

# **Harwell Residential Quarter**

## **Sustainability Strategy**

**033983**

5 January 2016

Revision 00



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author **Katherine Sydney**

date **5 January 2016**

approved **Trevor Curson**

signature



date **5 January 2016**

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## Glossary

Term	Definition
AONB	Area of Outstanding Natural Beauty
BREEAM	Building Research Establishment Environmental Assessment Method
CHP	Combined Heat and Power
LZC	Low / Zero Carbon
NPPF	National Planning Policy Framework
PV	Photovoltaic
RIBA	Royal Institute of British Architects (Plan of Work)
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage System
VoWH	Vale of White Horse (Council)
WSUD	Water Sensitive Urban Design

# 1 Introduction

## 1.1 Purpose of document

This document summarises the sustainability strategy for the proposed residential quarter of Harwell campus. The strategy sets out the overall sustainability objectives that the project team is working towards and specific targets which will measure progress towards those objectives. This information is presented as evidence to support the *Vale of White Horse District Council (VoWH) Local Plan* Examination in Public, which will discuss, amongst other things, the principle of residential development at Harwell Campus.

The information within this document will form the basis of a sustainability statement, to be submitted with the anticipated residential quarter outline planning application. The statement will report on the progress made in achieving the sustainability strategy objectives and targets. As such, the sustainability strategy report does not assess the sustainability of the current proposals at this stage.

## 1.2 The framework masterplan

The purpose of the framework masterplan is to provide a set of site-wide principles and a high level spatial form, to guide future development within the Harwell Campus site. The framework masterplan comprises a series of strategies and parameter plans, which define:

- The mix of land uses at the site and where those uses should be located;
- The primary road layout and rights of way;
- Relative development densities in zones across the site and corresponding maximum building heights; and
- A network of green infrastructure.

A residential quarter will be situated in the north of the site, along with the residential properties in the southeast of the site. Commercial, research and academic uses will be clustered into groups with similar focuses, for example the space cluster. Activity hubs providing transport, retail and amenity uses will be situated to provide facilities within easy walking distance for all site users.

Generally, higher density development will be situated within the centre of the site, with low density or no development around the edges of the site, particularly where it borders open landscape.. The landscape strategy proposes strengthening the existing woodland and network of open spaces with additional planting around the northern and eastern edges, and a network of greenways permeating into the site.

The framework masterplan has been evolving in consultation with VoWH and through design review by Cabe. The development of site-wide strategies has been ongoing as part of the framework masterplan work, therefore the residential quarter proposals have been developed alongside the site-wide strategies.



### 1.3 The residential quarter site

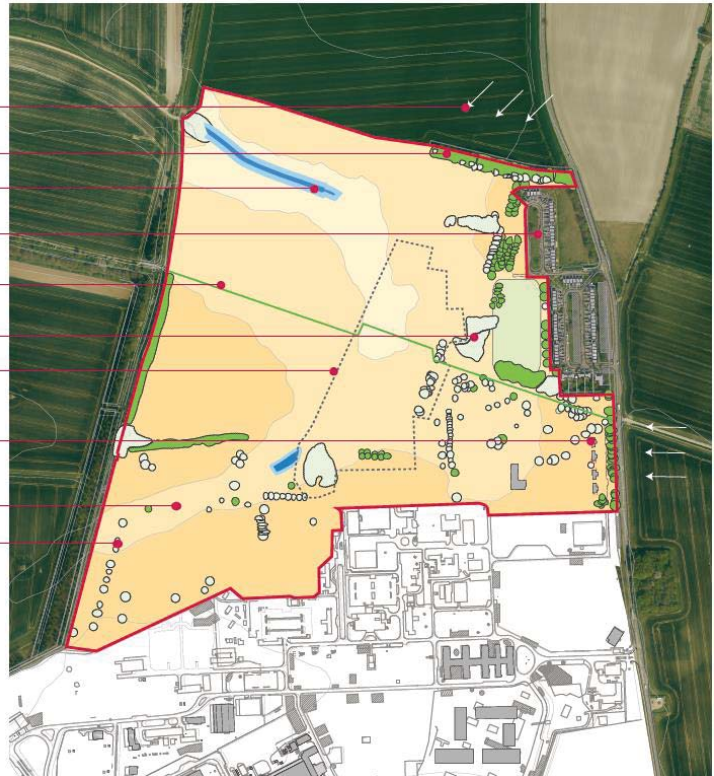
The proposed redevelopment has been informed by a number of baseline studies, which have provided a good understanding of the constraints and opportunities at the site. The site is currently a mix of greenfield agricultural land and land occupied by open spaces, buildings and infrastructure relating to existing or former Harwell activities (Figure 1-1).



**Figure 1-1 Existing site**

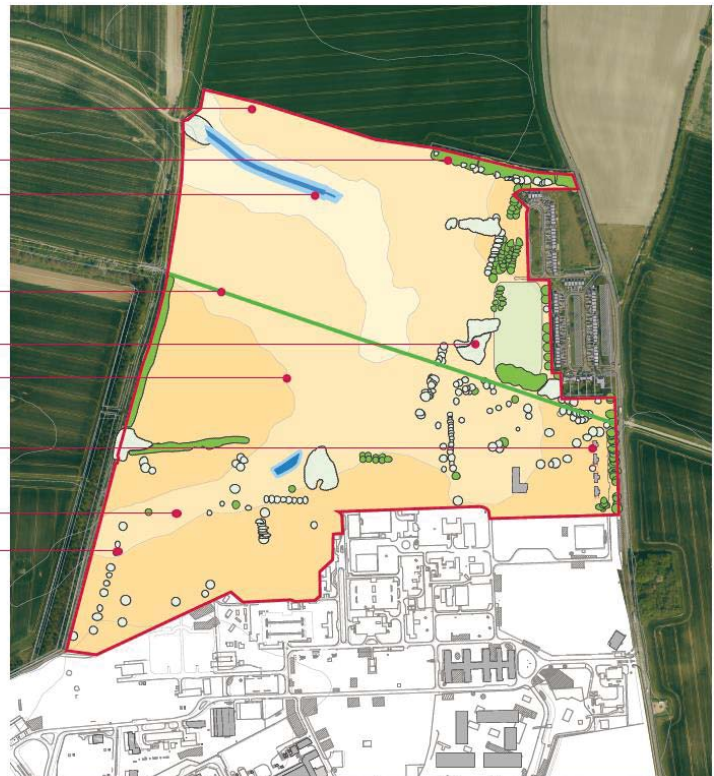
The physical characteristics of the site will provide the unique setting for residential development within the campus but also require sensitive design, to ensure that the features of value are not diminished by development. Figures 1-2 and 1-3 show the physical features that the proposed design intends to respond to.

