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MERTON COLLEGE

SITE PR9: LAND WEST OF YARNTON

ENERGY STATEMENT

DECEMBER 2022

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ENERGY STATEMENT

DECEMBER 2022

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TABLES

FIGURES

1 EXECUTIVE SUMMARY

1.1.1 This Energy Statement sets out an energy strategy for the Proposed Development of Site PR9: Land West of Yarnton. It is submitted in support of an Addendum to a planning application submitted by Merton College to Cherwell District Council in October 2021 (ref. 21/03522/OUT).

1.1.2 The strategy has the Energy Hierarchy at its core to minimise carbon emissions. This encompasses a 'Be Lean, Be Clean, Be Green' methodology. The design, specification and construction of the buildings will be planned to achieve the specifications of the Future Homes Standard. Table 1.1 summarises the proposed measures and how the Energy Hierarchy has been implemented in the design of this strategy. The application of the Energy Hierarchy will depend on the build out date, for dwellings prior to Part L 2025 will be built to comply with the interim FHS 2021. After it comes into force, dwellings will be built to the higher standard and will require more renewable and low carbon technologies to be fitted.

Energy Hierarchy	**Part L 2021 Proposed Dwelling**	**Part L 2025 Proposed Dwelling**
Be Lean		
Modern methods of construction	Decided at Reserved Matters stage	Decided at Reserved Matters stage
Optimising orientation and site layout	Yes	Yes
Solar shading	Yes	Yes
Natural Ventilation	Yes	Yes
Energy Efficient Building Fabrics	Exceed building regulations	Exceed building regulations
Window glazing	Double glazed	Triple glazed
Lighting	LED	LED
Appliances	'A' rated	'A' rated
Be Clean		
District Heating Network	No	No
Gas CHP	Not feasible	Not feasible
Be Green		
GSHP	Either GSHP or ASHP	Yes
ASHP	Either GSHP or ASHP	Yes
Solar PV	No	All dwellings
WWHR	No	Yes
EV Infrastructure	All dwellings (subject to cost cap)	All dwellings (subject to cost cap)

Table 1.1: Energy Strategy for Site PR9 Land West of Yarnton

1.1.3 Although the exact specifications are not definitive at this stage, some specifications are given for the levels of fabric efficiency proposed for the Proposed Development under current and future building regulations. These figures are a slight improvement on the Future Homes Standard which is the current government pathway to zero carbon homes.

1.1.4 The feasibility of both District Heating and Combined Heat and Power has been explored but is unlikely to be viable for the Proposed Development.

1.1.5 The use of renewable and low carbon technologies within the Proposed Development will be vital to achieving the carbon reductions required under the Future Homes Standard. A combination of solar photovoltaics, waste water heat recovery, ground source heat pumps and air source heat pumps will therefore be utilised to achieve the Future Homes Standard and are core to the recommended approach.

2 INTRODUCTION

2.1 Overview

2.1.1 In October 2021, an outline planning application ('the Application') was submitted by Gerald Eve LLP on behalf of Merton College ('the Applicant') to Cherwell District Council ('CDC') for a residential-led mixed use development ('the Proposed Development') on the site known as PR9, Land West Of Yarnton ('the Site'). The Application has CDC reference no. 21/03522/OUT.

2.1.2 The Applicant now wishes to make an Addendum Submission to the Application, and Wardell Armstrong is appointed to produce this Energy Statement to accompany the submission.

2.2 The Site

2.2.1 The Site consists of land allocated for development by Policy PR9 of the adopted Cherwell Local Plan 2011-2031 Part 1 Partial Review of the Cherwell Local Plan – Oxford's Unmet Housing Needs. The PR9 allocation as a whole comprises a single parcel of land totalling approximately 99 hectares. The proposed area for development within the allocation (the Site) comprises approximately 25 hectares.

2.2.2 The PR9 allocated area is predominantly farmland lying to the west and north of Yarnton. The allocated area proposed for development is outside the designated Green Belt.

2.2.3 Regarding utility apparatus, the northern half of the Site is crossed by 33kV and 11kV HV overhead lines. To the south are two operational Thames Water rising mains for sludge and foul water. Together with the 33Kv line, these cross the A44, connecting into the adjacent PR8 allocation.

2.3 The Proposed Development

2.3.1 The Application was submitted as outline, with all matters reserved, save for the principal access points. The key aspects of the proposal can be summarised as follows:

- Up to 540 dwellings (Use Class C3) on approximately 25 hectares split into seven development parcels. Average net density to be around 40 dwellings per hectare;
- The provision of 50% of dwellings as affordable;
- Overall housing mix, tenure and size in line with the requirements of Policy PR2;

- Up to 9,000 sq. m GEA of elderly/extra care residential floorspace (Use Class C2);
- Provision of a Community Home Work Hub (up to 200 sq. m) (Use Class E);
- Retention and integration of Yarnton Medical Practice into the development;
- Two Local Equipped Areas for Play and one Neighbourhood Equipped Area for Play;
- Provision of 1.59 hectares for playing pitches and amenity space, enabling William Fletcher Primary School to expand within its existing site;
- Two vehicular access points, one to the north via the A44 and the second to the south, via Rutten Lane;
- Green infrastructure and areas of public open space based on the retention of veteran trees and provision of a network of swales and attenuation ponds. Incorporation of existing hedgerows into the layout, maintaining connectivity with retained and restored hedgerows passing through open habitat. New tree planting amongst strips of grassland to buffer retained habitats from development and reinforce the movement of wildlife.

2.4 **The Addendum Submission**

2.4.1 It is understood that the Addendum proposes no significant changes to the development, and that the overall mix and quantum of floorspace proposed remains as set out in the Application. The principal purpose of the Addendum Submission is to clarify a range of technical and other queries following extensive local stakeholder engagement undertaken since the Application was submitted.

2.5 **Purpose and Scope of this Statement**

2.5.1 This statement addresses issues raised by CDC's case officer in a letter dated 22nd September 2022, as follows:

"It is noted that no sustainable strategy or energy statement has been submitted with the application. Policies ESD1-5 of the Cherwell Local Plan 2015[1] require the consideration of sustainable construction matters through the submission of planning applications. In addition to the policies requirements below, the 'Future Homes

[1] Hereafter referred to as 'the Local Plan'

Standard' which will apply from 2025 are likely to be relevant to the development and therefore should also be considered at this stage.

