Sustainability, Carbon and Energy Statement

HADSCAL,
Hay-On-Wye.

02/11/2026

Quality Management

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1.0 Executive Summary

1.1 Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013)[1] is a long-term strategic development plan prepared by the Brecon Beacons National Park Authority. Its core purpose is to guide how the Brecon Beacons area will grow sustainably.

1.2 Policy SP4 of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) aims to manage climate change impacts in new development.

1.3 Policy SP11 and SP9 of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) aims to reduce energy usage and maximise the use of renewable energy sources.

1.4 In addition to the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013), Wales has a National Planning Policy (adopted February 2024)[2] which sets out the land use planning policies of the Welsh Government.

1.5 The Welsh Government Policy National Planning Policy (adopted February 2024) outlines that all new development must mitigate climate change in accordance with the energy hierarchy.

1.6 This report evaluates the proposed development at HADSCAL, Hay-on-Wye against the relevant policy set out in the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) and the Wales National Planning Policy (adopted February 2024).

1.7 The proposed development at HADSCAL, Hay-on-Wye comprises of approx. 36,700 m^2 sports, leisure and community building, and approx. 960 m^2 10 no. commercial units.

1.8 The report considers the Energy Hierarchy by prioritising reductions in energy demand through energy-efficient measures and low-energy design principles. It highlights the sustainable design features and low-carbon energy requirements in compliance with Policy SP4, SP11, SP9 and Wales Planning Policy.

1.9 In summary, this report confirms that the feasibility proposal aligns with Policy SP4, SP11 and SP9 of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) and the Welsh Government Policy National Planning Policy (adopted February 2024).

[1] *https://www.beacons-npa.gov.uk/wp-content/uploads/Brecon-Written-Statement.pdf*
[2] *https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf*

2.0 Background

2.1 RedSix have been appointed to prepare a Sustainability and Energy Statement for the proposed development at HADSCAL, Hay-on-Wye.

2.2 This document will demonstrate how the project aligns with the energy requirements of the following policies outlined in the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) and the Welsh Government Policy National Planning Policy (adopted February 2024):

- SP4: Climate Change
- SP11: Sustainable Design
- SP9: Renewable Energy

2.3 The report is designed to promote sustainable construction practices in the region, incorporating measures to address climate change and deliver positive outcomes for the community.

2.4 It details the strategies embedded within the design proposals to minimise energy demand, optimise energy use, and reduce carbon dioxide emissions, thereby lessening the scheme's environmental impact. In addition to energy efficiency measures, the report evaluates the potential integration of Renewable and Low or Zero Carbon (LZC) technologies into the development.

2.5 The Sustainability and Energy Statement independently verifies that the proposed development adheres to relevant planning policies at local, regional, and national levels. The Statement begins with an overview of the proposal, followed by an analysis of the policies and legislative framework. It then evaluates the proposal in the context of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) and the Welsh Government Policy National Planning Policy (adopted February 2024).

2.6 This assessment has been conducted at an early design stage to ensure the development achieves certified high standards of sustainability and informs the final building design accordingly.

