS OF PLAY
	RESIDENTIAL DEVELOPMENT		INDUSTRIAL ROAD		SANG WALKING ROUTE		SUSTAINABLE DRAINAGE
	SCHOOL SITE		SECONDARY STREETS		EXISTING VEGETATION		PARKING
	LOCAL CENTRE		TERTIARY STREETS		PROPOSED PLANTING		POTENTIAL HIGHWAYS UPGRADES
	EMPLOYMENT USES		PRIVATE LANES		NEW TREE PLANTING		MEETING POINTS
	SANG BOUNDARY		SHARED SURFACE STREET/MEWS		COMMUNITY ORCHARD		POTENTIAL CONNECTIONS TO EXISTING MOVEMENT ROUTES
	GP SURGERY		PROPOSED EMERGENCY		PUBLIC OPEN SPACE		
	CARE HOME FACILITY		EXISTING PUBLIC RIGHTS OF WAY		MULTI-FUNCTIONAL OPEN SPACE AND PAVILION		
	ACCESS VIA BASINGSTOKE ROAD		ACTIVE TRAVEL ROUTES		EXOLLUM PIPELINE		

KEY PRINCIPLES

1. PRIMARY ACCESS VIA BASINGSTOKE ROAD;
2. PRIMARY AVENUE THROUGH DEVELOPMENT;
3. SECONDARY STREETS;
4. TERTIARY STREETS;
5. FULLY CIRCULATORY CYCLE/ PEDESTRIAN ROUTES PROVIDING ACCESS TO ALL AREAS OF PUBLIC OPEN SPACE AND SURROUNDING INFRASTRUCTURE;
6. NEWLY CREATED SANG (GROVELAND COUNTRY PARK) PROVIDING A 2.3KM FULLY CIRCULATORY PEDESTRIAN ROUTE;
7. LANDSCAPED COMMONS AND GREENS PROVIDING RECREATIONAL SPACE FOR ALL AGES;
8. COMMUNITY SPACES IN THE FORM OF MULTI-FUNCTIONAL OPEN SPACES AND A COMMUNITY ORCHARD;
9. LANDSCAPED GREENWAYS PROVIDING PUNCTUATION THROUGH DEVELOPMENT AND AREAS FOR ADDITIONAL PLANTING;
10. MAXIMUM RETENTION OF EXISTING VEGETATION;
11. POTENTIAL CYCLE/ PEDESTRIAN CONNECTIONS TO EXISTING MOVEMENT ROUTES;
12. POTENTIAL HIGHWAYS IMPROVEMENT TO EXISTING HIGHWAYS TO FACILITATE CYCLE AND PEDESTRIAN MOVEMENT;
13. SITE LOW POINTS UTILISED FOR SUSTAINABLE DRAINAGE;
14. NATURALISED WILDLIFE PONDS (FALLING WITHIN SANG BOUNDARY);
15. MAXIMUM OUTWARD FACING DEVELOPMENT FOR NATURAL SURVEILLANCE;
16. VIEWING CORRIDORS PROVIDING OPPORTUNITY TO ENJOY FAR-REACHING VIEWS OVER RIVER LODDON AND LOCAL COUNTRYSIDE;

APPENDIX 2: Indicative Water Efficiency Calculator

Project Name	Spencers Wood
Project Number	233424
Date	27-Feb-24
Revision	P01
Status	S2
Author / Consultant	Ariana Beepath BASc (Hons) MSc

Water Efficiency Calculator				
Installation type	Unit of measure	(1)	(2)	(3)
		Capacity / flow rate	Use Factor	Fixed use (litres/person/day)
				(1x2 +3)
WC (single flush)	Flush volume (litres)	0.00	4.42	0
WC (dual flush)	Full flush volume (litres)	4.50	1.46	0
	Part flush volume (litres)	3.00	2.96	0
WC's (multiple fittings)	Average effective flushing volume (litres)	0.00	4.42	0
Taps (excluding kitchen / utility room taps)	Flow Rate (litres/min)	4.00	1.58	1.58
Bath (where shower also present)	Capacity to overflow (litres)	170.00	0.11	0
Shower (where bath also present)	Flow rate (litres/min)	7.50	4.37	0
Bath only	Capacity to overflow (litres)	0.00	0.50	0
Shower only	Flow rate (litres/min)	0.00	5.60	0
Kitchen / Utility sink taps	Flow Rate (litres/min)	6.00	0.44	10.36
Washing Machine	litres/Kg (dry load)	8.17	2.10	0
Dishwasher	litres/place setting	1.25	3.60	0
Waste disposal unit	litres/use	0.00	3.08	0
Water softner	litres/person/day	0.00	1.00	0
	(5)	Total calculated use =		109.482
	(6)	Contribution from greywater =		0
	(7)	Contribution from rainwater =		0
	(8)	Normalisation factor		0.91
	(9)	Total water consumption (5-6-7)x8 =		99.63
	(10)	External water use =		5.00
	(11)	Total water consumption = (litres/person/day)		104.63

Building Regulations Part G - Regulation 36

The potential consumption of wholesome water by persons occupying a new dwelling must not exceed

125 litres/person/day.

Calculated above in accordance with the methodology set out in BR Part G - 2016

Wokingham Borough Council Managing Development Delivery Document: Policy 2014

The potential consumption of wholesome water by persons occupying a new dwelling must not exceed

105 litres/person/day.

Notes;

1 - Washing machine and dishwasher figures input as mandatory figures, no information available.

2 - All other appliances including bath capacity, tap, kitchen tap and shower flow rates assumed