Policy ESD1 – Mitigating and Adapting to Climate Change, recognises the increasing need to reduce carbon emissions in order to reduce and adapt to the impacts of climate change by locating development in sustainable locations, increasing energy efficiency and increasing the use of renewable or low carbon energy sources. Mitigating and adapting to the impacts of climate change are an important priority for the District.

Policy ESD2 – Energy Hierarchy and Allowable Solutions requires an Energy Statement to be submitted with all major development applications and that all non-residential development demonstrates how the energy hierarchy has been applied.

Policy ESD3 – Sustainable Construction, sets out the Council's approach to implementing the first step of the energy hierarchy in Policy ESD2, especially the encouragement of the use of sustainable design and construction. Policy ESD3 states:

(i) all new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy and

(ii) (ii) that all new non-residential development will be expected to meet at least BREEAM 'very good'. Any application should be accompanied by an Energy Statement which outlines how the proposal will meet the criteria set out in the policy.

Policy ESD4 – Decentralising Energy Systems, requires that all applications for non-domestic development above 1,000m2 floorspace and/or more than 100 dwellings include a feasibility study for the provision of District Heating and Combined Heat and Power. Where this is demonstrated to be viable, it should be provided on site. Details will need to be included as part of this application submission for consideration.

Policy ESD5 – Renewable Energy, requires a feasibility assessment of the potential for significant on-site renewable energy provision for all residential developments of 100 or more dwellings.

Demonstration of climate change mitigation and adaption measures is also a key design and place shaping principle which is not addressed through the submission or the Design and Access Statement. It is vital that this is considered at the initial design stage and not considered as an afterthought once consent is granted for the development of the site.

The consideration of the above is becoming more pertinent having regard to climate change, Government law, policy and targets, guidance within the national Planning Policy Framework and Cherwell District Council's Climate Change Emergency Declaration".

2.5.2 We have sought to meet the requirements of Policies ESD 1-5 by :

- Identifying opportunities for emission savings across the Proposed Development in line with building regulations and the application of the Energy Hierarchy;
- Considering suitable design methods and specifying how Building Regulations will be met;
- Investigating the possibility for District Heating and Combined Heat and Power through a feasibility study; and
- Identifying opportunities for making use of significant on-site renewable energy provision (above any required to meet national building standards).

3 ENERGY REQUIREMENTS

3.1 Phasing

3.1.1 Subject to outline planning permission being granted, it is anticipated that construction of the Proposed Development could commence in 2024.

3.1.2 Appendix B sets out the current buildings regulations and introduces the Future Homes Standard ('FHS') which is the government's current net zero buildings strategy. The interim FHS came into force in 2022. The full FHS is set to be introduced in 2025, with regulations likely to come into force in 2026.

3.1.3 The Proposed Development is likely to commence during the interim period, but the majority of the Proposed Development will be constructed post 2026 when the more stringent full FHS regulations will be in operation.

3.1.4 Since the Application is currently at outline stage, this report sets out a broad strategy for deploying the most likely options and technologies. The precise details will then be established through subsequent reserved matters submissions, once the eventual builder(s) have been selected and they have prepared their detailed proposals.

3.2 Energy Hierarchy

3.2.1 Policy ESD2 requires developments to be in line with standard practice and to apply the energy hierarchy.

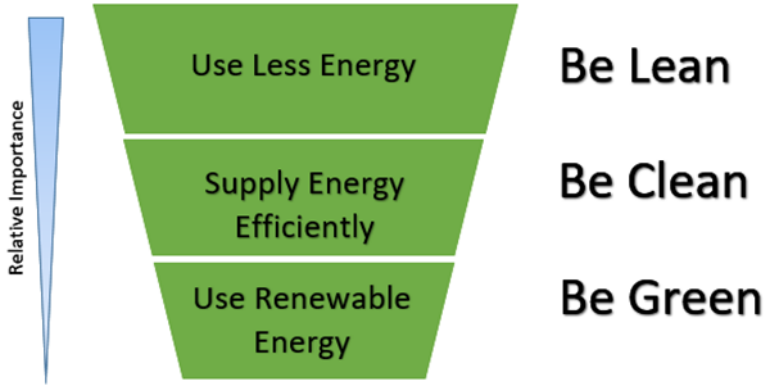

Figure 3.1: Energy Hierarchy

3.2.2 Policy ESD2 also includes a fourth tier for 'allowable solutions.' Allowable solutions were formerly part of the Government's earlier strategy for zero carbon homes (the Code for Sustainable Homes) but this was abandoned in 2015. The idea was that where it was not technically feasible to deliver zero carbon homes on-site, developers would be allowed to pay into a scheme to provide off-site solutions and effectively offset their emissions.

3.2.3 After the removal of the Code for Sustainable Homes and the zero carbon homes requirement, delivery of 'zero carbon ready homes' is intended to be achieved through the introduction of the Future Homes Standard. As previously discussed, this seeks to require new dwellings constructed after 2025 to reach a 75-80% emission reduction compared to Part L 2013, with the remainder of the carbon savings expected to be delivered from the decarbonisation of the electricity grid.

3.2.4 As allowable solutions are no longer part of central Government's carbon reduction approach, and there is no known mechanism through which to implement an equivalent local scheme, the fourth tier of the Energy Hierarchy has not been considered as part of in this assessment.

4 BE LEAN: SUSTAINABLE BUILDING DESIGN

4.1 Introduction

4.1.1 The first element of the Energy Hierarchy is “Be Lean”. This encompasses measures intended to reduce emissions that are inherent in a building’s design, specification and construction. It also includes other energy efficiency measures which can be incorporated into the day-to-day operation of a building, such as the use of energy efficient lightbulbs and smart meters.

4.2 Modern Methods of Construction

4.2.1 Modern Methods of Construction (‘MMC’) are important as they assist with improving construction efficiency and overall performance whilst reducing material wastage.