- Sensitive views from the north and east of the site
- Category A Trees to be retained
- Culvert and open water course at Lyde Bank Brook forms part of existing site drainage
- Existing North Drive residential development adjacent to development site
- Icknield Way - protected ancient bridleway
- Category B Trees (to be retained where possible)
- Foul treatment plant license boundary (to be decommissioned by 2021)
- Existing buildings of various condition on site
- Existing infrastructure; existing gas mains, water trunk main, other below grade utilities and existing road infrastructure
- Trees located throughout south west of site



**Figure 1-2 Physical constraints plan**

- Enhance woodland and tree belt to the north mitigating against sensitive views. Enhancement to west also.
- Category A trees retained to provide screening and maintain existing landscape character
- Enhance and provide community facility interacting with existing water features on site such as Lyde Bank Brook
- Widen, enhance and straighten the Icknield Way back to its original alignment
- Category B Trees (to be retained where possible)
- Development to respond to existing site topography
- Retain and enhance the site with some of the existing buildings on the eastern edge, helping to mitigate against sensitive views
- Make use of existing infrastructure such as built roads and under-surface utility lines
- Create a distinct character area using existing mature trees located throughout south west of site



**Figure 1-3 Physical opportunities plan**

## 1.4 The residential quarter masterplan

A draft masterplan has been prepared for the residential quarter, which accommodates c.1400 residential units within the 37.2ha site. The masterplan is work in progress and will be developed further. The intention is to provide a mix of housing types which serve the campus's needs and provide for local people, including affordable housing, and properties for rent or sale at market rates.

The neighbourhood would be supported by a number of non-residential uses, which could include:

- Restaurant / café;
- Community infrastructure e.g. local play, events space, remediated pond, collection hub, allotments, and the Icknield Way;
- Tertiary retail e.g. bike / DIY shop;
- Two form entry primary school;
- Children's nursery;
- Doctors surgery and pharmacy;
- Food store; and
- 150-room hotel with conference / hospitality facilities.

Prior to parts of the site being built upon, they may be put to 'meanwhile uses' such as events, food trucks, markets or show homes.

Access to the site would be provided from the A4185 Newbury Road via Curie Avenue, which enters the southeast of the residential quarter, and via a new link road in the northeast. The Thompson Avenue entrance to the main part of the campus will also provide a link into the residential quarter from the south. An internal bus route would form a loop from the main campus entrance at Fermi Avenue to Curie Avenue within the residential quarter.

The current illustrative masterplan and landscape plan are shown in Figure 1-4 and 1-5, below.





**Figure 1-4 Current masterplan and design strategy**

The features shown in Figure 1-4 are:

1. Proposed continuous tree/ shrub belt along western and northern boundaries;
2. Clustering of houses within green landscape fingers to create a soft interface between development and nature to northern edge of site;
3. Potential future northern access road link into site;
4. 'Village' area within central green space;
5. Potential allotment area or other community facility adjacent to Icknield Way, helping to activate and enhance the journey along its route through the campus;
6. Tiered housing responding to site topography creating an area of high value residential;
7. Central pedestrian and cycle loop to connect key community amenity spaces with existing areas of high significance landscape assets and enhance site water features;
8. Residential zone reconfigured to allow for the designated wildlife / node and conservation area as within the Framework Masterplan; and
9. 'Pavilions in the forest' character within the south western zone, making use of and enhancing the existing mature trees.



Figure 1-5 Proposed landscape plan

### 1.5 Sustainability strategy approach

The sustainability strategy provides a set of objectives and targets which the project team agree to strive towards, and outlines the approach to developing a design which meets those targets.

The following steps have been taken in developing this strategy:

- **Understand vision:** identify the sustainability aspirations of the project and how these align with the wider campus vision;
- **Review sustainability objectives and targets:** review the Campus sustainability objectives and compile a series of appropriate targets for the residential quarter, based on the campus framework masterplan targets and other targets appropriate to residential development. These form the framework against which the proposal will be appraised in the sustainability statement at the planning application stage;
- **Identify opportunities:** review the strategies already under consideration by the design team and identify further sustainable design strategies which could be appropriate to the residential quarter, in collaboration with the project team;
- **Reporting:** present the above in a form which can be referred to by the design team and which provides a summary of the proposed approach for external stakeholders.

## 1.6 Document structure

The framework masterplan sustainability statement was structured around the sustainability topics set out in the Vale of White Horse Sustainable Design and Construction Supplementary Planning Document (SPD) 2009, with an additional topic *Place-making and Design* added to capture those aspects of sustainability not picked up by the SPD, particularly those identified in the Vale of White Horse Design Guide SPD 2015. For the residential quarter, additional topics have been added – education, employment and community – to strengthen the social and economic aspects of the sustainability strategy, reflecting the principal aims to provide homes and facilities for campus employees and the surrounding community. The ‘design’ category previously used has been split into landscape and townscape, and ‘health, safety and wellbeing’ has been incorporated into the ‘pollution control’ and ‘place-making, townscape and community’ categories. Table 1-1 compares the two sets of topics used.

**Table 1-1 Comparison of framework masterplan and residential quarter sustainability topics**

Framework masterplan topics	Residential quarter topics
Energy	Energy
Water resources	Water resources
Waste & materials	Waste & materials
Biodiversity	Biodiversity & landscape
Pollution control	Pollution control
Transport & access	Transport & access
Health, safety & wellbeing	
Climate change adaptation	Climate change adaptation
Place-making & design	Place-making, townscape and community
	Education and employment

For each topic, an introduction to the context of the topic is provided, the overall sustainability objective and more detailed targets which identify whether the target is mandatory or aspirational and to what stage of the project it applies. An outline strategy, exploring the proposed approach and options available, is provided along with any next steps identified.

The targets tie in with those identified for the Harwell Campus framework masterplan and are taken from planning policy and guidance, and other good practice. Where a target will be mandatory at the planning application stage, this has been identified. Appendix A summarises the policies on which the sustainability targets have been based. At the outline planning stage, these will be reviewed and updated so that the residential quarter is assessed against those policies which are relevant to the proposed development.

## 2 Sustainability drivers

### 2.1 Project vision

The overall vision for Harwell Campus is as follows:

*Harwell is a campus with local, regional, national and European status and importance that is growing to become recognised as a globally significant hub for science and innovation. To capture and support this momentum, Harwell will attract inward investment to a world class environment which transcends its role as a science and business park and delivers an exceptional quality of life for those who live and work at the Campus. Harwell will foster the development of a work-live-play community and cultivate a strong sense of community and pride which celebrates the Campus's unique setting and pivotal influence in science and technology. Harwell will benefit from strong links to public sector organisations and leading academic institutions and encourage cross fertilisation of talent and ideas.*

Following on from the Vision, six objectives have been identified for Harwell Campus. They are to:

1. *Support the delivery of a range of modern business environments, which enable Harwell to generate substantial economic benefits and maximise the inherent potential of the Campus as an internationally significant centre, attractive to innovation and science based research and business - from start-up enterprises to major companies and institutions;*
2. *Foster an exceptional and high quality physical environment which integrates the Campus's built form into the surrounding AONB landscape whilst meeting the needs of existing and future occupiers;*
3. *Deliver an integrated residential neighbourhood at Harwell, strengthening the community of residents and employees whose lives are enriched by the Campus's distinct sense of place and range of services;*
4. *Create opportunities for clustering to facilitate natural collaboration and cross-fertilisation between different technologies, with the potential to catalyse new scientific discoveries and investment that will improve the human condition; and*
5. *Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

### 2.2 Policy and legislative context

The principal documents relevant to the framework masterplan are described below; specific policies are summarised in Appendix A. Local policies and guidance from the Vale of White Horse District Council, as local planning authority, carry the greatest weight locally; however national policy and, in some cases, county policy is also relevant.

