Sustainability and Energy Report

Hawkwell Village, North West Bicester

November 2025

Turley
Sustainability

Contents

Client

Hallam Land

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1. Introduction

1.1 Introduction

This Sustainability and Energy report has been prepared by Turley Sustainability, on behalf of Hallam Land (hereafter referred to as Hallam), in response to post-submission feedback from Cherwell District Council ('CDC') following the submission of an Outline Planning Application (OPA) to develop up to 3,100 dwellings and associated development at Hawkwell Village, North West ('NW') Bicester.

The outline application at NW Bicester was submitted in December 2021 and is currently in determination. The OPA was supported by an Energy Strategy which was reviewed by CDC's sustainability advisors, Bioregional, who provided a detailed response to the sustainability strategy. The original OPA was developed to respond to Policy Bicester 1: North West Bicester Eco-Town, which sought a development area of 390 hectares of zero carbon, mixed use development including 6,000 homes. The development is intended to be an exemplar of sustainable development.

Hallam appointed Turley Sustainability to provide post-submission support and have reviewed the previous Energy Strategy, as well as the consultation comments from Bioregional. These comments are set out in **Appendix 1** of this document.

This report supersedes the previous energy strategy presents a revised strategy in response to the comments raised by Bioregional with respect to the following issues:

- How the zero carbon requirements of Policy Bicester 1 are met;
- The requests for a feasibility assessment of the potential for significant on-site renewable energy provision;
- A carbon management plan; and
- Addressing climate change adaptability.

One of the key requests identified by Bioregional was a 'path to net zero' in accordance with Policy Bicester 1. This report responds positively to that request with the inclusion of updated benchmark energy modelling based on the latest Future Homes Standard (FHS) consultation. This includes analysis to demonstrate how net zero will be delivered at the site in varying scenarios, quantifying each stage of the energy hierarchy. The Energy Strategy also incorporates a renewables feasibility study which assesses the main technologies and options available to the site, including the potential for a ground mounted solar array.

Whilst this report provides a detailed response to the comments raised by CDC/ Bioregional, Hallam note that this is an outline planning application with a considerable construction period of more than ten years during which time technology, policy and construction standards will change. The outline strategy presented in this report therefore allows some flexibility and will be confirmed during each reserved matters application.

1.2 Proposed Development

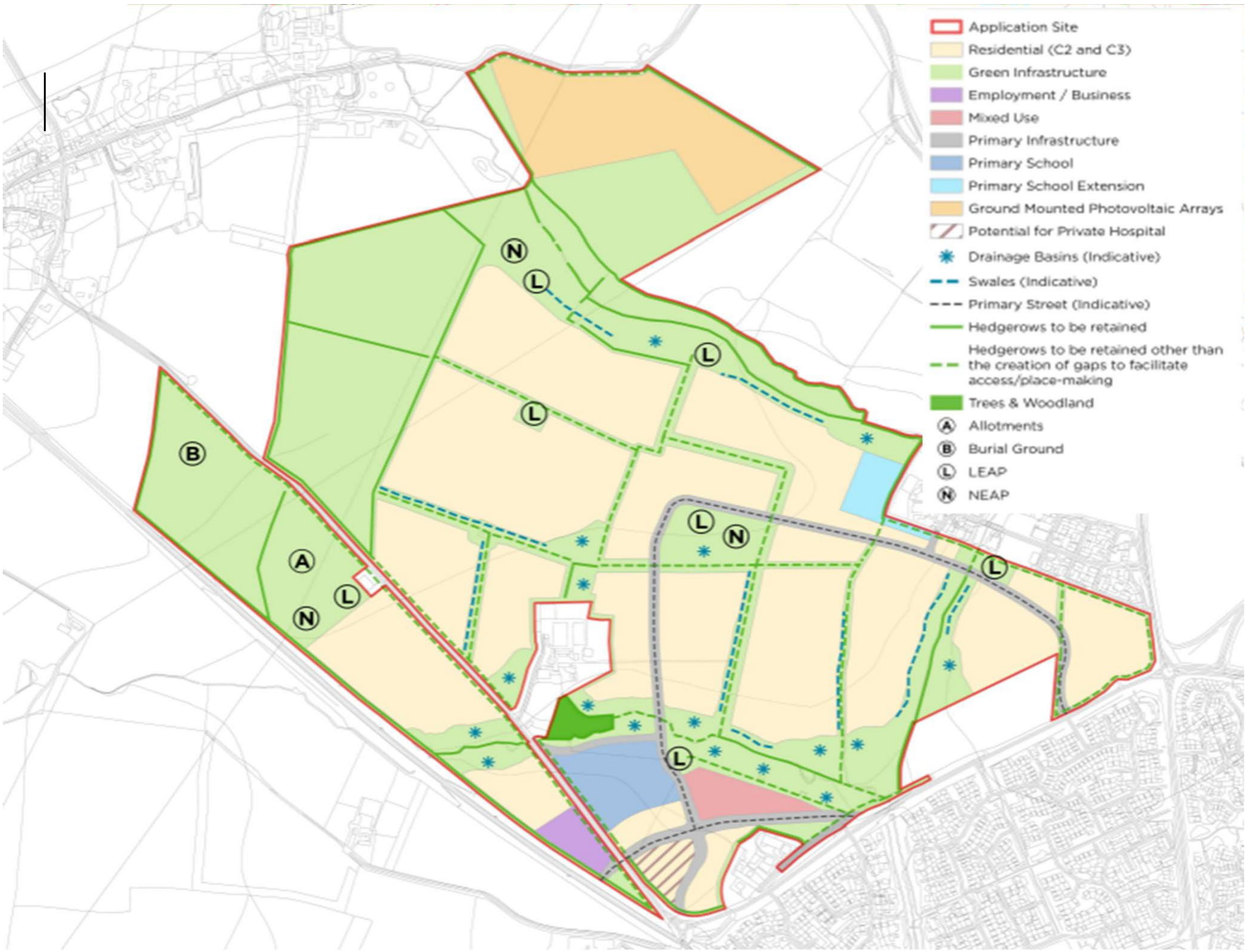
The formal planning description for the proposed development is as follows:

"OUTLINE – with matters of appearance, landscaping, layout, scale and access (partial) reserved except for the following specified Access points: signalised junction at A4095/Germander Way, secondary access from/to Bucknell Road, access off Cranberry Avenue, Elmsbrook, which are sought for approval at outline stage [and to facilitate access connections in relation to SLR/realigned A4095 (2no. access points via Lords Lane)] – Mixed Use Development delivered in phases comprising of up to 3,100 dwellings (including extra care) (C3); residential and care accommodation

(C2); mixed use local centre (comprising commercial, business and service uses (Use Class E), residential uses, C2 uses, local community uses (F2(a) and F2(b)), hot food takeaways, public house, wine bar, mobility hub); employment area (E(g), E(d), E(e), E(f)); Private Hospital (Class E(e)); learning and non-residential institutions (Class F1) including primary school (plus land to allow extension of existing Gagle Brook primary school); green infrastructure including formal and informal open space, allotments, landscape, biodiversity and amenity space and associated facilities; burial ground; play space (including Neaps/Leaps/MUGA); ground mounted photovoltaic arrays; sustainable drainage systems; movement network comprising new highway, cycle and pedestrian routes; car parking; associated infrastructure (including utilities); engineering works (including ground modelling); demolition (a phased development each phase being a separate and severable part of the development)."

Figure 1 overleaf shows the development framework plan of the proposed development.

Figure 1: Development Framework Plan (Source: David Lock Associates)



2. Background Context

2.1 Local Planning Policy Summary

2.2.1 Cherwell Local Plan 2011-2031

The Cherwell Local Plan Part 1[1] was adopted on 20th July 2015. It contains key sustainability and climate-related policies, summarised below:

Policy ESD1 Mitigating and Adapting to Climate Change

Policy ESD2 Applying the Energy Hierarchy and Using Allowable Solutions

Policy ESD3 Sustainable Construction

Policy ESD4 Encouraging Decentralised Energy

Policy Bicester 1 North West Bicester Eco-Town

Policy Bicester 1 requires homes to be capable of achieving a minimum of Level 5 of the Code for Sustainable Homes (CfSH). The CfSH has since been withdrawn and is no longer applicable. The proposed development will instead comply with current requirements which include the Building Regulations Parts L, S and O.

2.2 Bioregional Commentary

As noted in **Section 1.1** of this report, the previous Energy Strategy which accompanied the application was consulted upon by CDC's sustainability advisors, Bioregional. Bioregional's response covered a broad scope, including matters relating to employment, affordable housing, health and infrastructure requirements. Turley Sustainability have reviewed those comments from Bioregional which are relevant to 'environmental' sustainability, covering the following:

- Energy;
- Carbon;
- Water;
- Climate change mitigation and adaptation; and
- Sustainable construction (BREEAM)

A summary of the key issues raised by Bioregional is below. Please see **Appendix 1** for the formal comments received:

1. Insufficient information has been provided to demonstrate a path to net zero carbon.
2. The energy strategy for the non-residential requires clarification.
3. A Carbon Management Plan for the employment element is required.
4. It has not been confirmed that BREEAM assessments of the non-residential spaces will achieve a Very Good rating (as a minimum, and that it may be possible to achieve an Excellent).
5. The embodied carbon of construction and local sourcing should be secured and monitored.
6. No confirmation has been provided for efficient use of potable water on site during operation, including water consumption targets (litres/person/day) for residential and non- residential spaces. Policy Bicester 1 has a requirement to consider water neutrality.
7. No information has been provided regarding the production of an operational waste strategy and confirmation of waste storage locations.
8. Insufficient information has been provided to confirm that measures are in place to mitigate overheating risk.
9. It has not been confirmed that the cooling hierarchy has been considered to minimise cooling demand or if cooling is proposed anywhere on site.
10. Further detail on the feasibility of renewable energy technologies is recommended.