3.0 Proposed Development

3.1 The application site is situated at HADSCAL, Hay-on-Wye. The below indicates the feasibility scheme:

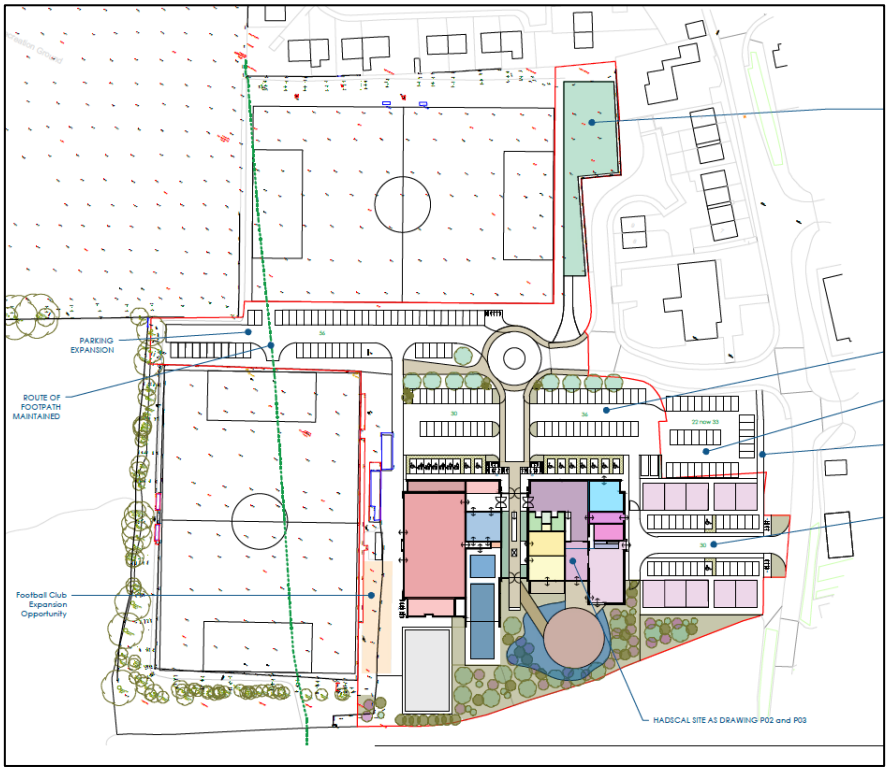

Figure 1: Draft Development Plan (CO2 Architects)

Figure 2: 3D Scene Image (CO2 Architects)

4.0 Policy & Legislative Context

4.1 Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) is a long-term strategic development plan prepared by the Brecon Beacons National Park Authority. Its core purpose is to guide how the Brecon Beacons area will grow sustainably.

4.2 The Energy Statement looks at the proposed development within the context of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013), which aims to direct development towards sustainable and resilient outcomes.

4.3 The Plan outlines the long-term vision and strategic framework for managing sustainable development across the national park.

4.4 The Plan incudes policies concerning energy and sustainability adaptation, with Policies SP4, SP11 and SP9 being relevant to the proposed development.

4.5 Welsh Government Policy National Planning Policy (adopted February 2024) acts as an additional supporting document to the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) which outlines that all new development must mitigate climate change in accordance with the energy hierarchy.

4.6 **Policy SP4: Climate Change**

Policy SP4 sets out requirements to ensure the Brecon Beacons National Park is a sustainable place to live that is resilient to the effects of climate change.

The policy states that all proposals will be required to demonstrate where relevant how the development will;

a) be resilient and adaptable to the likely effects of climate change.
b) limit and mitigate the causes of climate change; and
c) contribute to the aim of carbon neutrality.

4.7 **Policy SP11: Sustainable Design**

Policy S11 sets out requirements to ensure that new developments incorporate sustainable design and reduces energy use and maximises use of renewable energy sources.

All proposals for development will be required to address the principles of sustainable design by demonstrating that they:

a) Meet National and where defined local requirements for sustainable design or higher
b) Are able to demonstrate consideration of the use and where appropriate the application of renewable energy sources.

4.8 **Policy SP9: Renewable Energy**

Policy S9 sets out requirements to ensure renewable energy is appropriately considered for new developments and does not have a significant adverse impact on the Brecon Beacons National Park.

Proposals for renewable energy schemes will only be permitted where:-

a) they are of a scale and technology appropriate to their location; and
b) they do not have a significant adverse impact on the Natural Beauty, wildlife, cultural heritage and special qualities of the National Park

4.9 **Welsh Government National Planning Policy (adopted February 2024)**

Wales Planning Policy sets out the below regarding mitigating causes of climate change:

Welsh Government planning policy recognises an energy hierarchy. The Welsh Government expects all new development to mitigate the causes of climate change in accordance with the energy hierarchy for planning, as set out in the following energy policies. Reducing energy demand and increasing energy efficiency, through the location and design of new development, will assist in meeting energy demand with renewable and low carbon sources. This is particularly important in supporting the electrification of energy use, such as the growing use of electric vehicles and heat pumps. All aspects of the energy hierarchy have their part to play, simultaneously, in helping meet decarbonisation and renewable energy targets.