#### 2.2.1 National legislation, policy and guidance

##### National Planning Policy Framework and Planning Practice Guidance

The main national framework for sustainable development is set out in the National Planning Policy Framework (NPPF). There is a presumption in favour of sustainable development at the heart of the NPPF, which it seeks to achieve by:

- Building a strong, competitive economy;
- Ensuring the vitality of town centres;
- Supporting a prosperous rural economy;
- Promoting sustainable transport;
- Supporting high quality communications infrastructure;
- Delivering a wide choice of high quality homes;
- Requiring good design;
- Promoting healthy communities;
- Protecting greenbelt land;
- Meeting the challenges of climate change, flooding and coastal change;
- Conserving and enhancing the natural environment;
- Conserving and enhancing the historic environment; and
- Facilitating the sustainable use of minerals.

The purpose of the planning policy is to contribute to the achievement of sustainable development by seeking positive improvements in the quality of the built, natural and historic environment as well as the people's quality of life. Local Plans and development control decisions need to take local circumstances into account and respond to different opportunities for achieving sustainable development in different areas.

The NPPF is supported by Planning Practice Guidance, which provides additional guidance on technical aspects of the NPPF policies.

### **Part L of the Building Regulations**

The Building Regulations Part L governs the conservation of fuel and power in both new construction and refurbishment of the UK building stock. Compliance with building regulations is a regulatory requirement for all new developments, and carbon emissions of a development comparative to compliance with Part L is the key energy performance indicator.

Part L of the 2013 Building Regulations provides energy efficiency and carbon targets for both new construction dwellings (Part L1A) and non-domestic buildings (Part L2A). These documents stipulate a minimum level of efficiency that buildings must be constructed to. The regulations are accompanied by guides (Approved Documents) and other supporting documents.



## 2.2.2 Local policy and guidance

### Vale of White Horse Local Plan 2011 and Draft Local Plan 2031

The Vale of White Horse Local Plan is being replaced with the draft Local Plan 2031, which is the subject of the current Examination in Public. Until the 2031 plan is formally adopted, both Plans are a material consideration. Some of the policies within the 2011 Plan have been superseded by the NPPF. Where the Local Plan policies are consistent with the NPPF, they are still relevant, otherwise the NPPF is referred to instead when determining planning applications.

The draft Local Plan 2031 echoes the NPPF's presumption in favour of sustainable development and seeks to focus new housing developments within the Science Vale area. Harwell Campus is identified as an employment area and Enterprise Zone, and there are policies for two strategic housing sites adjacent to the Harwell Campus: the land to the east of the campus has been identified as suitable for around 850 homes and supporting facilities including a primary school, while the area to the north of the site has been identified as suitable for around 550 homes. Harwell Campus is seeking to amend the strategic housing allocations to accommodate these residential units within the existing campus boundary, rather than on adjacent land.

Science Vale is a key growth area within the 'Oxfordshire Knowledge Spine' encompassing the science centres of Harwell Campus, Culham Science Centre and Milton Park. An Area Action Plan is currently being prepared, which will identify a vision for the area and assist with the delivery of several strategic housing sites within Science Vale.

### Vale of White Horse Design Guide SPD 2015

The recently adopted Design Guide provides guidance on development siting, layout and form, and building design. The principles of good design are also principles of sustainable development and, as such, there is some overlap between the Design Guide and the older Sustainable Design and Construction SPD.

### Vale of White Horse Sustainable Design and Construction SPD 2009

The Sustainable Design and Construction SPD provides additional guidance relating to Local Plan policies, although it carries less weight. It provides guidance to planners, developers, architects and facilities managers on how to achieve the council's requirements in sustainable design and construction.

Together, the Local Plans, Design Guide SPD and the Sustainable Design and Construction SPD are the local authority's main documents against which the sustainability of planning applications will be assessed, although the NPPF is also relevant.

### Oxford County Council Oxfordshire 2030

Oxfordshire 2030 is a sustainable community strategy, which sets out a framework vision for the county. The strategy identifies the following key issues:

- Reducing our carbon footprint and adapting to climate change.
- Ensuring that all developments reduce carbon emissions and increase resilience to climate change.
- Preserving and enhancing the character of our city, our market towns and villages.
- Enhancing the quality of the natural environment, landscapes and biodiversity.
- Addressing flooding risks.

- Reducing the landfill of waste.
- Dealing with the environmental impact of population growth and development while maintaining the character of our towns, villages and countryside.
- Protecting and enhancing biodiversity.

### **Oxford County Council Local Transport Plan *Connecting Oxfordshire* (LTP4) 2015-2031**

Oxford County Council's current transport plan seeks to improve the condition of transport routes; reduce congestion, carbon emissions and environmental impacts; improve safety and accessibility and improve access to work, education and services. It also aims to secure the infrastructure and services to support development, reduce environmental impacts and develop and increase the use of public transport, cycling, and walking.

## **2.3 BREEAM**

BREEAM is a voluntary environmental assessment method, which can be used to assess buildings or masterplans, at an interim design stage and final post-construction stage. The BREEAM 2014 New Construction scheme can be used to assess various non-domestic uses including offices, education buildings, and industrial premises. BREEAM Communities is designed for assessing masterplans and is broken into three stages: Step 1 establishes the principle of development, Step 2 determines the layout of the development, and Step 3 focusses on the design details.

The Sustainable Design and Construction SPD includes guidance that requires that developments achieve a BREEAM rating of Excellent, demonstrated by submission of a pre-assessment checklist with a planning application. Where it can be robustly demonstrated that Excellent cannot be achieved by a development, Very Good is permissible. Due to the unique characteristics of the campus, the requirement for BREEAM has not previously been enforced at the site..

While BREEAM Communities certification is not sought for the residential quarter masterplan, the Step 1 and Step 2 principles have informed the sustainability targets and 'next steps' within this document, as examples of good practice.

If BREEAM accreditation is sought for the non-residential buildings within the residential quarter, the majority of the work relates to building-level design, however there are a number of credits which should be considered earlier on in the design process, as summarised in Table 2-1. These credits are not compulsory, but would contribute to a higher score. If BREEAM accreditation is required, a BREEAM assessor will be appointed to advise on achieving the required score.