4.2.2 The term modern methods of construction (or ‘smart construction’) is used to describe a set of building techniques centred around the off-site production of panels which can be easily assembled on-site.

4.2.3 The decision to include MMC will be taken at the Reserved Matters stage, however MMC is not essential to achieve the fabric standards proposed.

4.3 Optimising orientation and Site layout

4.3.1 Given the existing constraints imposed by the Site location and its surrounding environment, the building design has been developed to optimise passive gains and meet design criteria for overheating and cooling. Consequently, it has aimed to strike a balance between enabling sufficient daylight to be received throughout the year, taking advantage of solar gains during the winter and avoiding excessive heat gains during the summer. Achieving this will reduce requirements for artificial lighting and active heating and cooling thereby minimising emissions.

4.4 Solar Shading

4.4.1 The Proposed Development will retain a number of veteran trees. These will provide a degree of solar shading to ground floor areas, aiding their ability to avoid overheating during summer.

4.5 Natural Ventilation

4.5.1 Where possible, residential units will incorporate dual aspect provision within the design to help provide natural cross ventilation. Opportunities to provide higher floor to ceiling heights and high-level vents will similarly improve natural cross ventilation.

4.5.2 Whilst natural ventilation is intended to be the primary means of cooling and ventilating, provision of mechanical extraction ventilation is also proposed to help control humidity and help prevent overheating.

4.6 Energy Efficient Building Fabrics

4.6.1 The thermal performance of building fabrics is a key part of energy efficiency. A material's thermal transmittance is expressed in its U-value which describes the rate of heat transfer through that material's per unit temperature difference. High performance materials will have a low U-value.

4.6.2 The U-values intended for the Proposed Development will meet or exceed those specified in the building regulations applicable at the commencement of construction.

4.6.3 Emission reductions associated with the outline elements are not considered in detail as the design of those elements is not yet fixed and will be set out at the Reserved Matters stage.

4.6.4 It is proposed that initial emissions reductions will be made through improvements in fabric efficiency and air tightness, exceeding the emissions reductions required to meet the proposed Part L for both the interim FHS 2021 and FHS 2025. Whilst the proposed figures provided below in Table 4.1 are not definitive at this stage, they are representative of a building constructed under current Part L 2021 building regulations as well as a building designed to comply with the likely requirements for Part L 2025. The proposed figures are a slight improvement on the nominal building regulations specification for each period ensuring that minimum standards are exceeded.

	Part L 2021 Proposed Specification	Part L 2025 Proposed Specification
External Wall U-value (W/m^2K)	0.17	0.15
Corridor Wall U-value (W/m^2K)	0.17	0.18
Party Wall U-value (W/m^2K)	0	0
Roof U-value (W/m^2K)	0.10	0.11
Floor U-value (W/m^2K)	0.13	0.11
Window U-value (W/m^2K)	1.2	0.8
Window g-value	0.63	0.57
Door U-value (W/m^2K)	1	1
y-value (W/m^2K)	Based on option 1 psi values in table R2 of SAP 10.1	Based on option 1 psi values in table R2 of SAP 10.1
Ventilation system type	Intermittent extract fans with trickle vents	Intermittent extract fans with trickle vents
Air permeability ($m^3/h\ m^2$ at 50Pa)	5	4 (below 3 requires MVHR)

Table 4.1: Indicative fabric specification for Site PR9 Land West of Yarnton

4.7 Glazing

4.7.1 The specification of the glazing for the buildings within the Proposed Development is expected to meet or exceed Part L 2021 and 2025, which is expected to require a U-value of 0.12 W/m^2K and 0.8 W/m^2K respectively.

4.7.2 As a general principle, all windows will be triple glazed once the full FHS comes into force and, where possible, all windows will be opening, with suitable restrictors for safety and security, to prevent risk of overheating and aid ventilation, when required.

4.8 Lighting and Appliances

4.8.1 All dwellings will incorporate 100% low energy LED lighting. This will reduce the energy required to light the dwellings, thereby reducing emissions as well as aiding overheating provision by reducing additional sources of heat from the development.

Any indoor communal areas that may be present such as corridors, stairwells and external lighting will be 'A' rated for energy efficiency in design as well.

4.8.2 In most cases the provision of domestic appliances and white goods will be the responsibility of the individual homeowners and tenants rather than the Applicant (or developers who build out the Proposed Development) but, where control over the choice of any appliance does lie with the Applicant (or developer) a preference for energy efficient technology will be assumed. Steps will also be taken to provide information to new residents on the advantages of choosing energy efficient appliances.

4.8.3 Smart meters for electricity and heating will be included in every unit. It is intended that these will display instantaneous and cumulative consumption figures as well as information about the cost of energy being used. This will aid residents by informing them about the costs of their lifestyle choices and hopefully lead to a reduced energy consumption overall.

5 BE CLEAN: SUPPLY ENERGY EFFICIENTLY

5.1.1 The "Be Clean" element of the Energy Hierarchy is intended to examine the potential contribution of district heating and Combined Heat and Power ('CHP') for the Proposed Development.

5.1.2 Policy ESD 4: Decentralised Energy Systems requires developments to assess the feasibility of District Heating and CHP, including the consideration of biomass fuelled CHP.

5.2 District Heating

5.2.1 District heating uses centralised heat sources that then provide heating throughout a network of connected buildings, which is available via pre-insulated pipes.

5.2.2 District heating is widely championed due to perceived efficiency gains from a centralised energy centre, however, its application is not so simple. There is considerable cost associated with the installation of such a network and, although highly insulated pipes are used to deliver the heat, there will be network losses and pumping losses associated with delivering the heat to individual properties. There are also some losses associated with Heat Interface Units ('HIU') or heat exchangers.

5.2.3 Using the UK CHP Development Map[2] the location of both district heating schemes and local heat loads can be assessed however it confirms that there are no existing district heat networks or large heat loads close to the Site with which a connection could be made.

5.2.4 District Heating can be a viable option where there is a high density of housing, particularly in high rise accommodation and where existing heat networks are already in place which can be connected to. However, given the relatively low overall residential density of the Proposed Development , the absence of existing heat networks to connect to, and the fact that the high fabric efficiency that is being strived for will ultimately minimise the requirement for high temperature heating, site-wide district heating is not considered to be a viable option for the Proposed Development.