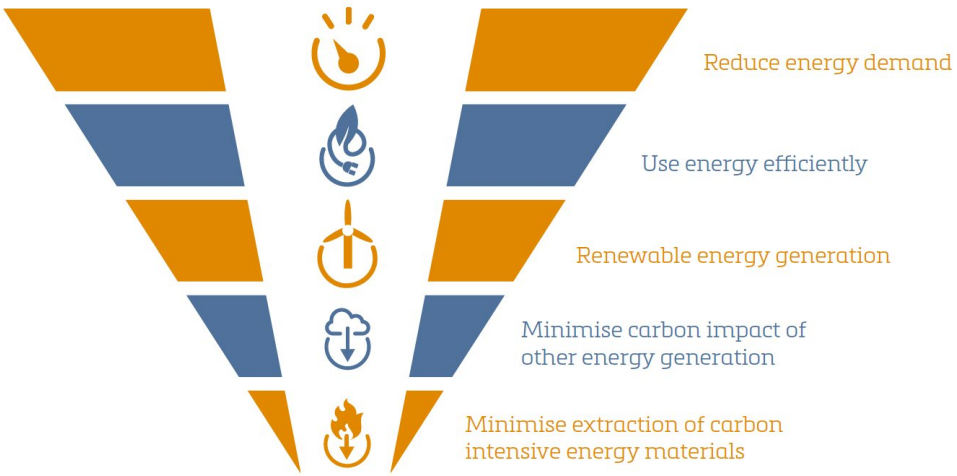

Figure 3: Wales Planning Policy (2024) – Energy Hierarchy for Planning

5.0 Policy SP4: Climate Change

5.1 Be resilient and adaptable to the likely effects of climate change

Annual average UK temperature was 0.9 °C higher during the period 2005-2014 compared with 1961-1990. Moreover, sea levels around the UK have risen by 15-20 centimetres since 1900 . These figures are forecast to continue to change as a result of climate change. At the same time, there are upward trends in rainfall across the UK. Higher levels of winter rainfall have been experienced often in increasingly heavy rainfall events leading to more flooding and damage to buildings and infrastructure. These patterns are consistent with projections of more and heavier rainfall for the UK in a warmer global atmosphere.

These changes increase health and safety risks to people and the built environment, increasing costs and disruption for repair and adaptation. The building stock will largely remain as it currently is for the next 50 to 60 years, given the relatively low levels of replacement that are likely to occur.

Therefore, there is a need for strategies to mitigate the impact of these events on our building stock overall and in particular to ensure that new buildings are designed and constructed to minimise future risks while avoiding over specification and resource use in the meantime.

The proposed development at has been designed to promote resilience to climate change and protect and enhance the local environment. Native and climate-resilient plant species have been included within the soft landscaping design to enhance biodiversity and habitat connectivity. Existing green corridors surrounding the site have been retained and integrated into the design. These measures collectively promote green infrastructure and enhance the ecological value of the site while ensuring the development is adaptable to the long-term impacts of climate change.

The site is also located in a Flood Zone 1, see Figure 2 below. Therefore, the site is at very minimal risk from the increased chances of flooding with the impacts of Climate Change.