**Table 2-1 Summary of the BREEAM credits that would require early consideration for the residential quarter**

Credit	Implications
Man 01 – Sustainable procurement	A sustainability champion (usually a BREEAM 'Accredited Professional') needs to be appointed before RIBA Stage 1; Should demonstrate that third party stakeholder consultation has influenced the project brief of concept design; Before the end of RIBA Stage 2, the project delivery stakeholders should meet to identify and define their roles and responsibilities; and A defined BREEAM performance target should be formally agreed between client and project team before the end of RIBA Stage 2.
Hea 06 – Safety and security	A suitably qualified security specialist should undertake a security needs assessment during or before RIBA Stage 2.
Ene 04 – Low and zero carbon	Analyse the proposed development and identify opportunities for the implementation

technologies	of passive design solutions; and An energy specialist should carry out a low or zero carbon (LZC) study to determine the most appropriate LZC technologies.
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The equivalent scheme for residential properties, the Code for Sustainable Homes, has been scrapped and partially replaced by the voluntary Home Quality Mark, and Building Regulations.

## 2.4 Other policies

Many of the companies operating at the campus will have their own environmental or sustainability policies, corporate social responsibility plans, or environmental management systems.

## 2.5 Developing targets from policies

There are common themes running throughout the various planning policy and guidance documents. The targets described in the chapters of this document are summaries of the good practice principles incorporated into the planning policies. The policies which have informed those targets are identified in Appendix A.

Those targets identified as mandatory at planning are those required by the Local Plan 2011, for example where the wording says 'must' etc. In some cases, the wording of policies indicates that measures are recommendations rather than requirements; these have therefore not been classes as mandatory.

Other good practice principles which are not specifically captured by planning policy are identified within the 'opportunities' section of each chapter.

## 3 Energy

### 3.1 Context

The proposed residential and non-residential uses will require energy for uses such as space heating/cooling and power, which could be provided in a variety of forms including gas (fossil / biogas), heat (waste/ground or air source) and electricity (grid or renewable)

Although there is no specific carbon reduction target for the site, planning guidance suggests that developments seek a reduction of least 10% of CO<sub>2</sub> emissions, using renewable sources. BREEAM Excellent standard is encouraged for all new developments, although this is voluntary for Harwell Campus and would apply to the later design stage.

The energy strategy for the framework masterplan has not been developed further than the initial high level options considered in the framework masterplan sustainability statement. Those options are included in the outline strategy section below, along with specific options relevant to residential development. The utilities strategy for the residential quarter seeks to ensure that the energy demands of the proposed development can be met using the existing supply and using standard building techniques, as a 'worst case'. Options to reduce the demand for energy and provide alternatives sources to fossil fuels will be explored as the site-wide energy strategy develops and as the residential quarter design progresses in detail. The options which would be appropriate to the residential quarter are described in the outline strategy section, below.

### 3.2 Objectives

Harwell Campus objective:

*E. Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

### 3.3 Sustainability targets

Table 3-1 Sustainability targets - energy

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Meet requirements of Building Regulations Part L 2016/2019 (yet to be defined - up to zero carbon)	✓			✓		Energy consultant / architect / building engineers
Reduce operational CO <sub>2</sub> emissions by at least 10% renewables (likely to be covered by Building Regulations).		✓	✓	✓		Energy consultant
Use district heating / combined head and power, where appropriate.		✓	✓	✓		Energy consultant
Minimise the energy consumption of buildings by taking into account landform, layout, building orientation, massing, landscaping, the requirement for solar gain and daylighting.		✓	✓	✓		Masterplanner / architect / energy consultant
Align buildings so that the largest facades are within 15 degrees of north/south and roofs are within 30 degrees of south.		✓		✓		Masterplanner / architect
Achieve floor plate depths of less than 16 metres for passive ventilation.		✓		✓		Masterplanner / architect

### 3.4 Outline strategy

The site wide energy strategy follows the 'mean, lean, green' energy hierarchy approach (Figure 3-1) to CO<sub>2</sub> emissions reduction. The staged approach of energy demand reduction, efficient production and distribution, and low- or zero-carbon energy generation follows best practice design, allowing for energy demand reductions to be designed into the development at an early stage, avoiding future costs associated with reducing energy demands (e.g. installing more renewable energy, upgrading building fabric efficiency etc.). This approach enables the development to meet government or planning policy requirements in reducing carbon emissions, and can also provide a more resilient energy network that allows for business continuity.

With the scientific community on site and Harwell's aspirations to create an exemplary place to live and work, there may also be support for innovation by utilising new technologies or approaches, for example aspiring to an off-grid development, providing a smart grid linked to appliances, and using monitoring data for research.



Figure 3-1 The energy hierarchy

The general principles of site layout and massing need to be considered at the masterplanning/outline planning stage, however opportunities for efficient networks are best considered as part of the site-wide energy strategy, as the energy requirements of the campus need to be considered at a strategic level. Demand reduction and the provision of efficient systems and small-scale renewables can be further considered at the building design/reserved matters stage.

The site-wide energy strategy needs to be developed further before the residential quarter strategy can be narrowed down in greater detail.

### **3.4.1 Reducing energy requirement ('mean')**

The requirement for heating and cooling, and therefore for energy, can be reduced at the masterplanning or outline design stage by arranging the site layout and building massing to support future passive building strategies. For example, residential terraces or blocks should be orientated to allow winter sun to enter, but be shaded from high summer sun; terraces also lose less heat than individual buildings. In buildings such as offices where computers or other equipment heat the building internally, solar gains are unwanted, but daylight is beneficial for building users. Passive ventilation and cooling systems can be designed to take advantage of the prevailing wind from the southwest. Figure 3-2 illustrates some examples of reducing energy requirements through site layout and building massing.

South or north-facing facades are easier to shade than east or west-facing facades, therefore blocks / buildings should therefore be arranged so that the smaller facades face east/west and larger facades are within 15 degrees of north/south. Mono pitch roofs should be within 30 degrees of south, to maximise solar access for photovoltaics or solar thermal (Figure 3-2). Natural ventilation requires maximum floor plates depths of 15-16 metres.

Energy use can be further reduced at the building level, through interventions such as:

- Passive solar design: detailing of windows and shading to maximise winter sunlight but minimise solar gains in the summer;
- Insulation and air tightness;
- Thermal mass and night time cooling: utilising materials capable of absorbing and storing heat during the day and releasing it at night;
- Energy efficient appliances and lighting, and low temperature heating systems; and
- Energy controls.