[1] Adopted Cherwell Local Plan 2011-2031 Part 1

Confirmation of the renewable technologies considered is requested.

11. No confirmation that allowable solutions are proposed to demonstrate policy compliance.
12. The following details have not been confirmed in the Energy Strategy: proposed building fabric u-values; proposed glazing u-values; targeted air permeability; ventilation strategies; and hot water provision.
13. Further information is required to demonstrate that sustainable design and construction is integral to the proposals.
14. An assessment to understand the feasibility of utilising waste heat from the Ardley ERF is required.
15. An assessment of the potential output of typical rooftop household PV array, and the potential output of the large PV array is requested. These benefits and carbon savings of the expected rooftop solar should be calculated and quantified.

2.3 Proposed Approach

Turley Sustainability had a meeting with Cherwell District Council and Bioregional on Thursday 16th November 2023 presenting the proposed approach to respond to the issues identified. It was confirmed that the approach taken by Turley Sustainability is reasonable and is therefore set out in more detail in this report.

2.4 Summary

The Bioregional comments identified above have been summarised within different sections of this report as presented below:

2.4.1 Energy Strategy & Renewable Energy

- Deliver zero carbon homes;
- A carbon management plan for employment areas;
- Smart energy systems and real-time monitoring;
- Consideration of the Ardley Energy Recovery Facility to provide heat;
- Estimation around allowable solutions to meet policy requirements;
- Renewable Energy Feasibility; and
- Evidence of output and opportunity from rooftop PV.

2.4.2 Embodied Carbon Emissions

- Reduce embodied carbon emissions; and
- Set targets.

2.4.3 BREEAM

- Set out the proposed route to a BREEAM 'Excellent' rating for all commercial buildings.

2.4.4 Climate Change Adaptation

- Following the cooling hierarchy;
- Minimising overheating risk;
- Flood Risk; and
- Water Usage

2.4.5 Waste Management

- Set out proposed targets as part of an operational waste strategy.

This report also responds specifically to the requests raised by Bioregional, as set out in **Appendix 1**.

3. The Route to Net Zero

This report responds specifically to the comments raised from Bioregional on behalf of CDC which have been listed in **Section 2.1**.

A table of Bioregional comments is set out in **Appendix 1** together with a response from Turley to each comment. This report has been split into five sections that cover the issues raised:

3.1 – Energy Strategy & Renewable Energy

3.2 – Embodied Carbon Emissions

3.3 – BREEAM

3.4 – Climate Change Adaptation

3.5 – Waste Management

3.1 Energy Strategy

Section 3.1 responds to the following issues identified by CDC/ Bioregional:

A Path to Net Zero

At the time of the submission of the original energy strategy, less detail was available with respect to the path to the Future Homes Standard 2025.

Hallam recognise the aspirations of Bicester 1 and its development from its identification as one of the first Eco-Towns.

Policy Bicester 1 and Bioregional's comments identified the need for development at NW Bicester to demonstrate a path to Net Zero Carbon and as part of this revised strategy, Hallam confirm that all homes built at Hawkwell Village, NW Bicester will deliver a clear path to Net Zero through the following steps:

- Constructing all dwellings and non-residential buildings to meet the Future Homes and Building Standards as a minimum;
- Installation of roof mounted PV;
- Eliminating the use of fossil fuels and creating an 'all-electric' energy strategy; and
- Identifying and offsetting all residual regulated and unregulated carbon emissions through one or more options which include:
  - Deployment of additional renewable energy technologies on buildings;
  - Construction of a large solar array to generate renewable power for export to the national grid; or
  - Contribution to the CDC carbon offsetting fund as per the mechanism set out in the Firethorn Appeal (see below)

Each of these steps are explained in further detail below. Through these steps, Hawkwell Village, NW Bicester will deliver a net zero carbon development in line with the requirements of adopted Policy BIC1 by delivering net zero for regulated and unregulated carbon.

Delivering Homes and Buildings for the Future

The exact detail of the Future Homes/Building Standard has been consulted upon with options presented; the industry is anticipating that buildings constructed to this standard will have the following characteristics:

- No fossil fuels / All-Electric
- High fabric standards
- Enhanced opportunity for smart energy
- Increased quality control with post-completion testing

The government has recently confirmed use of solar power is likely to be a requirement. All modelling in this document has been predicated on Option 1 of the FHS consultation, which includes solar, with the results split out to show the benefit.

The result of the FHS will be lower bills, improved air quality, much lower CO_2 emissions and a natural transition to net zero, as the buildings will decarbonise in line with decarbonisation of electricity supplied through the national grid. The government's projections with respect to the speed of electricity decarbonisation are provided in Figure 2. This may be accelerated, with the new government's Clean Power Plan that aims to almost decarbonise electricity generation by 2030.

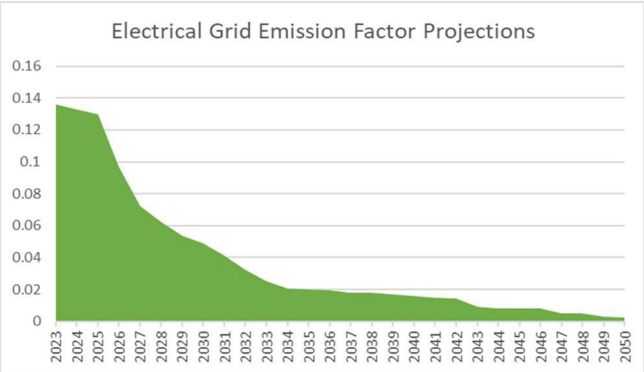


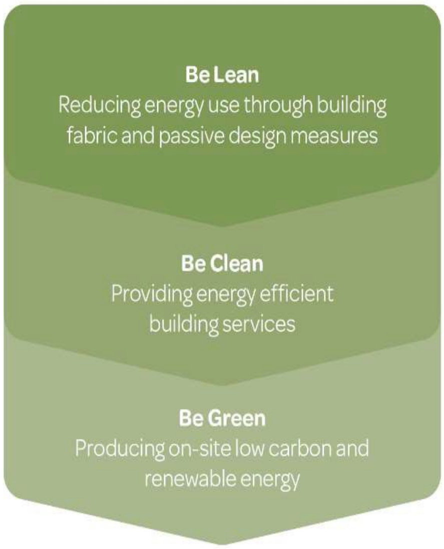
Figure 2: Elec. Grid Decarbonisation

In response to Bioregional's comments, further detail has been provided with respect to the energy strategy for the buildings in accordance with the Energy Hierarchy.

The Energy Hierarchy, as shown in **Figure 3**, sets out how to reduce energy demand through passive design measures and a fabric first approach before utilising low carbon energy and the production of on-site renewable energy.

To quantify the carbon emissions and the likely performance of the buildings, this process has been explained below. These calculations have been made on the basis that the whole development exists in 2025 rather than on a more realistic build out. This is because differing accounting methods require the calculation undertaken in different ways. Using a build-out profile shows much lower overall CO_2 emissions, as each subsequent phase will be built at a time of lower carbon electricity. The method used here, therefore represents a simplified worst case for carbon emissions.

Figure 3: The Energy Hierarchy



Be Lean – Reducing Energy Use

Reducing the primary energy demand of a building using an efficient fabric and services is a good place to start the process of optimising the performance of homes.

Table 1 provides the expected specification for the dwellings, with a similar standard for non-domestic elements, albeit varying by type.

Table 1: Indicative specification – FHS Option 1

	Indicative Spec.
Floor U-value	0.13
External Wall U-value	0.18
Roof U-value	0.11
Window U-value	1.2
Door U-value	1.0
Air Permeability @50Pa	4
Thermal Bridging – y value	0.05 (TBC)
Ventilation	MEV

These standards are significantly higher than current Building Regulations Part L, reducing the demand for space heating >10%.

Actual U-values will be confirmed once full detail of the FHS 2025 is confirmed, expected in 2025 for implementation in 2027, which aligns with the likely programme of construction commencing at Hawkwell Village.

Be Clean – Efficient Energy

The next stage of the energy hierarchy is the provision of energy cleanly. Also, under this heading heat from a decentralised energy system such as a Heat Network is considered. In the case of NW Bicester, there is a specific requirement to consider the use of heat from the nearby Ardley Energy Recovery Facility to serve a heat network.

In theory, the benefit of using a heat network is the opportunity to use different technologies to provide heat from a centralised location. This has typically involved a gas fired Combined Heat and Power (CHP) engine led system which can be fed into a network of insulated pipes which provide heating and hot water via individual heat interface units.

The decarbonisation of the electrical grid has reached a point where gas CHP engines are now high carbon compared even to individual gas boilers.

An alternative would be to use a heat pump led system. Heat pumps are a low carbon source of heat. There are several factors that have led to this option to be discounted. Firstly, heat pump heat networks are likely to be more expensive on a lifetime basis than individual systems. (The use of individual heat pumps is considered in the next section.)

Furthermore, the evidence is that heat networks have very high losses and are, therefore, less efficient than individual systems. This was confirmed by the government's SAP Scientific Integrity Group, which indicated that heat losses are typically 40% to 50% on a heat network. This is reflected in Building Regulation assumptions[2].