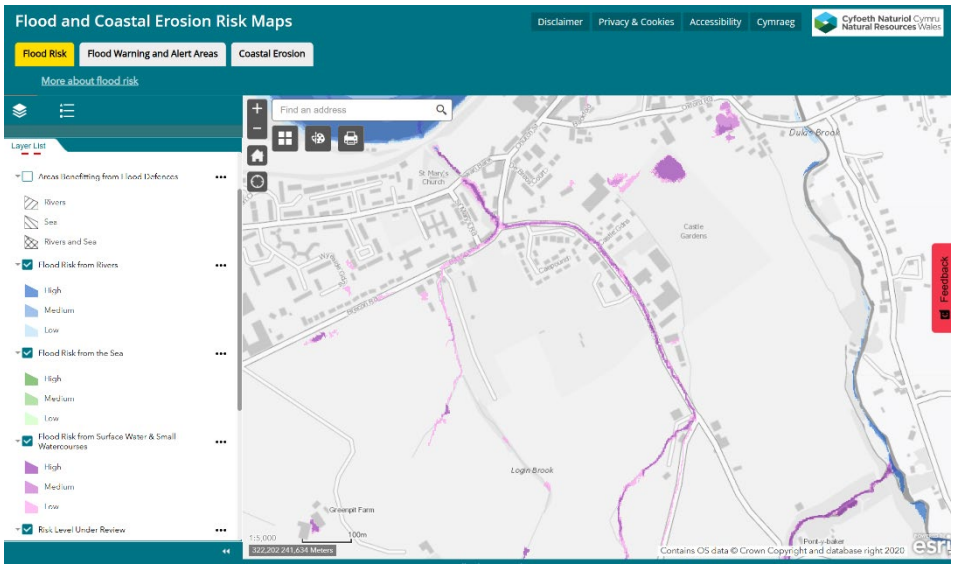

Figure 4: Flood Map for the Site (Natural Resources Wales)

5.2 Limit and mitigate the causes of climate change

The development has followed the energy hierarchy (Wales Planning Policy, adopted 2024) which sets out a hierarchy in reducing energy in the most climate responsible way for new developments.

Reduce Energy Demand
Improved building fabric performance helps to mitigate climate change by reducing the energy a building requires to operate, lowering greenhouse gas emissions and reducing reliance on fossil fuels. By designing and constructing buildings with high-performance fabric, we can reduce heat loss in winter, limit overheating in summer and decrease the energy required for heating, cooling and ventilation.

The development is proposing building fabric specifications that enhance upon the limiting values set out within the current building regulations and therefore help to reduce energy demand and therefore reduce the amount of energy required to operate the building.

Ultimately, good building fabric tackles climate change at its source by reducing energy demand and greenhouse gas emissions, while also helping buildings remain comfortable and resilient as the climate changes.

The development will be built to a high standard and limit air leakage, where a robustly airtight construction helps to:
- Prevent warm air from escaping through gaps in the building envelope.
- Reduce cold draughts and unwanted air infiltration.
- Maintains more stable indoor temperatures.
- Reduces the amount of energy required for space heating.

This helps to mitigate climate change impacts by reducing energy consumption and therefore reduces carbon dioxide emissions.

Use Energy Efficiently
Efficient building systems for Heating, Ventilation, and lighting are to be proposed which will help to mitigate and limit climate change by reducing the amount of energy and resources required to operate the buildings at the development, reducing the use of fossil fuels or electricity on site.

Water efficient fittings are important in reducing operational water consumption at the development. It is advised that the following performance levels for sanitary fittings are installed:

- WCs: 3.3 effective flush volume (litres)
- Wash-hand basin taps: 5.5 litres/min
- Urinals: 4.8 litres/bowl/hour
- Showers: 6.6 litres/min

Alongside the provision of water-efficient sanitary fittings, the building will include a water recycling system that captures and reuses greywater for appropriate non-potable uses, such as toilet flushing.

A significant amount of water is usually consumed during the construction process. The minimisation of water use during construction should also be considered.

Renewable Energy Generation
Renewable energy helps to limit and mitigate climate change by replacing fossil fuels with energy sources that produce little or no greenhouse gas emissions during operation. This reduces the amount of carbon dioxide (CO_2) and other greenhouse gases released into the atmosphere, helping to slow global warming. Further detail on the integration of these technologies is set out in Section 6.2 of this report.