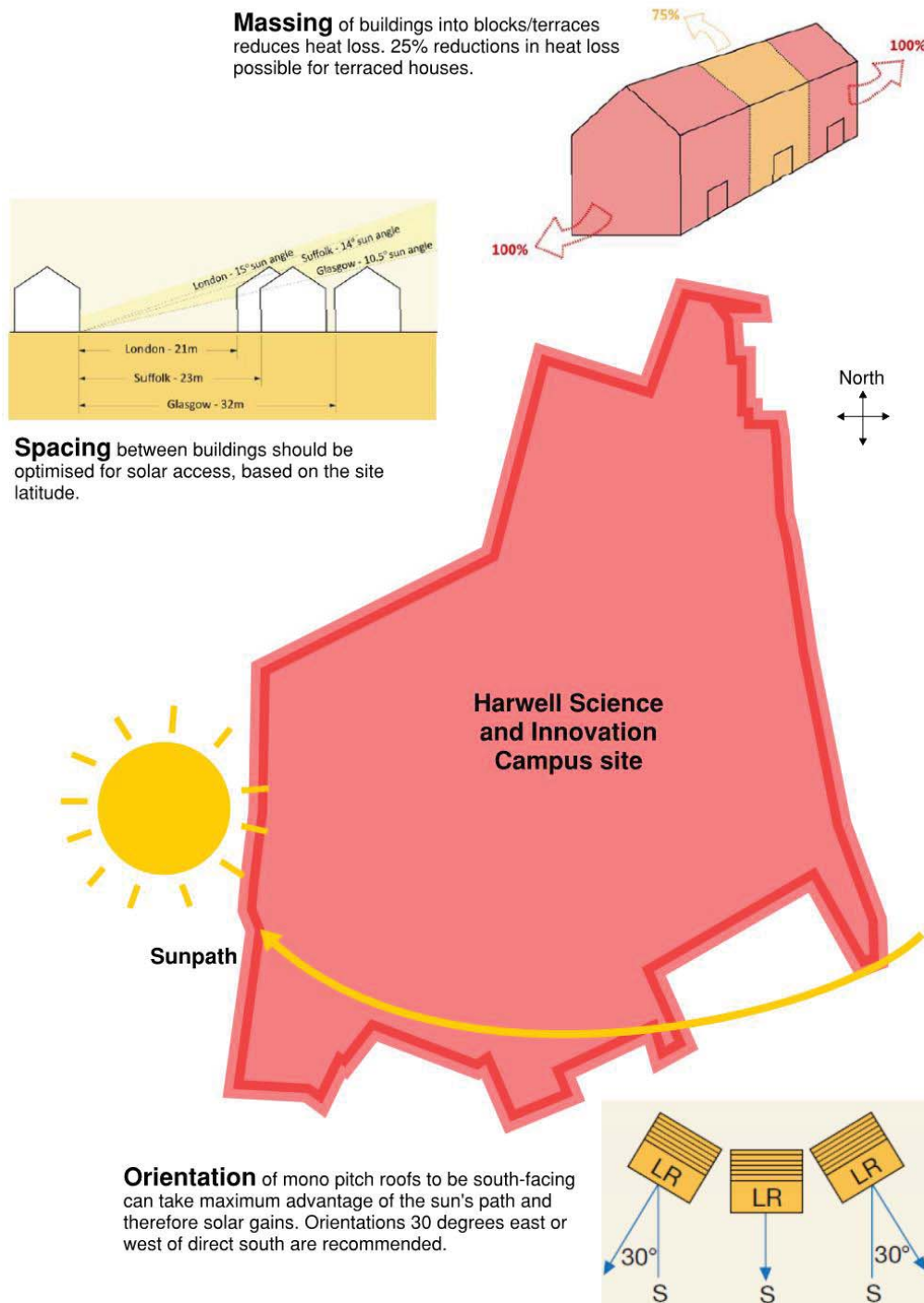


Figure 3-2 Massing, spacing and orientation methods for site layout passive design.

### 3.4.2 Efficient site-wide networks ('lean')

There may be opportunities for site-wide heat and power systems, depending on the intended mix of uses on campus and therefore demands and will be explored as part of the site-wide energy strategy. A district system could provide heating and hot water to the residential quarter, and could use biomass as a fuel to further reduce associated carbon emissions. It is also possible that waste heat from some of the existing science facilities on site could provide a significant proportion of the residential heating requirement, although energy would still be required for hot water and power. There is an infrastructure cost associated with piping heat, but it has been done successfully elsewhere.

### 3.4.3 Renewable energy ('green')

#### Solar technologies

Solar photovoltaics (PV) absorb sunlight and convert it to electrical power. The solar panels can be roof- or ground-mounted. Ground-mounted solar PV may require large areas of land, depending on the scale of electrical generation required. Solar thermal panels absorb sunlight and generate heat, either for space heating or hot water use. There is the opportunity to reduce reliance on traditional natural gas-fired boilers for this heat when using solar thermal panels.

The opportunities to site large-scale solar technologies within the campus will be explored as part of the site-wide energy strategy, but it may be possible to use parts of the residential quarter temporarily for solar generation (subject to potential effects on the AONB). Building-scale solar technologies are likely to form an important part of meeting the forthcoming requirements of Building Regulations Part L.

#### Biomass boilers or CHP

Biomass as an energy source has zero net carbon emissions. It is delivered in pellet or chip form and is burned to generate heat, either within boilers or as part of a CHP system. Deliveries of biomass to the Harwell site should be conducted at off-peak hours to avoid traffic issues. The appropriateness of biomass for the campus will be explored as part of the site-wide energy strategy.

Biomass to supplement waste heat or for CHP fuel could be grown on site as a 'meanwhile use' on areas which will be subject to later phases of development. Green waste could also be converted into biogas through anaerobic digestion, for use as a fuel.

#### Air or ground-source heat pumps

Air- and ground-source heat pumps generate heat from their surroundings. The pump absorbs heat from surroundings and transfers it to the required demand. Depending on conditions it is possible for a heat pump to transfer two to four times more energy than it consumes as electrical energy, making it a very efficient method for space heating. This can also reduce reliance on natural gas-fired boilers. The appropriateness of ground-source heat pumps is dependent upon ground conditions; these options will be explored as part of the campus energy strategy.

#### Wind turbines

Wind turbines are not appropriate due to the site's position within an AONB.

#### Energy storage

Some of the work being undertaken at Harwell Campus is exploring improved technologies for battery storage; this could be combined with small-scale renewables.



### 3.5 Next steps

The campus energy strategy will be further developed within the coming months and will include the consideration of appropriate approaches for the residential quarter. This will allow a clearer statement of intent to be presented with any outline planning application.

Whether or not BREEAM is required for the non-residential buildings needs to be confirmed with VoWH. If it is, an energy consultant will need to be appointed to undertake the LZC study and ensure that other early credit requirements are considered.

The exploration of massing options considered in developing the illustrative masterplan will take into consideration alignment for solar gain / shading and building depth for passive ventilation, as the masterplan develops.

## 4 Water resources

### 4.1 Context

The proposed residential quarter will have a water demand (potable but potentially also rainwater or treated greywater, for non-potable uses) and will generate greywater and foul water. Much of the residential quarter site is currently greenfield, therefore development would change surface water drainage and could contribute to an increased flood risk if not managed appropriately.

Harwell Campus is within Flood Zone 1, which means it has low probability of flooding and there are no known records of flooding at the site, although planning applications for the site that are greater than 1 hectare would require a Flood Risk Assessment. The existing site is currently 80% soft landscaped. It is understood that the existing hardstanding areas drain to the Lyde Bank Brook, within the northern part of the site. This is the nearest watercourse to the site and is fed by a naturally occurring spring. The site is also within a Nitrate Vulnerable Zone.

An initial study into flood risk at the campus has been undertaken and a specific Flood Risk Assessment for the residential quarter will be submitted with the planning application.

At present, there is a single water supply to the campus and water is metered. No adopted surface water sewers are located within the site and the foul water drainage system is a mixture of private networks and publicly adopted networks which are under the control of Thames Water.