Finally, there is a requirement for "thermal demand density" for a heat network to be viable. That is, there must be a high level of heat demand in a small area to minimise the cost and losses of the heat network. A rule of thumb for the minimum value is a demand of 30kWh per m^2 per year across a site. As a result of the adoption of the high fabric standards, the Hawkwell Village site is estimated to have a thermal demand density of 3.5kWh per m^2 per year, with a small amount of additional demand from the non-domestic elements. A heat network is considered unfeasible and is not proposed for the development.

On the specific issue of the Ardley facility, the thermal demand issue continues to make a heat network unviable. Furthermore, a report prepared for Bicester Strategic Delivery Board in 2018 concluded that the facility cannot be relied upon because the contract runs out in 2040, around the same time as the site would be completed. The conclusion was not to take the heat network idea further[3].

Using energy smartly will be important at Hawkwell Village, where there is likely to be a combination of technologies interacting in real-time, including solar, heat pumps, appliances, hot water tanks and EV charging. All buildings will be 'smart energy' ready, capable of optimising how these interact to reduce bills and CO_2 emissions. Because of the static nature of CO_2 emission accounting, it is not possible to quantify these benefits, but trials have shown they are significant and further detail can be provided during detailed design.

Be Green – Low Carbon Renewable Energy

The final stage of the Energy Hierarchy is the generation of on-site low carbon and/or renewable energy to provide a further reduction in carbon emissions. In accordance with Bioregional comments, a review of the renewable energy technologies together with an indication of those that are suitable are provided below.

Wind Turbines

[2] https://files.bregroup.com/SAP/SAP%2010.2%20-%2017-12-2021.pdf

[3] https://modgov.cherwell.gov.uk/documents/s39229/Heat%20Netwo r k%20Study.pdf

The site is in an area of low to medium wind speeds. Wind turbines have been discounted due to the lack of space and proximity to housing.

Small Scale Hydro Power

Hydroelectric power is the generation of electric power from the movement of water. A hydroelectric facility requires a dependable flow of water and a reasonable height for the water to fall. Due to the lack of suitable nearby watercourses, this option has been discounted.

Biomass

Biomass provides useable heat from a range of solid fuels including wood and straw. The installation of a biomass boiler, flue and associated fuel store require significant space, regular deliveries and would only be realistic as part of a heat network. This is not proposed, as above.

Photovoltaics (PV)

Solar power systems generate electricity from sunlight and are well suited to homes. Power can be used in the home, exported to the grid or can be harnessed using battery storage. Maintenance requirements are typically minimal, and the technology is cost-effective at generation.

Solar power is considered feasible and is proposed to be used on the site across buildings of all forms.

A calculation has been undertaken to demonstrate the amount of PV which could be deployed across the buildings with the energy strategy proposed. This is on the assumption that homes could have the equivalent of one pitch of a roof deployed with solar.

Table 2: Potential for rooftop solar at Hawkwell Village, NW Bicester

	MWh per annum	Current tCO_2 saving pa
Rooftop solar	10,859	1,053

The indication is that on-site solar, deployed on one roof pitch, could reduce regulated and unregulated carbon emissions by around 55%. It is possible that in some phases this will be significantly higher or lower depending on the mix of buildings, orientation, etc. It is also reasonable to assume, however, that the analysis will be an underestimate for the non-domestic elements due to the similar roof/floor area ratios and lower energy demands compared to homes. It is also possible the solar deployment could extend to both roof pitches, albeit less efficiently, as this would have to require deployment on some north facing pitches.

Heat Pumps

Heat pumps provide low carbon heat, normally using either via ground, (ground source heat pumps, GSHPs), water (water source heat pumps, WSHPs) or air (air source heat pumps, ASHPs). They require mains electricity to operate and typically generate at around three units of heat for every unit of electricity that is consumed. This is termed the co-efficient of performance (CoP).

Due to the decarbonisation of the grid and the CoP, heat pumps provide very low carbon heat. The carbon intensity of the heat will continue to decline as the grid decarbonises, giving a route to net zero heating.

It is expected that Air Source Heat Pumps will be the main form of heating for the development of homes and non-domestic buildings at Hawkwell Village. ASHPs do have external units which generate noise and visual impact, but this is minor and can be managed in a variety of ways.

Buildings Energy and Carbon Reduction Summary

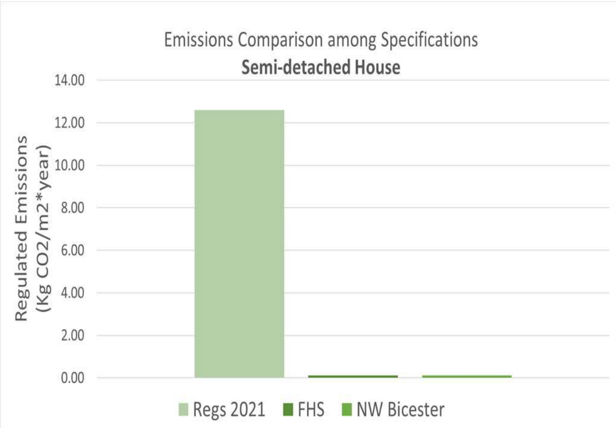
The energy strategy for the site is to align with the full Future Homes and Buildings Standards as a minimum across the site, minimising energy demand and using fossil-free heating systems.

In addition, Hallam commit to the use of solar power across the site, to varying degrees as a means of compliance with Policy Bicester 1.

The following graphs and data show the expected performance of Hawkwell Village, energy demand and CO_2 emissions. The energy strategy deployed will result in a highly energy efficient development, with very low CO_2 emissions, able to achieve net zero on- site through the decarbonisation of the grid over time and offsetting remaining CO_2 emissions.

Figure 4 demonstrates the anticipated operational performance of an expected house at Hawkwell Village (with solar) compared to a house built to the current Building Regulations and what is known of the Future Homes Standard, today. The reduction is around 95% for regulated loads.

Figure 4: Energy Modelling Results



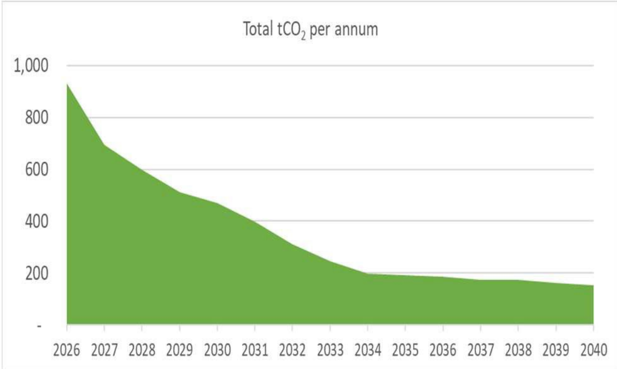
Considering the whole development of 3,100 homes, an estimation has been made using a 3-bed semi-detached home as a standard. Modelling has been undertaken in line with the proposed standard, with **Table 3** showing the results in terms of energy demand and CO_2 emissions, if the whole development were built with 2026 CO_2 emission factors for electricity.

Table 3: Estimated 1st year energy demand & CO_2

	Total
MWh Net Energy	9,579
tCO_2 Emissions	929

As the development is proposed to be all-electric, it will continue to decarbonise over time. **Figure 5** shows an illustration of decarbonisation from 2026 -2040 if the whole development was operational from 2026; dropping by around 85%.

Figure 5: Projected decarbonisation of all-elec. homes



The cumulative emissions from 2026 to 2050, based on the whole development existing in 2026 and factoring in decarbonisation of the grid would be 6,140 tonnes of CO_2. The figure will be 3,049 tonnes of CO_2, based on an estimated build-out. Offsetting options to address this are discussed below.

Carbon Management Plan – Non-Domestic

The analysis above has not included the non-domestic element of Hawkwell Village which at present is estimated to be 10,000m^2 of retail, B2/B8, office up to 7,050m^2 of commercial uses, a health centre, up to 1,100m^2 of community use space, a potential private hospital, primary school and a mobility hub.

As the exact mix of uses and floor areas will be determined during detailed design it is not possible to provide an exact carbon footprint of these buildings. An estimation of the carbon emissions from the non-domestic buildings has been calculated based on a pro-rata of the total floor area of Hawkwell Village which is c 3.5%.

In terms of an energy strategy and reducing GHG emissions the same approach is proposed as per the residential buildings, following the Future Buildings Standard and eliminating fossil fuels. Solar is likely to be suitable and deployed for at least some elements of the non-domestic development.

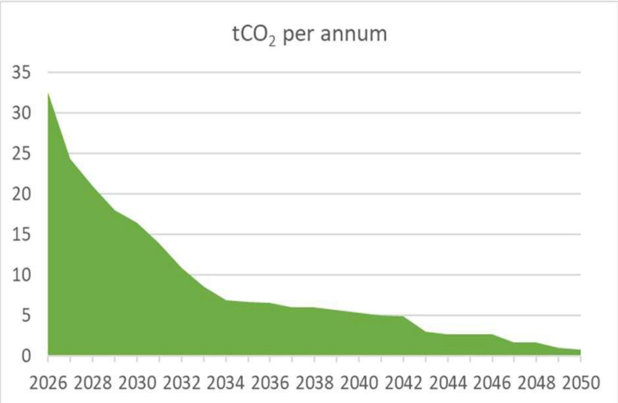
Assuming similar energy demand profiles to residential uses, which is likely to be broadly correct, gives results as below.