Minimise Carbon Impact of Other Energy Generation
The proposed development incorporates a combination of on-site renewable and low-carbon technologies, specifically Photovoltaic (PV) systems and Ground Source Heat Pumps (ASHPs), to significantly reduce operational energy demand and associated carbon emissions. The inclusion of PV panels will enable the generation of clean, renewable electricity on site, contributing directly to the development's overall carbon reduction strategy. In parallel, the proposed use of GSHP technology will provide a highly efficient, low-carbon means of delivering space heating and hot water, reducing reliance on fossil-fuel-based systems and supporting the transition to a decarbonised heat supply. Further detail on the integration of these technologies is set out in Section 6.2 of this report.

Minimise Extraction of Carbon Intensive Energy Materials
The development will be fully electric and therefore does not rely on the extraction of carbon-intensive energy materials such as coal, oil or natural gas.

5.3 Contribute to the aim of carbon neutrality

A development can contribute towards the aim of carbon neutrality through the reduction of greenhouse gas emissions associated with its construction, operation and additionally any future use, while also maximising the use of renewable energy and protecting natural carbon stores.

The development is conducting an embodied carbon analysis throughout design and construction stages. This will help to determine the baseline embodied carbon emissions for the development with subsequent workshops as the design progresses giving the opportunity to reduce embodied carbon emissions and therefore reduce overall construction stage greenhouse gas emissions.

Shown in section 6.1 below, both leisure/community building and commercial units on the development significantly improve upon the baseline carbon and primary energy targets. Through the use of improved fabric performance, airtightness, efficient building systems, LZC technologies and renewable energy from PV and GSHP both buildings demonstrate that greenhouse gas emissions are to be reduced during the development's operation.

6.0 Policy SP11: Sustainable Design

6.1 Meet National and Defined Local Requirements for Sustainable Design or Higher

To ensure that the proposed development improves upon the baseline threshold for CO_2 emissions and energy demand, specific measures to make the building energy efficient must be incorporated within the scheme design and construction.

The development improves upon the 2022 Wales Building Standard Part L Volume 2 Building Regulations. The following key passive energy efficiency design measures to reduce emissions and energy demand have been incorporated in the outline design of the project:

Table 1: Energy Efficiency Measures

New Fabric Elements	
Main Building - External walls	0.15 W/m^{2}k
Commercial Units - External walls	0.12 W/m^{2}k
Main Building - Ground Floor	0.15 W/m^{2}k
Commercial Units - Ground Floor	0.12 W/m^{2}k
Main Building - Roof	0.15 W/m^{2}k
Commercial Units - Roof	0.12 W/m^{2}k
Glazing	1.4 W/m^{2}k
Vehicle Access Doors	1.3 W/m^{2}k
Air Permeability	3 m^3/h/m^2 @ 50Pa

The proposed development will incorporate electric ground source heat pumps (GSHPs) to provide efficient heating. GSHPs are highly energy-efficient systems. This significantly reduces energy demand compared to conventional systems. In addition, the building will adopt measures to maximise energy efficiency, including LED lighting throughout.

Results

To provide evidence that the proposed development complies with the requirements of Policy SP11, the development was modelled using the IES Virtual Environment software. The tables below outline the results.

The community/leisure building improves upon the baseline in terms of primary energy rate by 41% and 70% in terms of carbon emissions. This is largely due to GSHPs accounting for 63% of the energy consumption and an LZC technology of PV accounting for approx. 33% of the energy consumption.

The commercial units improve upon the baseline primary energy rate by 164% and see an improvement on carbon emissions by 125%. This is largely due to GSHPs accounting for 25% of

the energy consumption and an LZC technology of PV accounting for approx. 163% of the energy consumption.

Table 2: Carbon Modelling Results – Community/Leisure Building

Baseline Primary Energy Rate (kWh/m²)	Modelled Primary Energy Rate (kWh/m²)	% Energy Reduction from Baseline	Baseline Carbon Emissions ($kgCO_2/m^2$)	Modelled Carbon Emissions ($kgCO_2/m^2$)	% Carbon Reduction from Baseline
88.37	51.93	41%	16.8	5	70%

Table 3: Renewable / LZC Technology Results - Community/Leisure Building

	Consumption / Production (kWh/m²)	% of Development Consumption
Total Energy Consumption	**50.27**	**/**
LZC Technology – GSHP	31.87	63%
Renewable Energy – PV	16.74	33%