All new homes have to meet the mandatory national standard for water consumption set out in the Building Regulations (of 125 litres/person/day). There is no mandatory standard for non-residential buildings, but if BREEAM accreditation is sought for the non-residential buildings, points can be awarded against credit *Wat 01 Water Consumption* for improvements against a notional baseline.

As part of the utilities strategy for the residential quarter the existing infrastructure, the anticipated capacity required and any further infrastructure required to meet this, have been identified. Opportunities for reducing the demand for potable water and the volume of water entering sewers will be explored at the building design stage; masterplan-level considerations are outlined below.

### 4.2 Objectives

Harwell Campus objective:

*E. Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

### 4.3 Sustainability targets

Table 4-1 Sustainability targets - water resources

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Achieve water consumption of 125/l/person/day in residences.	✓			✓		Water strategy consultant / architect
Achieve equivalent of BREEAM Excellent water credits for non-residential buildings.		✓		✓		Water strategy consultant / architect
Undertake a flood risk assessment.	✓		✓			Flood risk consultant
Incorporate SuDS into the scheme		✓	✓			Flood risk consultant / landscape architect
Retain, enhance or re-establish surface water features.		✓	✓			Landscape architect
Prepare a water strategy that follows the water hierarchy (reduce demand > increase efficiency > reuse directly > treat and recycle).		✓		✓	✓	Water strategy
Specify drought-tolerant planting.		✓		✓		Landscape architect
Set up systems for monitoring water consumption in use.		✓		✓	✓	Architect / management team

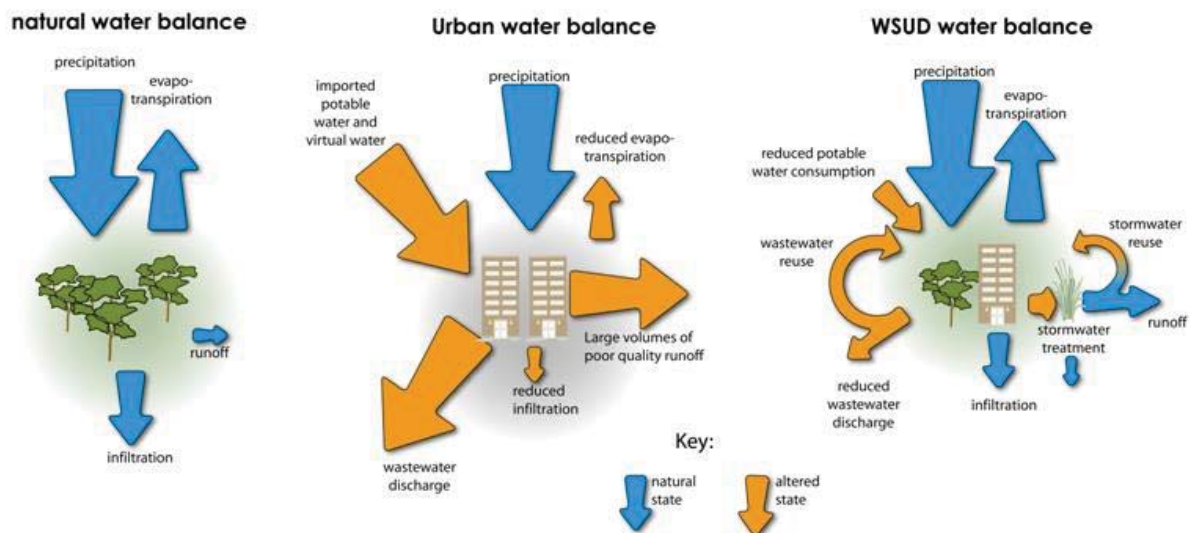
### 4.4 Outline strategy

The management of water resources within a development encompasses the following broad areas:

- Infrastructure - water supply and wastewater removal from buildings and the infrastructure networks required;
- Green infrastructure and landscaping – for the management of surface water and flood risk;
- Buildings – specification of building services, appliances and fittings; and
- Occupant behaviour and management – encouraging water efficiency and monitoring the success of strategies.

At this stage, it is possible to influence the infrastructure and landscaping, although the later opportunities to influence building design, behaviour and management should also be considered. Ideally, all aspects of water resource management are considered together, taking a water sensitive urban design approach.

Water Sensitive Urban Design (WSUD) (Figure 4-1) is the process of integrating water cycle management with the built environment through planning and urban design. It contains many of the elements of a sustainable drainage (SuDS) strategy but considers all aspects of water management, including water supply and consumption and grey/foul water disposal. A WSUD strategy could be developed alongside green infrastructure and utilities strategies, or WSUD principles could be incorporated into them, to identify existing problems or opportunities relating to water management that could be solved through site-wide landscaping, engineering or building design approaches.



**Figure 4-1 Water sensitive urban design (WSUD) (from [www.waterbydesign.com.au](http://www.waterbydesign.com.au))**

The landscape strategy seeks to integrate sustainable drainage into the landscape design, including:

- Rain gardens, water loving / drought tolerant plants chosen as appropriate;
- SuDS integrated into technical detail;
- Drainage considered in street design; and
- Water as a landscape feature and focal point.

The drainage strategy incorporates sustainable drainage systems (SuDS), including infiltration trench soakaways, permeable paving and/or swales. The strategy seeks to provide attenuation up to and including the 1 in 30 year storm event, with additional storage of peak storm water (1 in 100 year event) by allowing car parks and areas to flood, safely. Infiltration will provide a natural filtering of pollution. It is understood that the capacity of the foul drainage network could become limiting as the population on site increases. Diverting greywater away from foul water will reduce the volume of waste water entering the sewers. Greywater can be treated for use within buildings, for example for flushing toilets, or to external landscaping for irrigation, to soakaways or to reed beds. This is particularly suitable for residences, as they produce the most greywater.

#### 4.5 Next steps

A WSUD approach is being explored as part of the development of strategies for the campus. If this progresses over the coming months, any outline planning application for the residential quarter will take this into account in the accompanying flood risk assessment and sustainability statement. Otherwise, the approach for an outline planning application will be to :

- Carry out a flood risk assessment to define the requirements for SuDS;
- Incorporate SuDS principles into the landscape plan;
- Confirm the commitment to water efficiency standards (and BREEAM, if required); and then
- Develop the building-level water strategy and specific design of SuDS as part of the post outline-planning work.

## 5 Waste and materials

### 5.1 Context

The proposed new homes will generate a mix of recyclable materials, compost and garden waste, and residual waste. The non-residential uses will generate a different proportion of waste types, depending on the use, for example greater proportions of organic waste from a restaurant/café and a greater proportion of paper and card from a school. The means of management waste depends on the type and volume of waste produced.

At the moment, there is no site-wide approach to waste management at Harwell Campus and individual building or facility operators manage their own waste for collection. VoWH provides a waste collection service for residential waste, collecting mixed recycling, food waste, garden waste and residual waste in bins from the kerbside. They do not provide a business waste collection service.