This is considered conservative, as the contribution of solar is likely to be greater than for homes.

Table 4: Estimated non-resi 1st year energy demand & CO_2

	Total
MWh Net Energy	343
tCO_2 Emissions	33

Figure 6: Projected Decarbonisation - Non-Resi.



The cumulative non-domestic emissions from 2026 to 2050, based on the whole development existing in 2026 would be 220 tonnes of CO_2. The figure will be 110 tonnes of CO_2, based on an estimated build-out. Offsetting options to address this are discussed below.

At each Reserved Matters application that includes non-domestic buildings, a Carbon Management Plan will be prepared that presents the following:

1. Confirmation of the building type and its likely energy demand.
2. The energy strategy to be deployed and the carbon savings to be secured through each stage of the energy hierarchy.
3. The residual carbon emissions and the confirmed approach to offsetting these.

Offsetting Residual Carbon Emissions

Based on the analysis undertaken at the outline phase, considering the Be Lean, Be Clean and Be Green measures that have been accounted for, it is estimated that there remains an overall CO_2 emission of 3,159 tonnes, 2026-2050 based on the expected build-out. This is a significant overestimate, because the site will continue to decarbonise as the grid decarbonises and technologies improve.

The main options to reduce/eliminate/offset this are set out below:

- Ground mounted solar array
- Planting to sequester carbon
- A carbon offsetting scheme

Each of these is considered below.

Ground Mount Solar Array

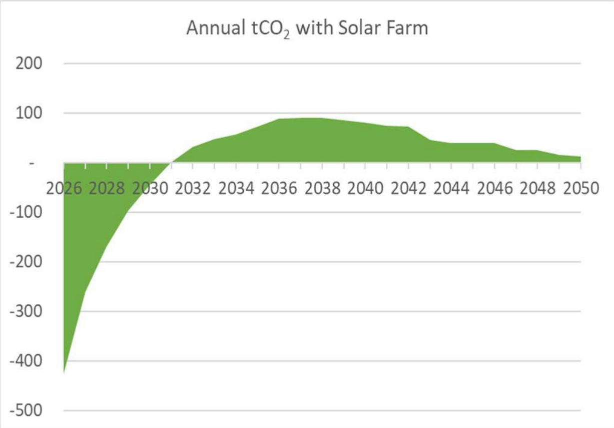
An area of ~10ha has been identified in the north of the site, with the potential to host a ground mounted solar farm of around 5MWp. A detailed feasibility study is required to confirm the details of the scale of the opportunity and feasibility which will include applications to the Distribution Network Operator. There are technical, environmental and financial reasons why this may be unfeasible which cannot be confirmed until detailed stages.

If the array is feasible and viable, a solar farm such as this would generate around 4,870MWh per annum of renewable electricity and save 472 tCO_2 in first year, or 3,122tCO_2 from 2026 to 2050, based on expected build-out. This represents about the total residual CO_2 emissions of the Hawkwell Village development. This would allow Reserved Matters applications to use the solar farm to account for some or all their remaining CO_2 emissions to deliver net zero buildings on site.

Table 5: CO_2 Saving Potential - Solar Farm

MWh pa	tCO_2 2026	tCO_2 2026-2050
4,870	472	3,122

Figure 7 - CO_2 Saving over lifetime - Solar Farm



Planting to sequester Carbon

The Hawkwell Village scheme is expected to bring a biodiversity net gain to the site and there is also the opportunity to have a net capture of CO_2 emissions through carbon sequestration.

The principle of carbon offsetting through planting is well established with an international market for carbon credits.

The Woodland Carbon Code[4] is a recognised standard to secure carbon offsetting credits through tree planting. It offers a calculator tool that can estimate the benefit of a proposed planting over decades, measured in woodland carbon units (WCUs). For example, indicative modelling shows that 1,000m^2 of "Broadleaf thinned woodland" would be able to offset around 22 tCO_2e over c.65 years.

To secure these carbon credits, the trees must be planted and maintained in accordance with the Woodland Carbon Code.

If this occurs within the site boundary, then this would allow carbon credits to be secured to offset some of the residual carbon emissions. During detailed design, this option will be considered and if feasible will be utilised and reported with Reserved Matters applications.

Local Authority Carbon Offset Fund

As an alternative a contribution to a carbon offset fund may be used. As agreed for the Firethorn development, this could involve a payment to Cherwell District Council to invest in CO_2 emission saving measures somewhere within the District. CDC would then be bound to deliver the required carbon savings through the identification, delivery and certification of suitable projects.

CDC confirmed that, at present, they do not have an established carbon offsetting fund. The appeal by Firethorn[5] for a similar, albeit smaller scheme confirmed that the offsetting payments can be calculated based on a price of £69 per tonne for 30 years. Should the plot developers be unable to identify any offsetting projects for the residual emissions then, Hallam or the plot developers to make a payment to CDC under the cost identified above although the contributions should cease in 2050 given that the UK is legally bound to have reached net zero at that point.

These payments are expected to be identified during detailed design and confirmed with each reserved matters application (utilising the grid emission factor in place at that time) with payments made upon occupation of buildings through a suitably agreed trigger.

If a local authority scheme is not in existence at the time the Reserved Matters Applications are made then, it may be proposed to use a third-party scheme.

Route to Net Zero Summary

In summary, the route to net zero follows the energy hierarchy **(Figure 8)** and gives confidence that net zero buildings can be delivered in accordance with policy.

[4] https://woodlandcarboncode.org.uk/

[5] Planning Application Reference: 21/01630/OUT

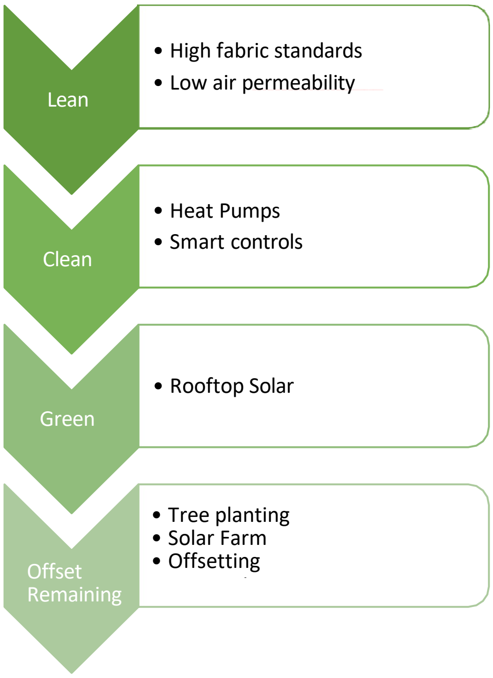


Figure 8 – Hawkwell Village Energy Hierarchy

3.2 Embodied Carbon Emissions

Section 3.2 responds to the following issues identified by CDC/ Bioregional:

Utilising Sustainable Materials

Increasingly stringent energy efficiency and operational carbon regulations means that embodied carbon is proportionately an increased part of a buildings carbon footprint and therefore a bigger relative contribution to climate change. Finding ways to reduce embodied carbon associated with new development is therefore becoming increasingly important.

Best practice industry standards and targets for embodied carbon continue to evolve, however for the purposes of this application the embodied carbon targets are considered appropriate as set out in in **Table 6**.

Hallam confirm that the development will aim to achieve the upfront embodied carbon targets set out above. During detailed design, a Whole Life Carbon Assessment (WLCA) on a representative sample (c 5%) of buildings (unless housebuilders have their own data) will be undertaken to identify the carbon footprint of the development. This will be reported as part of each Reserved Matters application.

	2030 Targets
Homes	800kg CO_2/m^2
Offices	900 CO_2/m^2
Schools	700 CO_2/m^2

Table 6: Embodied Upfront Carbon Targets

A strategy will be deployed to meet these targets and reduce embodied carbon within each building. This may include the use of cement alternatives, low temperature or recycled asphalt, recycled steel and the use of timber in construction. The principles of the circular economy will also be incorporated during construction and operation, including consideration of modern methods of construction (MMC) and pre-fabrication.

Where possible, materials will be procured locally, to reduce carbon emissions associated with the transport of materials. The development specification will also prioritise responsible supply chains such as those who hold FSC and BES6001 certification.

Insulation materials containing substances known to contribute to stratospheric ozone depletion or with the potential to contribute to global warming will not be used. Natural insulation materials such as mineral wool, rock wool or cork board will be considered as they are amongst the lowest Global Warming Potential (GWP) rating.

3.3 BREEAM

Section 3.3 responds to the following issues identified with the previous Energy Strategy:

Hallam confirm that the non-residential aspect of the development will commit to targeting a BREEAM 'Excellent' rating for buildings over 1,000m^2, where feasible and viable, exceeding the requirements of Policy Bicester 1 to achieve a minimum 'Very Good' rating.

To demonstrate a route to BREEAM Excellent Turley Sustainability have reviewed the masterplan and the following application materials:

- Flood Risk Assessment
- Transport Assessment
- Biodiversity Impact Assessment

Areas where the project and designs are currently contributing to an 'Excellent' rating have been identified, these are expanded upon in this section. Following the discussion with CDC and Bioregional, it has been confirmed to be acceptable that a BREEAM Pre- Assessment will be provided at the Reserved Matters stage, when further detail and information contributing towards credit achievement is available.