Table 4: Carbon Modelling Results – Commercial Units

Baseline Primary Energy Rate (kWh/m²)	Modelled Primary Energy Rate (kWh/m²)	% Energy Reduction from Baseline	Baseline Carbon Emissions ($kgCO_2/m^2$)	Modelled Carbon Emissions ($kgCO_2/m^2$)	% Carbon Reduction from Baseline
31.77	-20.27	164%	6	-1.5	125%

***Table 5:** Renewable / LZC Technology Results – Commercial Units*

	Consumption / Production (kWh/m²)	% of Development Consumption
Total Energy Consumption	23.66	/
LZC Technology – GSHP	5.97	25%
Renewable Energy – PV	38.66	163%

6.2 Demonstrate Consideration of the Use and the Application of Renewable Energy Sources

An initial outline assessment of feasible renewable energy sources has been carried out and the results are detailed below.

Wind Turbines: The wind speeds and frequencies in urban areas are not expected to yield any significant carbon reductions. For these reasons the application of a wind turbine for the project

has not been considered and is deemed not suitable for this development. This is due to constraints such as wind speeds, access, topography and land classification.

Solar Photovoltaics (PVs) are solar panels which generate electricity through photon-to-electron energy transfer, which takes place in the dielectric materials that make up the cells. The cells are made up from layers of semi-conducting silicon material which, when illuminated by the sun, produces an electrical field which generates an electrical current. PVs can generate electricity even on overcast days, requiring daylight, rather than direct sunlight. This makes them viable even in the UK, although peak output is obtained at midday on a sunny summer's day. PVs offer a simple, proven solution to generating renewable electricity.

The main types of commercially available PV panels on offer in the UK are constructed from cells as described below:

- Monocrystalline silicon cells are the most efficient of the PV technologies with a conversion efficiency of between 15-18% (available solar energy to electricity produced). They are cut from single ingots of silicon, have an unbroken crystal lattice and are the most expensive of PVs;
- Polycrystalline silicon cells have a conversion efficiency of between 13-16%. They are less expensive than monocrystalline cells, are constructed of a number of smaller crystals and are recognisable from a visible 'grain' on the panel.

PV panels present a suitable renewable energy for the development due to the extensive roof and external car parking space available. The large, unobstructed roof area and large parking area provides an ideal opportunity to install a significant PV array, enabling on-site renewable electricity generation and reducing reliance on grid-supplied energy. This approach not only supports compliance with local plan requirements to maximise energy efficiency but also contributes to lowering operational carbon emissions and improving the overall sustainability performance of the building.

Utilise low carbon energy

Ground Source Heating: Ground source heat pumps (GSHP) extract heat from the ground. GSHPs work on the principle that the below ground temperature is more constant compared to above ground. In the winter months, the below-ground temperature is warmer than above ground and the heat carrier fluid circulating within the absorber pipes absorbs the heat. This heat energy is then raised by a compressor (using the compression cycle) and through a heat exchanger, distributed via a low temperature distribution system such as under floor heating, to satisfy a proportion of space heating requirements. GSHP systems are not suitable for satisfying high temperature hot water demands.

In the summer months, the below-ground temperature is colder than above ground and heat carrier fluid circulating within the buried pipes rejects building heat. This heat rejecting capacity is then raised by a compressor (using the compression cycle), and through a heat exchanger, is

then distributed via a chilled water distribution system to satisfy a proportion of space cooling requirements.

There are several configurations for GSHP systems, the installation of a vertical collector system is considered technically feasible for the project. Therefore, a ground source electric heat pump system represents a non-combustion, technically feasible LZC system for the project.

Biomass: Biomass boilers replace conventionally powered boilers with an almost carbon neutral fuel such as wood pellets or wood chips. The fuel is classed as almost carbon neutral because the CO_2 released during the burning of biomass is balanced by that absorbed by the plants during their growth.

The existing site layout does allow for the adequate biomass fuel storage and safe delivery.