5.3 Gas Combined Heat and Power ('CHP')

5.3.1 A review of the UK CHP Development map shows low levels of domestic heat loads that cover the Site[3], and confirms that there are no existing CHP stations in close proximity to the Site and due to carbon and air quality concerns, no new gas CHP plants would be considered desirable. CHP systems rely on combustion technology and there have an impact on air pollution. The precise air quality impact will be dependent on the performance of the CHP plant. Whilst gas CHP is more efficient at delivering heat than individual gas boilers in each dwelling, it is still generating energy from the combustion of a fossil fuel which results in carbon emissions entering the atmosphere. As such we can discount gas CHP at this stage.

5.3.2 Other CHP

5.3.3 The Renewable & Low Carbon Energy map at Appendix 5 of the Local Plan shows the broad potential for decentralised heat supply in the District, illustrating any potential waste heat sources, the existing DH/CHP schemes in the District that could be extended, the off-gas areas, and the typical major users of heat that could anchor a district heating system. However, this map does not identify any District Heating or Potential Heat Sources in the immediate vicinity of the Site.

5.3.4 Biomass CHP has been considered but not taken further due to a lack of feedstock available in the local area. The system would need to rely on imported biomass or

[2] UK CHP Development Map represents heat demand across the United Kingdom. Available at https://chptools.decc.gov.uk/developmentmap

[3] BEIS (2022) *UK CHP Development Map.* Available from: https://chptools.decc.gov.uk/developmentmap [Accessed 24 November 2022].

develop partnerships with local farmers which would be in direct competition with food crops. This is not considered to be a sustainable solution in the long term.

The closest is an anaerobic digestion ('AD') plant operated by Severn Trent Green Power which at its nearest point to the residential and non-residential building elements of the Site is 1.1km to the south (see location in orange fill at Figure 5.1 below, together with the redline boundary of the Application Site):

Figure 5.1: Red Line Boundary with 3km Buffer

5.3.5 Figure 5.1 shows the red line boundary of the Site with a 3km buffer from the centre of the Application Site. The residential and non-residential elements of the Site lie within the parcel of land filled with light blue. A 3km buffer was chosen as a distance where infrastructure works could theoretically be undertaken at a feasible cost. We have undertaken a visual assessment of the land uses within this buffer, considering

any sites likely to be potential heat sources which could be used. The AD plant was the only one identified.

5.3.6 We have contacted the operators of the plant and discussed the feasibility of using the waste heat from the AD plant as part of a CHP system at the Proposed Development. The outcome from the discussion was that the waste heat from the AD plant is unsubstantial in the winter, and the costs to get this heat to the development are too large to justify. AD plants rely on ambient heat and so the heat output will be lowest when the requirement from the development is highest. Additionally, the lifespan of the AD plant creates a commercial challenge for the supply of long-term waste heat.

5.3.7 Another key obstacle to the feasibility of building the infrastructure to supply the Proposed Development is that a railway line runs between the AD plant and the Proposed Development. This provides a further challenge to delivering the pipework required for such a scheme and would likely make the infrastructure costs untenable. The engineering, regulatory and licensing issues caused by providing pipework under the railway tracks would be substantial.

5.3.8 The higher the fabric efficiency the less economically feasible district heating becomes. As the majority of the Site is likely to be built after the 2025 FHS, the economic case for district heating will be also diminished.

6 BE GREEN: RENEWABLE ENERGY TECHNOLOGIES

6.1.1 The next level of the Energy Hierarchy is 'Be Green' which focuses essentially on how to best incorporate renewable technologies into proposed developments.

6.1.2 Several renewable and low carbon energy options have been considered in detail to determine their suitability for meeting the energy requirements for the Proposed Development.

6.2 Ground Source Heat Pumps ('GSHPs')

6.2.1 GSHPs can be used to meet space heating requirements. They are generally suited to buildings which require low-level continuous heating, and which have good levels of fabric efficiency. GSHP systems can use horizontal trench-based loops (slinky) or vertical borehole-based ground loops, the latter being more expensive but requiring significantly less space. It is not considered to be particularly practical to operate a horizontal system at this location, where ground space is at a premium. Allocation of ground space for boreholes would also be restricted by the construction of the buildings themselves.

6.3 Air Source Heat Pumps ('ASHPs')

6.3.1 ASHPs operate in a similar way to ground source heat pumps but do not have the same requirements for ground availability or subsurface freedom.

6.3.2 Instead of 'pumping' heat from the ground they extract low grade heat from the outside air around the Development. The heat is absorbed into a refrigerant working fluid which is passed through a compressor allowing its temperature to be increased. The working fluid delivers its heat to the heating circuits before expanding and cooling ready to be circulated again.

6.3.3 Since the refrigeration cycle draws in heat from the surroundings, less input energy is required to achieve a set level of heating that would be the case for a conventional heating system. The ratio of input energy to heat energy obtained is referred to as the heat pump's co-efficient of performance ('CoP').

6.3.4 The seasonal co-efficient of performance ('SCoP') provides a more realistic indication of the energy efficiency of the system by taking account of seasonal variations in performance. In lower ambient air temperatures, an air source heat pump will need to work harder to absorb enough energy to reach a desired temperature and this will reduce the system efficiency overall.

Figure 6.1: Example of a Mitsubishi Ecodan ASHP

(www.mitsubishi-electric.co.nz/images/product/large/PUHZ-W50VHA-EHPT20X.jpg)

6.4 Solar Photovoltaic ('PV')

6.4.1 Solar PV is not expected to be required at the development prior to 2026. Once the full FHS 2025 comes into force all dwellings are expected to include solar PV as well as

all non-residential elements of the building mix. PV systems will also be fitted with solar diverters. These diverters convert excess PV power into hot water rather than exporting it to the grid, maximising the benefits for homeowners.

6.4.2 Solar PV is now an established technology in the UK house-building market. There are a large number of solar PV manufacturers producing panels for the UK, including from Europe, America and China.