3.3.1. Recommended BREEAM route to Excellent

I. Management

This category encourages the adoption of sustainable management practices in connection with design, construction, commissioning, handover and aftercare. The credits within this category are awarded to project and design teams who consider and incorporate sustainability measures, involving key stakeholders from project brief through to occupation.

This includes elements such as life cycle costing, seasonal commissioning, consideration of construction site impacts, testing of building fabric and post occupancy evaluation.

II. Health and Wellbeing

The Health and Wellbeing category of the BREEAM schemes has been aligned with the 'WELL' Standard, bringing the comfort of building occupiers to the forefront of the design.

Overheating within buildings is likely to be a significant effect of climate change and will be accounted for through Part O of the Building Regulations, see **Section 3.4**. The indoor air quality, visual comfort, and acoustic performance will also be considered to ensure a comfortable, high quality environment for the building occupants.

III. Energy

The Energy category encourages the specification and design of energy efficient solutions, systems and equipment. The credit requirements support the reduction of carbon emissions throughout the operational phase of the development proposal.

As set out in **Section 3.1** of this report, the proposed development is anticipated to deliver an efficient and very low carbon development, with renewable energy generation. This will enable the non-domestic elements to exceed the requirements for a BREEAM Excellent rating.

IV. Transport

This category encourages provision of and improved access to local amenities and to sustainable means of transport, such as public transport and other alternative transport solutions for occupants. The aim is to reward locations and solutions that support reductions in car journeys and, therefore, congestion and CO_2 emissions over the life of the building.

A Transport Assessment and Travel Plan have been produced to communicate the proposed sustainable transport measures to reduce private car travel to and from the site, contributing towards BREEAM credit Tra01.

Supporting Tra02, Hawkwell Village will provide a range of sustainable transport measures, including a permeable network of high-quality cycling and walking routes to maximise the site's accessibility and permeability by active modes of travel. High quality bus routes will also be provided as part of the wider NW Bicester scheme, facilitating frequent and direct bus connection to key destinations, ensuring all dwellings will be within 600 metres of a bus stop, encouraging public transport.

Secured and sheltered cycle parking spaces will be provided at an appropriate level in discussion with Oxfordshire County Council. The development will meet CDC's requirements for Electric Vehicle charging infrastructure throughout the development.

V. Water

The aim of the Water category is to reduce the consumption of internal and external potable water over the lifetime of the building and minimising losses through leakage. To reduce water consumption through sanitary uses and achieve this reduction, reduced flow showers, low volume WCs, and rainwater harvesting for WCs and urinals should be considered.

The reserved matters applications will confirm the detail and demonstrate that the BREEAM Excellent criteria for water efficiency are targeted. It is expected that the non-domestic elements will align with the domestic approach to minimising potable water use, see Section **3.4**.

VI. Materials

The Materials category encourages development to take a 'whole life cycle' approach to construction products, considering impacts of the supply chain from raw material to end-of-life.

The design team will also consider the effect of environmental factors such as water ingress, solar radiation and temperature variation on the building.

Where possible, materials will be procured locally, to reduce carbon emissions associated with the transport of materials. Manufacturers with responsible sourcing accreditation, for example, BES6001, ISO14001, FSC and CARES certification will be prioritised during construction.

Please refer to **Section 3.2** of this report for further detail on reducing the embodied carbon of the development.

VII. Waste

The Waste category encourages the reduction of waste associated with construction methods through measures implemented during the design and on-site management. The category also rewards design measures encouraging the building users to recycle waste during building operation.

The individual non-residential development proposals will minimise construction and operational waste in line with best practice. Please refer to **Section 3.4.4** of this report for further detail.

VIII. Land Use and Ecology

The aim of the Land Use and Ecology category is to encourage sustainable land use, habitat protection and creation and improvement of long-term biodiversity.

As part of the development proposals, a Biodiversity Impact Assessment (BIA) has been undertaken by FPCR Environment and Design Limited. The BIA provides several enhancement measures including creation of a Country Park comprising semi-natural woodland and species-rich grassland. Green corridors will be created alongside existing public footpaths to contribute to ecological connectivity, and attenuation features including swales, would be provided, improving site ecology and helping habitats and species to adapt to climate change. To ensure that the proposals further lead to an overall net gain in biodiversity in line with the NPPF, a range of other habitat creation measures have been recommended within the proposals to provide additional gains for faunal species. These include a range of bird, bat and insect boxes, hedgehog highways and herptile habitat features.

The BIA demonstrates that the outline scheme currently could lead to an overall gain of 13.19% in habitat units, 10.01% in hedgerow units, and 24.13% gain in watercourse units, providing the recommended habitat conditions are adhered to. This contributes to BREEAM credit LE04 'enhancing site ecology', and 'change and enhancement of ecology' in that Hawkwell Village will provide a net gain in habitat and hedgerow units.

IX. Pollution

The aim of the Pollution category is to address the prevention and control of pollution and surface water run-off associated with the building's location and use.

Pollution issues covered within the credit requirements include light, noise, flooding and emissions to air, land and water.

The non-residential elements of the development will probably follow an all-electric building services strategy, with electric vehicle charging infrastructure in place in accordance with the Building Regulations.

Pollution impacts associated with light and noise will be reduced and managed in accordance with good practice.

An FRA has been undertaken which classifies the site as being largely within Flood Zone 1, supporting the achievement of BREEAM credit Pol03. Mitigation measures are being incorporated into the design to ensure surface water run-off is appropriately managed, for example using SuDS such as infiltration systems, swales and detention basins.

3.3.2 Summary

This section has summarised the BREEAM-related sustainability credits expected to achieve the proposed Excellent target rating. The development is already supporting the achievement of the proposed target through the measures discussed, and a BREEAM pre-assessment can be provided at each reserved matters application for non-residential uses with a floor area >1,000m^2.

3.4 Climate Change Adaptation

Section 3.4 responds to the following issues identified with the previous Energy Strategy:

This section identifies key measures which will be incorporated into the design of new buildings and the proposed development to adapt to climate change. Essentially, these issues relate to higher temperatures and more varied rainfall.

Climate change adaptation has been integral to the design of the Hawkwell Village development. Homes and buildings will consider a range of adaptation measures, including the use of Sustainable Drainage Systems, rainwater harvesting, water efficient fixtures and fittings, and green infrastructure. Homes and buildings at Hawkwell Village will be energy and water efficient, also limiting unwanted solar gains in the summer to mitigate against overheating.

3.4.1 Water Neutrality

Policy Bicester 1 requires utilities and infrastructure to allow for water neutrality on the site and demonstrate how this would be met. The established definition of water neutrality is that 'total demand for water should be the same after new development is built, as it was before. That is, the new demand for water should be offset in the existing community by making existing homes and buildings in the area more water efficient'[6].

This requirement is technically and commercially challenging and would require NW Bicester to not remove any water from the environment, as well as recycle and re-use all waste water. This would probably require greywater recycling systems throughout and/or a two-pipe water supply around the site which transmits and collects potable and grey water. Research has not identified any reliable two-pipe systems in the UK and it is expected such a system would have prohibitively high installation and high maintenance costs and requirements.

On this basis it is concluded that water neutrality is therefore not viable at North West Bicester. Instead, the development will focus on improving water efficiency, which will be enhanced through the measures set out in **Section 3.4.2**.

3.4.2 Water Efficiency

Cherwell District is served by Thames Water and is classed as being in an area of serious water stress[7]. For that reason, CDC are permitted under the Governments technical standards to request the higher water efficiency standard of 110 litres per person per day (l/p/d).

The homes at Hawkwell Village will therefore aim to reduce water consumption by committing to a maximum of 110 litres per person per day with water fittings, such as:

[6] Microsoft Word - SC080033 SR1 REPORT SCT.doc (publishing.service.gov.uk)

[7] Water stressed areas - 2021 classification - GOV.UK (www.gov.uk)

- Reduced flush WCs;
- Low flow fittings such as taps and showers; and
- Kitchen / catering equipment with reduced water usage.

This will be demonstrated using the government water calculator tool at the reserved matters stage.

The non-domestic elements will use the BREEAM water calculator tool to demonstrate a reduction in water use in line with the requirements of a BREEAM Excellent rating. This would typically involve targeting a minimum of two credits within credit issue Wat01 'water consumption'. Achieving these credits will reduce water consumption by approximately 25% over the baseline water usage defined by the BRE. Likely water saving measures will include:

- Low flush WCs;
- Restricted flow showers and taps; and
- Water saving kitchenette equipment.

Non-domestic buildings will also prioritise rainwater harvesting for WCs and urinals where feasible, to reduce water demand and consumption.

3.4.3 Flood Risk and Drainage

A Flood Risk Assessment (FRA) has been prepared by Brookbanks Consulting Limited. In terms of fluvial flood risk, most of the site is within Flood Zone 1, meaning the site is classified as having a less than 1 in 1,000 annual probability of river or sea flooding. Assessment of other potential flooding mechanisms shows the land to have a low probability of flooding from overland flow, groundwater and sewer flooding.

Sustainable Drainage Systems (SuDS) have been prioritised for the surface water drainage strategy. SuDS features considered for the site at outline stage include infiltration systems, swales and detention basins. At the reserved matters stage, rainwater harvesting, filter drains, trees and pervious pavements will also be considered to reduce surface water runoff. The use of SuDS can provide betterment on water quality through pollutant removal, whilst also enhancing biodiversity. The drainage strategy ensures that Hawkwell Village will not flood for all storm events up to 100 years plus a 40% allowance for climate change.

Further information on the sites flood risk and the proposed surface water management system can be viewed in the accompanying FRA.