Although many biomass burners will meet Clean Air Act requirements, combustion of wood biomass releases higher quantities of NO_X, SO_X and particulates (PM10 and PM2.5) compared to a comparable system fuelled by natural gas, which can adversely affect local air quality.

Biomass could technically be burned at the application site but is not preferred given site spatial limitations for a central plant and fuel storage area, the management burden of fuel deliveries and removal of ash and the potential impact on local air quality. For these reasons, a biomass boiler has been deemed unfeasible for the project.

Air Source Heat Pump System (ASHP): An air source heat pump system provides an efficient, low-carbon option by extracting heat from the outside air to provide space heating and hot water. The system can significantly reduce operational carbon emissions, particularly when combined with renewable electricity such as solar PV, while also eliminating the need for on-site combustion, gas infrastructure and associated flues.

GSHP systems typically have greater efficiencies compared to an ASHP system, therefore due to a GSHP being proposed at the development, an ASHP system is not being proposed for the site although is technically feasible for the project.

Summary:
To summarise, the low carbon technologies considered to be most feasible for the proposed project (and subject to further detailed technical review) are Ground Source Heat Pumps and Solar Photovoltaics (PVs). It is suggested that a 129 kWp PV array is needed for the development. In addition to this, GSHPs with a minimum CoP of 2.55 are needed in both buildings to meet the requirement. Changes in these systems are likely to cause changes in the modelling results.

7.0 Policy SP9: Renewable Energy

7.1 Demonstrate Renewable Energy Sources are of a scale and technology appropriate to their location

The proposed development incorporates a combination of on-site renewable and low-carbon technologies, specifically Photovoltaic (PV) systems and Ground Source Heat Pumps (ASHPs), to significantly reduce operational energy demand and associated carbon emissions. Further detail on the integration of these technologies is set out in Section 6.2 of this report.

7.2 Demonstrate Renewable Energy Sources do not have an Adverse Impact on the Natural Beauty, Wildlife, Cultural Heritage and Special Qualities of the National Park

Solar panels are being carefully integrated into the development's design through roof mounted panels and clever car park installation with natural planting to enhance the natural beauty of the space. The GSHP system will use a borehole installation which requires minimal ground disturbance and therefore minimising impact on the local biodiversity and any existing habitats.

8.0 Welsh Government National Planning Policy

The proposed development has adopted the Energy Hierarchy set out within the Welsh Government National Planning Policy (adopted February 2024) to guide design development and decisions regarding energy, balanced with the need to optimise environmental and economic benefits. National Planning Policy details the energy hierarchy as summarised in the following stages:

1. Reduce Energy Demand
2. Use Energy Efficiently
3. Renewable Energy Generation
4. Minimise Carbon Impact of Other Energy Generation
5. Minimise Extraction of Carbon Intensive Energy Materials

Please see section 5.2 confirming how the development has adhered to the above energy hierarchy.

9.0 Conclusion

9.1 This Sustainability and Energy Statement demonstrates how the proposed development has been designed to maximise the consideration of sustainability measures, aligning with Policy SP4, SP11, and SP9 of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) and adhering to the energy hierarchy set out within the Welsh Government National Planning Policy (adopted February 2024).

9.2 The statement outlines how the proposed project located at HADSCAL, Hay-on-Wye incorporates the Energy Hierarchy, ensuring that energy efficiency is prioritised prior to the consideration of any renewable energy.

9.3 Site analysis indicates that the installation of GSHP and PV will significantly benefit the development. It is projected that these on-site Renewable and Low Carbon (LZC) technologies will significantly reduce carbon emissions, through the use of GSHP and the installation of 129 kWp of PV across the development.

9.4 This Sustainability and Energy Statement evaluated the proposal against the relevant policies of the Brecon Beacons National Park Authority Local Development Plan (Adopted Dec 2013) and Welsh Government National Planning Policy (adopted February 2024) highlighting the project's commitment to responding to climate change and ensuring sustainable new builds. Overall, the development is confirmed to align with the principles of sustainable development for the area.