6.4.3 PV panels are made from collections of PV cells which, in turn, are made from layers of semi-conducting (usually silicon) material. When sunlight falls on to the cell it creates an electric field across the layers. The more intense the sunlight is, the more electricity is produced.

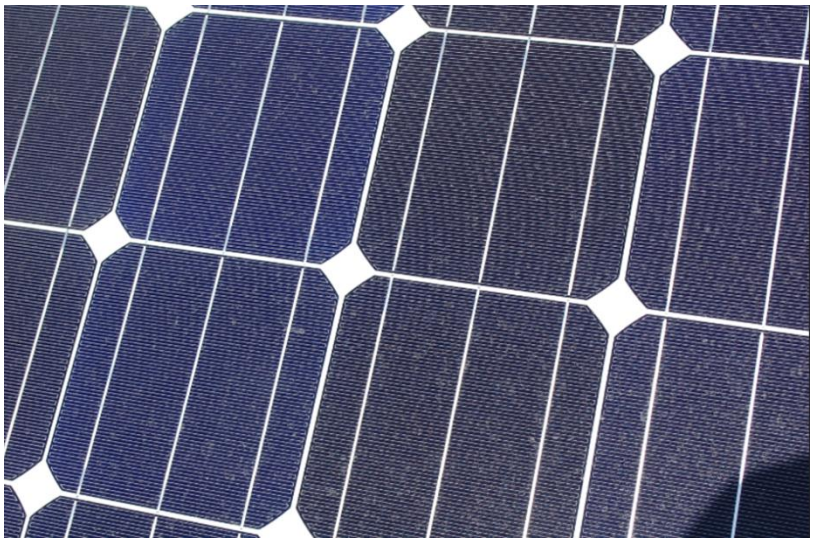

Figure 6.2: Solar PV Cells

6.4.4 The power of a PV cell is measured in watts peak ('Wp'), or kilowatts peak ('kWp'). This describes the rate at which it generates energy at peak performance under standard test conditions ('STC') – cell temperature of 25^{o}C, solar irradiance of 1000W/m^{2}, and air mass of AM1.5 – which approximates being in direct sunlight in the middle of the summer.

6.4.5 Each individual Solar PV panel will operate at optimum efficiency when deployed orientated towards the south. However, this does not preclude the use of panels on southwest or northwest facing-roofs, which will still generate a significant amount of power. Panels located on east-facing roofs will only generate in the morning while the sun is in the eastern sky, whereas west-facing panels will only catch the sun in the afternoon and evening as it passes over into the western sky. The pitch of the roof will also affect the efficiency of the panel, with an optimum south-facing pitch being about 35^{o} at this latitude.

6.5 Waste Water Heat Recovery ('WWHR')

6.5.1 A WWHR system extracts heat typically from waste water from showers or sinks. This heat is used to warm incoming mains water, reducing heating demands. Cold mains water is passed around a copper hot water waste pipe to exchange heat before continuing 'pre heated' to the hot water heat source (Figure 6.3). This technology is relatively simple, as there are no electrical components and requires minimal maintenance. Despite its simplicity, it may result in an overall emissions reduction of approximately 5% as a result of the reduced heating demand.

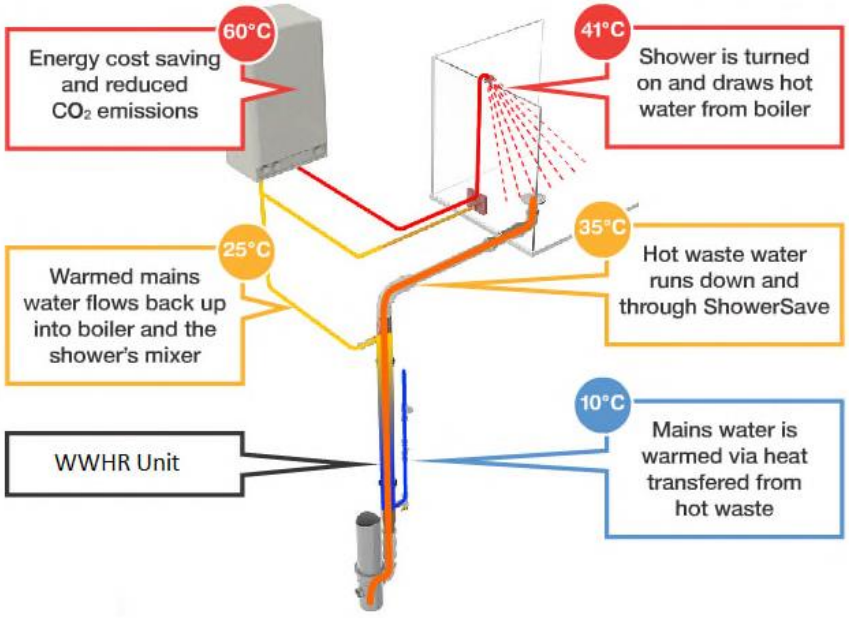

Figure 6.3: Waste Water Heat Recovery System

6.6 Electric Vehicle ('EV') Infrastructure

6.6.1 Under the new Part S building regulations EV charge points are required for all dwellings with an associated car parking space.

6.6.2 Every new non-residential building with more than 10 car parking spaces will be required to have one charge-point, and cable routes for an electric vehicle charge-point for one in five spaces.

7 HOW THE ENERGY HIERARCHY IS APPLIED ON SITE

7.1.1 Table 7.1 summarises how the Energy Hierarchy will be applied to two nominal dwellings. The application of the Energy Hierarchy will depend on the build out date, for dwellings prior to Part L 2025 will be built to comply with the interim FHS 2021. After it comes into force, dwellings will be built to the higher standard and will require more renewable and low carbon technologies to be fitted.