3.4.4 Overheating

With rising summer temperatures, there is an increasing risk of overheating in buildings which could adversely affect building occupants and users. The proposed homes will consider the cooling hierarchy, as shown in **Figure 9**, to prioritise resident comfort and reduce carbon emissions.

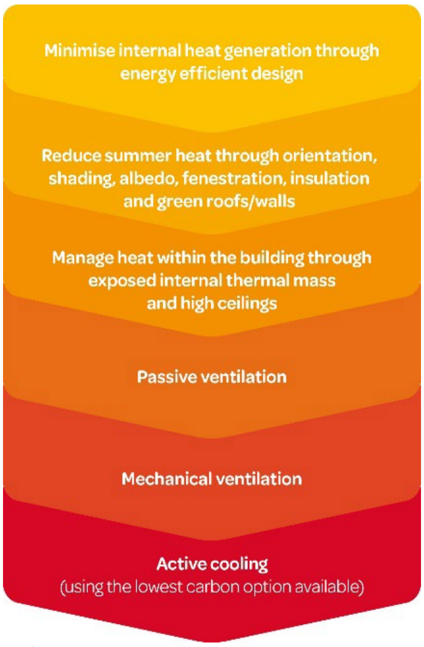


Figure 9: Cooling Hierarchy

This process is now more formalised in Part O of the Building Regulations. Part O sets out requirements for mitigating overheating, specifying that residential developments must limit unwanted solar gains in the summer and provide means to remove heat. There is a comparable standard for non-domestic buildings as well.

Compliance with Part O can be demonstrated using two methods to demonstrate the risk of overheating from rising summer temperatures has been mitigated:

- Following a simplified prescribed glazing and free area ratio; or,

- Use of Dynamic Simulation Modelling.

Each phase of Hawkwell Village, NW Bicester will submit a more detailed analysis due to the variation in design, typology, location, etc.

The Part O modelling analysis will require the use of future weather files of the 2020s and 2050s.

An early-stage analysis of Hawkwell Village has been carried out using the Good Homes Alliance Early-Stage Overheating Risk Tool[8]. This tool considers issues such as the location, site characteristics and dwelling types to give an indication of whether the site is of low, medium or high risk of overheating. The indications are that houses will be of low risk and even flats may be low risk depending on whether they are single or dual aspect.

On this basis, with design considerations at reserved matters stages, it is not expected that any of the homes will need active cooling and will have reduced the risk of overheating in accordance with best practice. Commercial buildings will have a thermal comfort study as part of the detailed design and in some cases may require cooling.

3.5 Waste Management

Section 3.5 responds to the following issues identified with the previous Energy Strategy:

Hawkwell Village will minimise construction and operational waste based on industry best practice. This involves setting targets for both non-domestic and residential waste, considering benchmarks from the British Standard and BREEAM NC 2018 manual for non-domestic waste. The BREEAM indicators aid in the calculation of non-domestic construction waste arisings, applying the entry level metric from the BREEAM New Construction 2018 manual [9]of 11.1t/100m2 (GIA). The development at Hawkwell Village will consider using the British Standard 5906 (2005) Waste Management in Buildings Code of Practice [10]to calculate non-domestic operational waste. The BS 5906 provides benchmarks for typical weekly waste arisings based.

Municipal operational waste arisings can be calculated utilising Local Plan data, for example the volume of waste per household in Cherwell can be multiplied by the estimated number of homes built as part of the NW Bicester development. Turley Sustainability have conducted research into waste intensity metrics and can provide a range of best-practice industry-wide metrics to estimate residential construction waste.

At this outline application stage, there is not enough detail to develop a detailed Waste Strategy, as the exact types of buildings and construction processes have not been identified. Instead, it is suggested that a Waste Strategy will be prepared at the reserved matters application stage[11], when further detail specifying building types and sizes can be provided to enable more accurate waste estimations. At a high level, the strategy will set targets and based on experience of similar schemes, Turley Sustainability consider the following to be ambitious but achievable:

- Provide adequate waste facilities to enable residents to work toward a recycling rate of 100% of recyclable materials with zero recyclable waste to landfill.
- Enable alignment as far as possible with the Circular Economy targets in construction:
  - Demolition waste: minimum 95% diversion from landfill for reuse, recycling or recovery.
  - Excavation waste: minimum 95% diversion from landfill for beneficial use.
  - Construction waste: minimum 95% diversion from landfill for reuse recycling or recovery.
  - Recycled content: A target of 20% of materials to be comprised of recycled or reused content.

[8] https://goodhomes.org.uk/wp-content/uploads/2019/07/GHA-Overheating-in-New-Homes-Tool-and-Guidance-Tool-only.pdf

[9] BREEAM New Construction 2018 (UK) - Wst 01 Construction waste management (bregroup.com)

[10] ubkc.gov.uk

[11] As agreed by the Firethorn Appeal

4. Conclusion

This Sustainability and Energy report has been prepared to demonstrate how the proposed development at North West Bicester responds positively to the comments set out by Bioregional relating to energy, carbon, water, climate change mitigation and adaptation, and sustainable construction (BREEAM). The formal response from Bioregional can be seen in **Appendix 1** of this report.

Energy Strategy & Renewable Energy

The route to net zero at Hawkwell Village, NW Bicester can be summarised as follows:

- Constructing all dwellings and non-residential buildings to meet the forthcoming Future Homes and Building Standards as a minimum;
- Installation of roof mounted PV as a further commitment to net zero
- Eliminating the use of fossil fuels and creating an 'all-electric' energy strategy for all dwellings; and
- Identifying and offsetting all residual regulated and unregulated carbon emissions through one or more options which include:
    - Deployment of additional renewable energy technologies on buildings;
    - Construction of a large solar array to generate renewable power for export to the national grid; or
    - Carbon sequestration;
    - Financial contribution to a carbon offsetting fund

Embodied Carbon Emissions

As set out in **Section 3.2**, the Hawkwell Village development will implement measures to reduce embodied carbon as far as possible. This includes through the following:

- Targeting the best-practice requirements of RIBA 2030 Climate Challenge

Further detail will be provided at the reserved matters stage, where a whole life carbon assessment will be conducted and reported upon. A strategy will be deployed to meet these targets, and the use of sustainable materials will be considered. This may include cement alternatives, low temperature or recycled asphalt, recycled steel and the use of timber in construction. Modern methods of construction (MMC) and pre-fabrication will also be considered.

BREEAM

The non-residential aspect of the development will commit to targeting a BREEAM 'Excellent' rating for buildings over 1,000m^2, exceeding the requirements of Policy Bicester 1 to achieve a minimum 'Very Good' rating. As set out in **Section 3.3**, through a review of the application materials, the development design is already contributing to an 'Excellent' rating across a range of areas. This includes through sustainable transport measures, including a permeable network of high-quality walking and cycling routes, bus routes, and cycle parking storage to encourage active travel.

Reduced flow showers, low volume W/Cs, and rainwater harvesting will reduce water demand and consumption.

Ecology will be enhanced through a number of measures such as the creation of a Country Park, green corridors and attenuation features, as well as the inclusion of bird, bat and insect boxes, hedgehog highways and habitat features. SuDS including infiltration systems, swales and detention basins will also be incorporated to manage surface water runoff.

Climate Change Adaptation

This section sets out how climate change adaptation has been integral to the design of the Hawkwell Village development through the following measures:

- Water efficiency, targeting a maximum of 110 litres per person per day (l/p/d) or lower through low flow fittings, reduced flush WCs and kitchen equipment with reduced water usage.
- Sustainable drainage systems to reduce surface water runoff, improve water quality and enhance biodiversity, prioritising infiltration systems, swales and detention basins at the outline stage, with rainwater harvesting, filter drains, trees and pervious pavements to be considered at the reserved matters stage.
- Overheating measures to demonstrate compliance with Building Regulations Part O, utilising future weather files of the 2020s and 2050s. Further detail on overheating mitigation will be provided at the reserved matters stage when greater design detail is available.

Waste Management

The Hawkwell Village development at NW Bicester will target non-domestic and construction waste, considering benchmarks from the British Standard and BREEAM NC 2018 manual for non-domestic waste. Municipal operational waste arisings can be calculated using Local Plan data, and residential construction waste can be calculated based on industry best-practice metrics. A detailed Waste Strategy will be provided at the reserved matters stage when further detail specifying building types and sizes can be provided to enable more accurate waste estimations. Key targets include the provision of adequate waste facilities to enable residents to work toward a recycling rate of 100%, enable alignment with the Circular Economy as far as possible by setting construction and demolition waste targets, and setting a target for 20% of materials to comprise of recycled or reused content.

Summary

This strategy has responded specifically to the requests raised by Bioregional on behalf of Cherwell District Council, as set out in **Appendix 1**. **Appendix 1** provides further detail on these requests, and a response from Turley Sustainability to each comment, setting out where this is addressed, with further detail to be provided at the reserved matters stage in many cases, when more information is available. In summary, the Hawkwell Village development at North West Bicester will incorporate measures to deliver a climate-resilient, sustainable development in line with the aspirations of Policy Bicester 1.