### 5.2 Objectives

Harwell Campus objective:

*E. Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

### 5.3 Sustainability targets

**Table 5-1 Sustainability targets - waste and materials**

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Provide sufficient space for the sorting, storing and collection of waste for each building.	✓			✓		Architect / waste consultant
Identify buildings which can be refurbished, reused, recycled or maintained, and those of significant value.		✓	✓			Architect
Develop a waste strategy which follows the waste hierarchy. (prevent > minimise > reuse > recycle > recover > dispose). Focus on seeking opportunities to design out waste.		✓		✓	✓	Waste consultant
Implement a Site Waste Management Plan to reduce construction waste impacts.		✓		✓	✓	Waste consultant / contractor
Design buildings to facilitate re-use.		✓		✓	✓	Architect

### 5.4 Outline strategy

The space requirements for waste management are:

- Houses: space for two wheelie bins (mixed recyclables and residual waste) and a food waste caddy outside the home; three for homes with private gardens;
- Flats: as for houses, or a communal bin storage area (mixed recycling, residual waste and organics, as a minimum), which is accessible by local authority waste collectors;
- Other uses: space for bins for a minimum of two waste types (mixed recyclables and residual waste).
- Collection vehicles: roads should be to an adoptable standard to allow access by local authority waste collection vehicles.

Good practice waste management follows the waste hierarchy: prevention, reuse, recycle, recover, dispose; reducing the production of waste should be explored before identifying opportunities for reuse, recycling or energy recovery. The circular economy approach to waste management involves designing out waste or designing for its reuse within or near the development so that the flow of resources into and out of a development are minimised. This approach is most suited to fixed catchments, where inputs and outputs can be controlled. This approach could be applied to the residential quarter; for example the requirement for food or garden waste collection could be reduced by providing shared composting facilities, which would provide compost which could be used in private gardens, allotments, or public landscaped areas. Waste can also be prevented or designed out by reducing the waste producing products that are brought onto the site, for example by homogenising products bought by different companies, arranging bulk deliveries or procuring products from companies that take back packaging. Shared facilities, such as canteens, can also reduce waste produced.

There may be opportunities to share resources (collections, used materials etc.) with other users of the campus, although this is difficult to anticipate at this stage without further development of the campus waste management plan.

Keeping cars and servicing vehicles separated from cyclists and pedestrians would help to reduce the impact of waste collection on the public realm. Underground storage of waste is not considered necessary for this type and density of development, nor are pneumatic waste collection systems, which are better suited to some hospitals, airports and very dense residential developments.

## 5.5 Next steps

Ensure that sufficient space is provided for waste infrastructure at outline planning stage.

The waste strategy for the buildings within the residential quarter will be developed at the building design stage, taking into account any opportunities for interaction with the rest of the campus as these arise from the campus strategy.

## 6 Biodiversity and landscape

### 6.1 Context

Harwell Campus lies within an Area of Outstanding Natural Beauty (AONB), with the northwest portion of the residential quarter currently open grassland, as is the surrounding landscape. The historic Icknield Way runs east-west through the residential campus and the site supports a diverse mix of habitats and species. Redevelopment of the site will need to ensure that features of value are protected and enhanced where possible.

The residential quarter site contains a number of habitat types including hedgerows (Biodiversity Action Plan habitat), woodland, scrub and grassland, and standing water. These support a number of plants of conservation interest including white helleborine (*Cephalanthera damasonium*) (with a population size of county to national scale importance), hound's tongue (*Cynoglossum officinale*) (county importance) and yellow bird's nest (*Monotropa hypopitys*) (county importance). The areas of the site with the best populations of these plants are associated with the beech trees. The site also has the potential to support protected or notable species, and further surveys will be carried out to confirm the likely presence or absence of dormice, breeding birds, badgers, bats, and reptiles.

Landscaping at the site needs to provide for a variety of uses including amenity and recreation space, walking and cycling routes, sustainable drainage, and defined public/private spaces, as well as biodiversity. Some areas of ecological value will need to be lost to enable future development, which will require mitigation, and the increased population at the site will increase levels of activity on the remaining green spaces.

### 6.2 Objectives

Harwell Campus objective:

*B. Foster an exceptional and high quality physical environment that integrates the Campus's built form into the surrounding AONB landscape whilst meeting the needs of existing and future occupiers.*

Landscape Vision:

- *Protect and enhance landscape character and setting;*
- *Maintain and enhance green connections (including biodiversity);*
- *Create a community-priority landscape\*.*

\*Targets for community-priority landscape are in Chapters 9 Health, safety and wellbeing, and Chapter 11 Place-making, townscape and community.



### 6.3 Sustainability targets

**Table 6-1 Sustainability targets - biodiversity and landscape**

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Maximise opportunities for nature conservation and habitat creation in landscaping	✓		✓	✓		Landscape architect / ecologist
Develop an ecology strategy and mitigation / compensation plan, (including mitigation for protected species).	(✓)	✓	✓	✓		Landscape architect / ecologist
Retain, enhance or create features of nature conservation value. Where all adverse impacts cannot be avoided, provide mitigation or compensation.		✓	✓	✓		Landscape architect / ecologist
Protect and enhance visual amenity and important landscape features	✓		✓	✓		Landscape architect
Development must not detract from the natural beauty of the AONB or diminish enjoyment of the ridgeway	✓		✓	✓		Landscape architect / architect
Development at Harwell will not be permitted in the structural areas of open space or open landscaping and must be in accordance with a comprehensive landscape plan for the whole campus	✓		✓			Landscape architect / masterplanner
Appropriate and comprehensive buffering and containment, preserving views into the site		✓	✓			Landscape architect / ecologist
Consider scale, height, massing, materials and colours of buildings and how they can be integrated into their surroundings		✓	✓	✓		Architect / masterplanner
Maintain and enhance green infrastructure connecting Harwell Campus to the wider green sinks and links around the site		✓	✓	✓		Landscape architect / ecologist / masterplanner
Support biodiversity and ecological connections across the site - consider implementation of greenways		✓	✓	✓		Landscape architect / ecologist / masterplanner