Energy Hierarchy	Part L 2021 Proposed Dwelling	Part L 2025 Proposed Dwelling
Be Lean		
Modern methods of construction	Decided at Reserved Matters stage	Decided at Reserved Matters stage
Optimising orientation and site layout	Yes	Yes
Solar shading	Yes	Yes
Natural Ventilation	Yes	Yes
Energy Efficient Building Fabrics	Exceed building regulations	Exceed building regulations
Window glazing	Double glazed	Triple glazed
Lighting	LED	LED
Appliances	'A' rated	'A' rated
Be Clean		
District Heating Network	No	No
Gas CHP	Not feasible	Not feasible
Be Green		
GSHP	Either GSHP or ASHP	Yes
ASHP	Either GSHP or ASHP	Yes
Solar PV	No	All dwellings
WWHR	No	Yes
EV Infrastructure	All dwellings*	All dwellings*

Table 7.1: Energy Strategy for Site PR9 Land West of Yarnton

*Assuming the cost to install the charge points is under the £3,600 cap per installation. More information is in Appendix B.

7.1.2 The Energy Hierarchy provides the framework for this strategy. It has been used to define how energy use in the dwellings can be minimised, and how renewable and low carbon technologies can be utilised.

7.1.3 The non-residential elements of the Proposed Development include the managed care home and the community home work hub. The Future Buildings Standard ('FBS') sets out changes to Part L of the building regulations. The non-residential buildings will comply with Part L at the time of building.

8 POLICY ESD 5: RENEWABLE ENERGY

8.1.1 This policy requires a feasibility assessment for significant on-site renewables. As there is not an on-site water source hydro power has been discounted as an option.

8.2 Wind

Figure 8.1: Map showing the Red Line Boundary of the site and Oxford Airport

8.2.1 Figure 8.1 shows the boundary of the Site and the location of Oxford airport under 2km and directly to the north. Figure 4.11 in CAP 168: The Licensing of Aerodromes highlights the obstacle limitation surfaces which would apply to Oxford Airport[4]. The approach comes over the Site and any tall structures would penetrate the protected surface that is designed to provide safe passage for aircraft on approach or departure from the airport. For this reason, the Site is not deemed suitable for wind turbines.

8.3 Solar

8.3.1 The potential for ground-mounted solar was estimated using the Green Infrastructure Parameters Plan. A GIS assessment of the land apportioned for meadows revealed 32.5ha of meadowland. A gap was left around the perimeter of the meadowland for

[4] https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=6114 [Accessed 05 December 2022].

access vehicles. This land was deemed suitable for solar. An estimate of the total power output of the solar panels would be 16.25MW.

8.3.2 The meadowland to the north would be impacted by the existing woodland and proposed community woodland. This would cause some shading which would adversely affect the feasibility of solar panels in this area. There is no guarantee the power can be exported to the electricity grid, and it would depend on local substation headroom and capacity. OFGEM rules do not allow the electricity from the ground-mounted solar to supply the Proposed Development directly.

8.3.3 Flood risk can be an issue for ground-mounted solar panels. However, the Site does not appear to be in a flood risk zone. There are several grade 2 listed buildings in the local vicinity, with the closest being about 250m from the meadowland. There is also a grade 2* and grade 1 listed building within 1km from the meadowland. This could provide a barrier to achieving planning permission for the solar panels. The effects from glint and glare on the nearby airport could also be an obstacle.

9 SITE WIDE ENERGY AND EMISSION REDUCTIONS

9.1.1 The energy strategy has been determined based on the requirements of the FHS and considers the energy requirements and carbon emissions arising from the operation of the Proposed Development as occupied homes.

9.1.2 The interim FHS sets an emission reduction of 31% compared to 2013 building regulations for the Proposed Development.

9.1.3 The FBS requires non-residential buildings to produce 27% less CO2 emissions when compared to current building regulations. The non-residential elements will comply with this standard. This would provide highly efficient buildings which are fit for the future.

9.1.4 After the full FHS 2025 comes into force this would rise to an 75-80% reduction compared to 2013 building regulations.

9.1.5 Installing renewable and low carbon technology, such as heat pumps and solar panels, and designing the homes in an energy efficient way will lower the energy loads of the dwellings as well as reduce carbon emissions.

10 CONCLUSIONS

10.1.1 The Energy Strategy has been developed through consideration of the Energy Hierarchy and how it can be applied to the across the development to minimise carbon emissions.

10.1.2 'BE LEAN' encompasses measures intended to reduce emissions that are inherent in a building's design, specification and construction. Modern Methods of Construction will be considered. The development will optimise Site layout, solar shading, natural ventilation, and energy efficient building fabrics. The level of window glazing will depend on the build schedule to meet building regulations at the time. All lights will be LED and appliances, where supplied, will be as efficient as possible.

10.1.3 The 'BE CLEAN' element of the energy hierarchy focusses on supplying energy more efficiently. This requires consideration of district heating networks or combined heat and power generation. Neither of these options are considered practical or viable for this Proposed Development.

10.1.4 The final element of the energy hierarchy is 'BE GREEN', which involves the use of renewable technologies to reduce the carbon emissions associated with supplying the energy demands for the Proposed Development. The Energy Strategy set out in this report uses roof-mounted Solar PV and WWHR for the whole development once the 2025 FHS has come into force. The precise detail as to the choice of heat pump between ASGP and GSHP will be decided at the Reserved Matters stage. These will complement solar PV to supply low carbon heating throughout the Proposed Development. EV infrastructure will be provided throughout, to comply with Part S building regulations.

APPENDICES

11 APPENDIX A: ABBREVIATIONS

ASHP	Air Source Heat Pump
BEIS	Government Department for Business, Energy & Industrial Strategy
BRE	Building Research Establishment
CDC	Construction Leadership Council
CHP	Combined Heat and Power
DER	Dwelling Emission Rate
DFEE	Dwelling Fabric Energy Efficiency
DPER	Dwelling Primary Energy Rate
DHN	District Heat Network
FEES	Fabric Energy Efficiency Standards
GSHP	Ground Source Heat Pump
kW	Kilowatt (unit of power)
kWh	Kilowatt hour (unit of energy)
LPA	Local Planning Authority
MEP	Mechanical, Electrical, Plumbing (as in MEP cupboard for domestic utilities)
MEV	Mechanical Extract Ventilation
MHCLG	Ministry of Housing, Communities & Local Government
MMC	Modern Methods of Construction
MVHR	Mechanical Ventilation with Heat Recovery
MW	Megawatt (unit of power)
PV	Solar Photovoltaic
SAP	Standard Assessment Procedure (to model domestic energy consumption)
TFEE	Target Fabric Energy Efficiency
TPER	Target Primary Energy Rate
WA	Wardell Armstrong
WWHR	Waste Water Heat Recovery

12 APPENDIX B: POLICY AND REGULATION

12.1 National Policy and Regulation

12.1.1 At the national level, principal planning policy is provided by the National Planning Policy Framework and the Planning Practice Guidance. Building Regulations are part of the building control process and ensure appropriate minimum standards of build are maintained across the nation. Further detail is provided below.