Appendix 1 – Bioregional response

Bioregional's response to application 21/04275/OUT – Part OS Parcel 8149 Adj Lords Lane And SE Of Hawkwell Farm Lords

Application description: OUTLINE - with all matters reserved except for Access - Mixed Use Development of up to 3,100 dwellings (including extra care); residential and care accommodation(C2); mixed use local centre (comprising commercial, business and service uses, residential uses, C2 uses, local community uses (F2(a) and F2(b)), hot food takeaways, public house, wine bar); employment area (B2, B8, E(g)); learning and non-residential institutions (Class F1) including primary school (plus land to allow extension of existing Gagle Brook primary school); green Infrastructure including formal (including playing fields) and informal open space, allotments, landscape, biodiversity and amenity space; burial ground; play space (including Neaps/Leaps/MUGA); changing facilities; ground mounted photovoltaic arrays; sustainable drainage systems; movement network comprising new highway, cycle and pedestrian routes and access from highway network; car parking; infrastructure (including utilities); engineering works (including ground modelling); demolition.

Bioregional have assessed a range of documents submitted with the application 21/04275/OUT against Policy Bicester 1 (North West Bicester Eco-Town) and Policies ESD 1-5 from the adopted Cherwell District Council Local Plan 2011-2031. A full table is provided below.

We would like to note that the red line boundary of the site does not wholly fall within the North West Bicester Eco-Town site allocation and the agreed masterplan from 2014 for the NW Bicester Eco Town. The Design and Access Statement (Hallam Land Management, December 2021) states that the "substantial majority" of the site is within the allocated land, therefore, we have applied this policy.

Key: Comments in a Red box – significant information outstanding; Amber box – some information outstanding, Green box – sufficient information provided.

<u>*Summary:*</u>

In general, some sustainability elements have been addressed to an appropriate level of detail in the documentation provided. Key items we believe to be outstanding include: Water Cycle Study; demonstration of net biodiversity gain; demonstration of residential water efficiency proposals; proposed overheating analysis details; waste management strategy; and sustainability credentials including BREEAM for non-residential spaces and standards equivalent to Code for Sustainable Homes Level 5. Where relevant, we have noted that some issues will need to be fully reviewed by other technical consultants.

For energy issues, we believe insufficient information has been provided. We would strongly recommend that the energy strategy documentation is re- visited to demonstrate how the policy definition of net zero carbon has been met by this application, including calculations of emissions from the development, and how improvements against the baseline including passive design measures and the inclusion of renewable energy technologies has been calculated.

Response:

Policy Bicester 1 (North West Bicester Eco-Town)	**Compliance and next step**	**Turley Sustainability Response**
Has evidence been provided to confirm the Zero Carbon definition has been met?	It is not clear in the supporting Energy Strategy how the zero-carbon definition proposed for this application meets the requirements of Policy BIC 1. The policy documentation is clear that development in NWB should be a zero-carbon development. This definition is based on all carbon emissions from all energy uses within buildings to be as a whole net zero or below over a one-year period. This includes both regulated and unregulated emissions. From the energy statement it is not clear if this definition of zero carbon has been considered. For example, have the unregulated emissions been included? Whilst there is mention of Zero Carbon within the planning documentation (notably in the DAS and Energy Statement) – however the Energy Statement does not go into the detail of the of how this would be achieved. Whilst we acknowledge that this is due to the outline nature of the application, we do not	Please refer to **Section 3.1** of this report for further detail. This section sets out the path to net zero at Hawkwell Village, North West Bicester, the application of the energy hierarchy to demonstrate compliance, as well as an indicative dwelling specification in line with the Future Homes and Buildings Standard plus a commitment to go beyond this with Solar PV. An assessment of a range of renewable energy technologies is also included. The offsetting opportunities for the residual carbon emissions are also discussed, considering ground mounted solar, green infrastructure planting to sequester carbon, and a contribution to a carbon offsetting scheme as established through the Firethorn appeal.

	believe that sufficient information has been provided for this issue. However, we would expect to see an indicative carbon balance to be presented that provides reassurance on the zero-carbon target to be met, this should include: • Baseline carbon emissions for the development (based on indicative scheme) • Proposed breakdown of compliance as per the energy hierarchy We would expect to see a commitment to build to certain fabric efficiency e.g., in line with the FHS consultation or beyond e.g., Energy Use intensity targets as per LETI guidelines – currently this is not clear. We would expect to see how the level of renewable energy that could be generated on site by the solar farm can contribute to the zero-carbon target.	
Employment		
A Carbon Management Plan shall be produced to support all applications for employment developments.	No information provided.	Please refer to **Section 3.1** of this report for further detail. This section sets out the proposed non-domestic Carbon Management Plan, estimating the carbon emissions of the proposed retail, B2/B8, office and education uses at Hawkwell Village. This includes an energy strategy following the Future Buildings

		Standard, eliminating fossil fuels and utilising renewable energy in the form of solar PV. The offsetting opportunities for the residual carbon emissions are also discussed, considering ground mounted solar, green infrastructure planting to sequester carbon, and a contribution to a carbon offsetting scheme.
New non-residential buildings will be BREEAM Very Good with the capability of achieving BREEAM Excellent.	No detail of BREEAM standard can be found in supporting documents. We would recommend that a pre- commencement condition is set requesting that a BREEAM Design Stage assessment is provided, and a condition for post completion requests a BREEAM Post Construction certificate within 6 months of completion. The Sustainability Statement states that there is a document titled "ESS0274-BREEAM NC 2018 Pre-Assessment-20210827" which confirms the score for the proposed development, however this has not been provided.	Please refer to **Section 3.3** of this report for further detail. This section sets out the BREEAM strategy for the proposed non-residential aspect of the development, targeting a BREEAM 'Excellent' rating for buildings over 1,000m^2. **Section 3.3** demonstrates where the project and designs are currently contributing to an 'Excellent' rating, based on a review of the masterplan and application materials.
Housing		
Homes to be constructed to be capable of achieving a minimum of Level 5 of the Code for Sustainable Homes on completion of each phase of development, including being	We would recommend a condition is set to provide evidence to demonstrate the targets (litres/person/day) are set for flow rates/volumes in both residential and non- residential spaces.	Please refer to **Section 3.4.2** of this report for further detail. This section sets out the strategy for water reduction and efficiency at Hawkwell Village, setting a maximum target of 110 l/p/d, or lower, through a range of measures such as reduced flush WCs, low flow fittings such as taps and showers, and

equipped to meet the water consumption requirement of Code Level 5	We would also recommend a condition is set to demonstrate these are achieved at completion.	kitchen/catering equipment with reduced water usage. Section 3.4.2 also sets out the non-domestic water efficiency strategy, using the BREEAM water calculator tool to demonstrate a 25% reduction in water consumption over the BRE baseline, through water saving measures, and prioritising of rainwater harvesting where feasible.
Infrastructure Needs		
Waste Infrastructure – The provision of facilities to reduce waste to include at least 1 bring site per 1,000 dwellings positioned in accessible locations. Provision for sustainable management of waste both during construction and in occupation shall be provided. A waste strategy with targets above national standards and which facilitates waste reduction shall accompany planning applications.	An operational waste strategy with targets and confirmation of waste storage locations should be provided.	Please refer to **Section 3.5** of this report for further detail. This sets out the proposed waste strategy for both the residential and non-domestic aspects of Hawkwell Village. It sets out construction and operational waste targets in line with industry best practice, considering benchmarks from the British Standard and BREEAM NC 2018 manual for non-domestic waste.
Monitoring		
Embodied impacts of construction to be monitored, managed and minimised (ET21)	Whilst a CEMP is mentioned in the ES, this is a standard request to control development and doesn't cover embodied carbon or construction issues. It is noted that the Council's Environmental Protection Officer has requested a CEMP and this is supported. The embodied carbon of construction	Please refer to **Section 3.2** of this report for further detail. This sets out the proposed embodied carbon targets for Hawkwell Village, based on UK Net Zero Carbon Buildings targets for homes, offices and schools. **Section 3.2** demonstrates how these targets will be implemented, through the use of cement alternatives, recycled asphalt and steel, and using timber in

	and local sourcing should also be secured and monitored.	construction. It also sets out how materials will be procured locally to reduce the carbon emissions associated with the transport of materials.
Sustainability metrics, including those on zero carbon, transport, water and waste to be agreed and monitored for learning, good governance and dissemination (ET22).	We recommend that BREEAM assessment scores are provided. These will address sustainability metrics for carbon, transport, water and waste. Could metrics for learning, good governance and dissemination be outlined now to ensure sustainability for the longer term? S106 could include regular monitoring of sustainability standards.	Please refer to **Section 3.3** of this report for further detail. This section sets out the BREEAM strategy for the proposed non-residential aspect of the development, targeting a BREEAM 'Excellent' rating for buildings over 1,000m^2. **Section 3.3** demonstrates where the project and designs are currently contributing to an 'Excellent' rating, based on a review of the masterplan and application materials.
Design and place shaping		
High quality exemplary development and design standards including zero-carbon development, Code Level 5 for dwellings at a minimum and the use of low embodied carbon in construction materials, as well as promoting the use of locally sourced materials.	Whilst the Energy Statement confirms measures for reducing carbon emissions during operation of the development, the policy requirement seeks confirmation that Code Level 5 is achieved, demonstrating that low embodied carbon materials and locally sourced materials are used. This has not been confirmed. A target could be set for sourcing materials within a certain number of miles from site and for using recycled materials and/or modular construction for material efficiency.	Please refer to **Section 3.2** and **3.5** of this report for further detail. This sets out how materials will be procured locally to reduce the carbon emissions associated with the transport of materials, and how the development specification will also prioritise responsible supply chains such as FSC and BES6001 certification.
All new buildings designed to incorporate best practice on tackling overheating,	We would strongly encourage a commitment through a condition is used to ensure analysis and compliance using CIBSE TM52 and CIBSE TM59 is	Please refer to **Section 3.4.4** of this report for further detail. This sets out how the cooling hierarchy will be considered at Hawkwell Village to reduce emissions

taking account of the latest UKCIP climate predictions	provided. Insufficient information has been provided to confirm that measures are in place to mitigate overheating risk. We would encourage that this analysis looks at future climate scenarios (e.g.: 2050 climate scenario) to ensure any development is adapting to future changes associated with climate change.	and prioritise resident comfort, and compliance with Part O will be demonstrated at the Reserved Matters stage. It also includes a summary of the findings of an early-stage analysis of Hawkwell Village using an Overheating Risk Tool, demonstrating that houses will be at low risk of overheating.
Demonstration of climate change mitigation and adaptation measures including exemplary demonstration of compliance with the requirements of policies ESD 1 – 5	See below.	Please refer to **Section 3.4** of this report for further detail. **Section 3.4** sets out how climate change adaptation has been considered, and how it has been integral to the design of the development through water neutrality and efficiency, flood risk and sustainable drainage, and overheating mitigation.
Cherwell District Council Local Plan 2011-2031 ESD policies		
ESD1: Mitigating and Adapting to Climate Change		
Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction)	As stated above, we would recommend that conditions are set to ensure a suitable BREEAM rating is delivered. Following the proposed energy efficiency measures, the targeted reduction in carbon emissions for residential and non-residential spaces has not been estimated. A condition could be set to ensure that evidence is provided to demonstrate targeted reduction in carbon emissions is achieved at completion of the units.	Please refer to **Section 3.1** and **3.3** of this report for further detail. **Section 3.1** sets out how Hawkwell Village, NW Bicester is compliant with the energy hierarchy, as well as an indicative dwelling specification in line with the Future Homes and Buildings Standard. An assessment of a range of renewable energy technologies is also included. It also includes an estimation of the energy demand and CO_2 emissions, using energy modelling to compare emissions among the 2021 Building Regulations, the 2025 Future Homes Standard and the design of the homes at NW Bicester.

	A condition to ensure efficient water consumption is suggested below.	**Section 3.3** sets out the BREEAM strategy for the proposed non-residential aspect of the development, targeting a BREEAM 'Excellent' rating for buildings over 1,000m^2.
Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling	It has not been confirmed that the cooling hierarchy has been considered to minimise cooling demand or if cooling is proposed anywhere on site. A condition could be set for this.	Please refer to **Section 3.4.4** of this report for further detail. This sets out how the cooling hierarchy will be considered at Hawkwell Village to reduce emissions and prioritise resident comfort, and compliance with Part O will be demonstrated at the Reserved Matters stage. It also includes a summary of the findings of an early-stage analysis using an Overheating Risk Tool, demonstrating that houses at Hawkwell Village, NW Bicester will be at low risk of overheating.
Minimising the risk of flooding and making use of sustainable drainage methods	See above	Please refer to **Section 3.4.3** of this report for further detail, which includes detail from application documents summarising the Sustainable Drainage Systems (SuDS) which have been prioritised for the surface water drainage strategy. This includes infiltration systems, swales and detention basins.
ESD2: Energy Hierarchy and Allowable Solutions		
Reducing energy use, in particular by the use of sustainable design and construction measures.	The Energy Hierarchy has been followed in the Energy Statement to demonstrate suitable energy efficiency measures and renewable technologies have been proposed as part of the design of the development. Further detail on the feasibility of renewable energy technologies would be recommended – this is requested below.	Please refer to **Section 3.1** of this report for further detail. This section sets out the path to net zero at Hawkwell Village, the application of the energy hierarchy to demonstrate compliance and emissions reduction, and an assessment of a range of renewable energy technologies, including calculations to demonstrate the potential for rooftop solar.

Making use of renewable energy.	Renewable energy technologies are proposed – see below.	As above.
Making use of allowable solutions.	We would recommend that the applicant is asked to provide information confirming allowable solutions proposed in order to demonstrate policy compliance.	Please refer to **Section 3.1** of this report for further detail. This section sets out the offsetting opportunities for the residual carbon emissions, considering ground mounted solar, green infrastructure planting to sequester carbon, and a contribution to a carbon offsetting scheme.
ESD3: Sustainable Construction		
All new 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. The Zero Carbon in Eco-towns definition from the Eco Towns Planning Policy Statement (2009) states that "over a year the net carbon dioxide emissions from all energy use within the buildings on the eco-town development as a whole are zero or below".	The proposed energy efficiency measures are suitable however we would request further information for each stage of the Energy Hierarchy and would recommend that this is requested via a condition. The Energy Strategy is based upon an all- electric heating solution using ASHPs. Carbon sequestering (tree planting) is suggested for the project to "offset any remaining carbon emissions". It achieves zero carbon by using the assumption that the potential decarbonisation of the national grid "could reduce carbon emissions from the development by 50% and will ultimately deliver a Zero Carbon development by 2050". This does not demonstrate how the development will be zero carbon from the outset and relies heavily on the decarbonisation of the grid which is out of the control of the project.	Please refer to **Section 3.1** of this report for further detail. This section sets out the path to net zero at Hawkwell Village, the application of the energy hierarchy to demonstrate compliance, as well as an indicative dwelling specification in line with the Future Homes and Buildings Standard. An assessment of a range of renewable energy technologies is also included. The offsetting opportunities for the residual carbon emissions are also discussed, considering ground mounted solar, green infrastructure planting to sequester carbon, and a contribution to a carbon offsetting scheme.

	As mentioned previously in other comments we would seek clarity on the definition of zero carbon being sought and how this aligns with policy BIC1.	
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.	We would recommend a condition is set to provide evidence to demonstrate the targets (litres/person/day) are set for flow rates/volumes in both residential and non- residential spaces. We would also recommend a condition is set to demonstrate these are achieved at completion.	Please refer to **Section 3.4.2** of this report for further detail. This section sets out the strategy for water reduction and efficiency, setting a maximum target of 110 l/p/d or lower, through a range of measures such as reduced flush WCs, low flow fittings such as taps and showers, and kitchen/catering equipment with reduced water usage.
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.	See above.	Please refer to **Section 3.3** of this report for further detail. **Section 3.3** sets out the BREEAM strategy for the proposed non-residential aspect of the development, targeting a BREEAM 'Excellent' rating for buildings over 1,000m^2.
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	Further information should be provided as follows: • Minimising energy demands and energy loss – what are targeted building fabric u- values? and efficiency of ASHPs? • Maximising passive solar and natural ventilation – what ventilation strategy is proposed for residential and non- residential spaces? • Locally-sourced, sustainable materials – see above	Please refer to **Section 3.1**, **3.2, 3.4 and 3.5** of this report for further detail. **Section 3.1** applies the energy hierarchy to the development at Hawkwell Village, NW Bicester, showing where energy demand is minimised and energy efficiency is increased. **Section 3.1** also provides an indicative dwelling specification in line with the Future Homes and Buildings Standard, reducing the demand for space heating. **Section 3.2** sets out how materials will be procured locally to reduce the carbon emissions

- 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).	• Reducing waste during construction and providing waste facilities for operation – a Construction Site Waste Management Plan will be created • Green roofs and cooling – see above • Sustainable drainage – see above • Embodied construction methods – see above	associated with the transport of materials, and how the development specification will also prioritise responsible supply chains such as FSC and BES6001 certification. **Section 3.4** demonstrates how climate change adaptation has been integral to the design of the NW Bicester development through SuDS, green infrastructure and water and energy efficiency measures. Section 3.5 sets out the proposed waste strategy and targets for the site.
ESD4: Decentralised Energy Systems		
Does the feasibility assessment indicate that decentralised energy systems are deliverable as part of the development?	Insufficient information has been provided with regards to utilising waste heat from the Ardley ERF. A heat network would be a good solution to providing heat across the site as there are mixed uses and demands.	Please refer to **Section 3.1** of this report for further detail, which sets out the application of the energy hierarchy at Hawkwell Village, NW Bicester. **Section 3.1** assesses the Ardley ERF feasibility in the 'Be Clean' section; connecting to a heat network.
ESD 5: Renewable Energy		
Does the feasibility assessment indicate that onsite renewable energy systems are deliverable as part of the development? Yes/No	We would request to see confirmation of the renewable energy technologies considered (this could include solar thermal and ground source heat pumps and perhaps even a localised anaerobic	Please refer to **Section 3.1** of this report for further detail, which includes a review and assessment of renewable technologies which could be feasible at Hawkwell Village, NW Bicester.

	digester to use food waste generated on site to heat community buildings, for example).	
If yes, does onsite renewable energy form part of the proposed development? (As required by Policy ESD 5) Yes/No	We would like to see evidence of potential output of a typical rooftop household PV array and also the potential output of the large PV array. A condition could be set to ensure that these measures are delivered in the buildings and demonstrated prior to occupation.	Please refer to **Section 3.1** of this report for further detail. This includes modelling to demonstrate the impact and potential emissions savings that could be achieved using solar PV.
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 condition could be set to request evidence to demonstrate the heat pumps will not have an unacceptable adverse impact on biodiversity, residential amenity or have a visual impact. A condition could also be set for the archaeological excavation evaluation ahead of work starting on site.	Please refer to **Section 3.1** of this report for further detail. This provides detail on the feasibility of heat pump connectivity and feasibility at Hawkwell Village, NW Bicester based on a range of factors.

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