12.2 National Planning Policy Framework (NPPF)

12.2.1 The National Planning Policy Framework (the 'NPPF' or 'the Framework') was first published in March 2012, with the most recent edition published in July 2021. The Framework replaced the majority of existing Planning Policy Statements (except for a small number of documents, including Planning Policy Statement 10: Planning for Sustainable Waste Management, the Companion Guide to Planning Policy Statement 22: Renewable Energy (which was subsequently superseded by the 'Planning Practice Guidance for renewable and low carbon energy' document published in July 2013) and the PPS5: Planning for the Historic Environment Practice Guide).

12.2.2 The Framework is a material consideration that must be taken into account in the determination of planning applications.

12.2.3 The Framework, along with Planning Practice Guidance, forms the main body of national planning policy in the UK.

12.2.4 Annex 1 of the Framework states that "*existing policies should not be considered out-of-date simply because they were adopted or made prior to the publication of this Framework (the closer the policies in the plan to the policies in the Framework, the greater the weight that may be given)*".

12.2.5 References to 'NPPF' or 'the Framework' hereafter shall be in relation to the 2021 revised documents.

12.2.6 The cornerstone of the Framework is the "*presumption in favour of sustainable development*" (paragraph 11) to ensure that sustainable development is pursued in a positive way.

12.2.7 This means that local authorities should generally seek to approve development proposals that accord with the development plan without delay and, where the relevant plan is silent or out of date, grant planning permission unless it would give rise to adverse impacts which would significantly and demonstrably outweigh the

benefits, when assessed against the Framework as a whole. Development which is sustainable should proceed.

12.2.8 Chapter 14 of the NPPF, 'Meeting the challenge of climate change, flooding and coastal change', notes several relevant points. Firstly, paragraph 148 states that "*the planning system should support the transition to a low carbon future…and support renewable and low carbon energy and associated infrastructure."*

12.2.9 Additionally, "*new development should be planned for in ways that… 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*" (paragraph 150).

12.2.10 Paragraph 151 states that development plans should "*identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers*."

12.2.11 Paragraph 153 also notes new development must "*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 not feasible or viable; and take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption."*

12.3 **Building Regulations**

12.3.1 Part L of the Buildings Regulations state that new dwellings must achieve both a 'Target Emission Rate' (TER) and a 'Target Fabric Energy Efficiency' (TFEE) rate. Both the TER and TFEE must be calculated using methods set out in 'Standard Assessment Procedure' (SAP), 2012. An equivalent calculation is carried out for non-residential property using the 'Simplified Building Energy Model' (SBEM).

12.3.2 The TFEE was derived from Fabric Energy Efficiency Standards (FEES) developed by the Zero Carbon Hub which are a measure of the amount of energy required to maintain a building at a comfortable temperature. The TFEE rate is an overall value measured in kWh/m^2/yr which is affected by:

- Building fabric U-values;
- Thermal Bridging;
- Thermal Mass; and
- Features effecting lighting and solar gains.

12.3.3 Various combinations of fabric efficiency measures may be employed to meet the TFEE limit. There are also limiting standards for the properties of the fabric elements of the dwelling, although the buildings specification needs to be considerably better than the limiting values to meet the TER. The TER is calculated using a notional dwelling of the same size and shape as the actual building but with specific building fabric properties. If a building is built out using the exact specifications as the notional dwelling, the built dwelling will achieve the TER and fabric energy efficiency requirements.

12.3.4 It was proposed that in 2013 the TER value set out in Part L of the Building Regulations would be reduced in line with the Zero Carbon Hub timeline to zero carbon homes in 2016. The recommendation was to improve the standards by 44% of the 2006 values. However, preceding a government consultation, in 2013 it was decided to reduce the TER on aggregate across the build mix by only 6% of the 2010 limits. This is also when the FEES concept was introduced into regulation.

12.3.5 It was expected that under this mechanism the UK government would continue to improve the TER and TFEE targets until zero carbon homes standard was achieved onwards from 2016. However, in its report, 'Fixing the Foundations: Creating a More Prosperous Nation' (2015), the government set out a revised policy on zero carbon homes: -

12.3.6 *"The government does not intend to proceed with the zero carbon Allowable Solutions carbon offsetting scheme, or the proposed 2016 increase in on-site energy efficiency standards, but will keep energy efficiency standards under review, recognising that existing measures to increase energy efficiency of new buildings should be allowed time to become established"*

12.3.7 It was expected that at least for the short-term future, the established targets set out in Part L of the Buildings Regulations would remain the targets for building energy efficiency. The 2016 Building Regulations confirmed this noting that "*Regulation 25B Nearly zero-energy requirements for new buildings will not come into force until 2019 at the earliest*".

12.4 **The Future Homes Standard ('FHS')**

12.4.1 In October 2019, the Government consulted on changes to Part L and Part F of the Building Regulations for new dwellings, with the intention of improving Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations applicable to new residential dwellings. The 'Future Homes Standard' "*will require new*

build homes to be future-proofed with low carbon heating and world-leading levels of energy efficiency.". The Future Homes Standard will be introduced by 2025.

12.4.2 The FHS sets out the intended performance requirements of dwellings that will apply from 2025, along with other conditions such as restricting access to the gas grid for new dwellings from 2025.

12.4.3 An interim FHS has since been implemented which sets an emission reduction of 31% compared to 2013 building regulations for the Proposed Development. After 2025 this would rise to an 75-80% reduction.

12.4.4 A low carbon heating system will be integral to the FHS specification set out by the Government. It is anticipated that heat pumps will become the primary heating technology for new homes, as installation of fossil fuel heating such as a natural gas boiler is phased out. A full technical consultation on the FHS draft notional building specification is planned for spring 2023. The Government intend to introduce the necessary legislation in 2024, ahead of full implementation in 2025.

12.5 **Electric Vehicle Charging Infrastructure (Part S)**

12.5.1 In the Road to Zero strategy published in 2018, the UK Government announced that it wants every new home to have a smart charging point for electric vehicles ('EV'), where appropriate, to help future proof homes for the transition to low emissions transport. The government consulted on plans to introduce an EV smart charging requirement in the English Building Regulations (a new Part S) and also to transpose the requirements of the European Union (EU) Energy Performance of Buildings Directive (EPBD)3.

12.5.2 In June 2022, the Building Regulations Part S for EV charging infrastructure came into effect and requires:

Policy position: Residential Buildings

12.5.3 Every new dwelling with an associated car parking space to have a charge-point. This requirement applies to buildings undergoing a material change of use to create a dwelling.

12.5.4 The number of electric vehicle charge points that must be installed is the maximum number of electric vehicle charge points that it is possible to install at an average sum of £3600 or less for the connection cost of each electric vehicle charge point connection ("the £3600 cap").

Policy position: New Non-Residential Buildings

12.5.5 Every new non-residential building and every non-residential building undergoing a major renovation with more than 10 car parking spaces will be required to have one charge-point, and cable routes for an electric vehicle charge-point for one in five spaces.

12.6 **Local Planning Policy**

Cherwell Local Plan 2011 - 2031

12.6.1 The Local Plan includes Policies for Ensuring Sustainable Development. The key policies are:

- Policy ESD 1: Mitigating and Adapting to Climate Change
- Policy ESD 1: Energy Hierarchy and Allowable Solutions
- Policy ESD 3: Sustainable Construction
- Policy ESD 4: Decentralised Energy Systems
- Policy ESD 5: Renewable Energy

12.6.2 These policies are all relevant to the Proposed Development and are therefore reproduced in full below.

12.6.3 **Policy ESD 1: Mitigating and Adapting to Climate Change**

Measures will be taken to mitigate the impact of development within the District on climate change. At a strategic level, this will include:

- *Distributing growth to the most sustainable locations as defined in this Local Plan*
- *Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars*
- *Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction)*
- *Promoting the use of decentralised and renewable or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy).*

The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:

- *Taking into account the known physical and environmental constraints when identifying locations for development*
- *Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling*

- *Minimising the risk of flooding and making use of sustainable drainage methods, and*
- *Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).*

Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

12.6.4 **Policy ESD 2: Energy Hierarchy and Allowable Solutions**

In seeking to achieve carbon emissions reductions, we will promote an 'energy hierarchy' as follows:

- *Reducing energy use, in particular by the use of sustainable design and construction measures*
- *Supplying energy efficiently and giving priority to decentralised energy supply*
- *Making use of renewable energy*
- *Making use of allowable solutions*

12.6.5 **Policy ESD 3: Sustainable Construction**

All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy.

Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.

All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of the achievement of this standard should be set out in the Energy Statement.

The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- *Minimising both energy demands and energy loss*
- *Maximising passive solar lighting and natural ventilation*
- *Maximising resource efficiency*

- *Incorporating the use of recycled and energy efficient materials*
- *Incorporating the use of locally sourced building materials*
- *Reducing waste and pollution and making adequate provision for the*
- *recycling of waste*
- *Making use of sustainable drainage methods*
- *Reducing the impact on the external environment and maximising*
- *opportunities for cooling and shading (by the provision of open space and*
- *water, planting, and green roofs, for example); and*
- *Making use of the embodied energy within buildings wherever possible*
- *and re-using materials where proposals involve demolition or*
- *redevelopment.*

Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an independent economic viability assessment can be undertaken. Where it is agreed that an economic viability assessment is required, the cost shall be met by the promoter.

12.6.6 **Policy ESD 4: Decentralised Energy Systems**

The use of decentralised energy systems, providing either heating (District Heating (DH)) or heating and power (Combined Heat and Power (CHP)) will be encouraged in all new developments.

A feasibility assessment for DH/CHP, including consideration of biomass fuelled CHP, will be required for:

- *All residential developments for 100 dwellings or more*
- *All residential developments in off-gas areas for 50 dwellings or more*
- *All applications for non-domestic developments above 1000m2 floorspace.*

The feasibility assessment should be informed by the renewable energy map at Appendix 5 'Maps' and the national mapping of heat demand densities undertaken by the Department for Energy and Climate Change (DECC) (see Appendix 3: Evidence Base).

Where feasibility assessments demonstrate that decentralised energy systems are deliverable and viable, such systems will be required as part of the development unless an alternative solution would deliver the same or increased benefit.

12.6.7 **Policy ESD 5: Renewable Energy**

The Council supports renewable and low carbon energy provision wherever any adverse impacts can be addressed satisfactorily. The potential local environmental, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications.

Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

- *Landscape and biodiversity including designations, protected habitats and*
- *species, and Conservation Target Areas*
- *Visual impacts on local landscapes*
- *The historic environment including designated and non designated assets*
- *and their settings*
- *The Green Belt, particularly visual impacts on openness*
- *Aviation activities*
- *Highways and access issues, and*
- *Residential amenity.*

A feasibility assessment of the potential for significant on-site renewable energy provision (above any provision required to meet national building standards) will be required for:

- *All residential developments for 100 dwellings or more*
- *All residential developments in off-gas areas for 50 dwellings or more*
- *All applications for non-domestic developments above 1000m^2 floorspace.*

Where feasibility assessments demonstrate that on site renewable energy provision is deliverable and viable, this will be required as part of the development unless an alternative solution would deliver the same or increased benefit. This may include consideration of 'allowable solutions' as Government Policy evolves.

Sustainable Buildings in Cherwell Supplementary Planning Document

12.6.8 The Sustainable Buildings in Cherwell Supplementary Planning Document sets out detailed guidance on techniques to help improve the sustainability of new development based on the layout, distribution and orientation of buildings and their associated infrastructure.

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