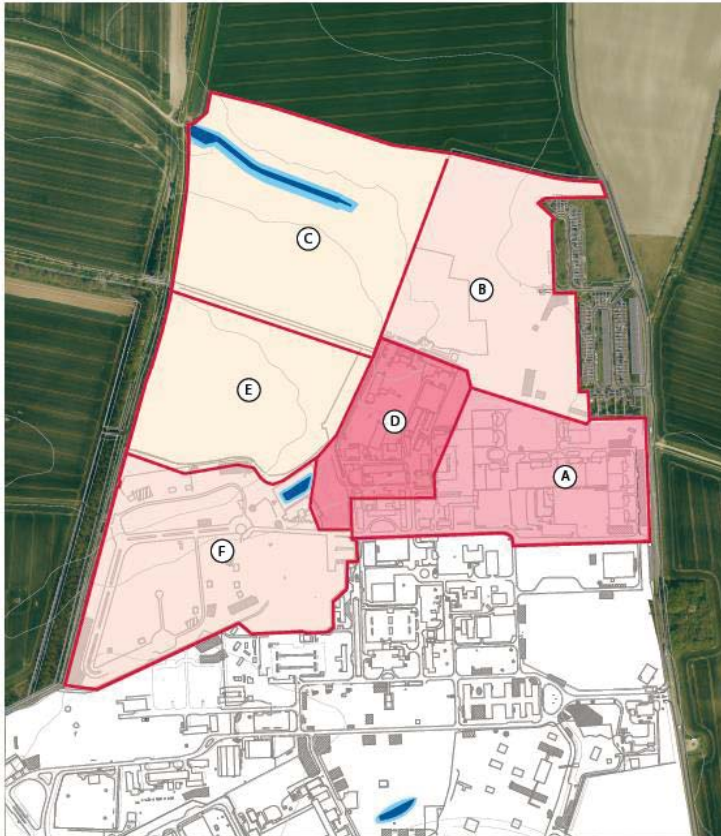
### 6.4 Outline strategy

The campus provides good opportunities for incorporating ecological enhancement into the development of a site-wide green infrastructure strategy and to use this to contribute towards the creation of an attractive setting for development. Development of the framework masterplan has allowed a site-wide approach to be taken to biodiversity enhancement and mitigation, rather than on a plot by plot basis.

The landscape strategy for the residential quarter provides for a range of different open space typologies, including:

- Communal gardens;
- A responsive landscape which integrates SuDS and drainage;
- Streetscapes and homezones; and
- Public open space with a rural, naturalistic character.

Minimising the visual effects of the proposed development on the AONB landscape has been a key influence on the proposed layout and massing of the residential quarter. Development density has been arranged so that the more sensitive perimeter areas of the site are of lower density, with high density concentrated near to existing development and in the middle of the site (Figure 6-1).

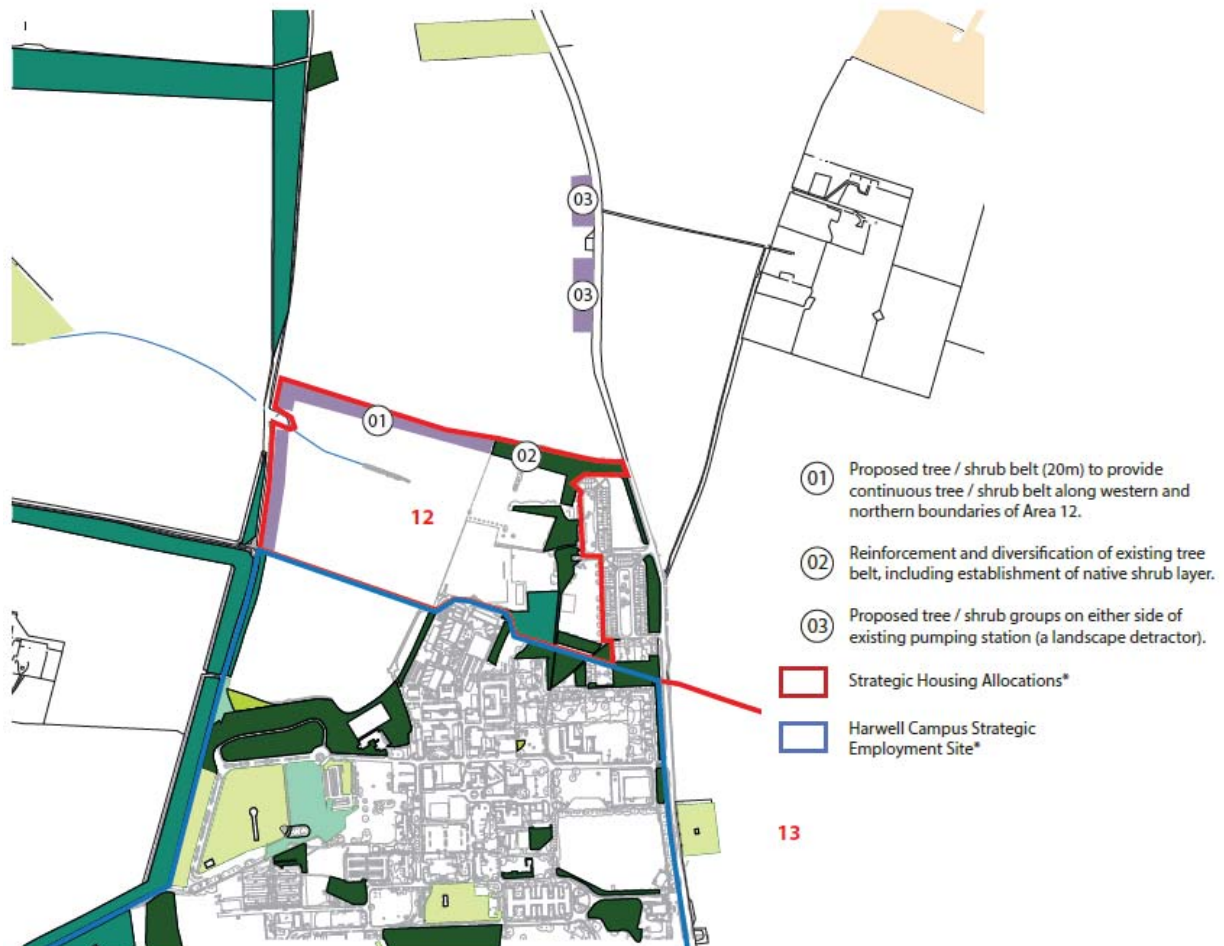


**Figure 6-1 Proposed development density**

By maintaining a well-vegetated landscape, and by retaining as much of the existing structural landscape and habitat features as possible, a semi-rural character can be maintained. Perimeter planting around the northern and western boundaries of the residential quarter site will strengthen the screening provided by existing vegetation of the campus, as seen from the surrounding AONB open landscape. The opportunities being explored for shelter belt enhancement are shown in Figure 6-2 and are:

1. Large copse woodland (c.400mx200m) planted to 1880s field boundary to respect historic character and provide accessible natural greenspace for dense development;
2. Shelterbelt enhancement (c.10-15m planting depth) and replacement along the substantially open northern site perimeter;
3. Infill of western shelter belt planting (c.30m) to enclose site and promote management of "linear riparian tree belts" (AONB Landscape Guidance); and

4. Hedgerow boundary restoration opportunities (c.10m depth) to be taken advantage of according to AONB Management Requirements.



**Figure 6-2 Opportunities for shelter belt enhancement**

Key opportunities for incorporating biodiversity enhancement into the landscaping proposals are the enhancement and maintenance habitats supporting notable plant species, woodland, tree avenues, hedgerows and street trees, and the creation of wetland habitats by improving the existing ponds.

A biodiversity compensation plan has been prepared for the campus, which identified strategies for ecological protection, mitigation and enhancement. The compensation plan includes:

- The creation of wildlife corridors and nodes, where current ecological interest will be retained and enhanced;
- The recreation of calcareous grassland elsewhere on the site, using the existing topsoil and seed bank;
- Preservation of hedgerows where possible;
- Preservation of ponds, where possible, and measures to protect or relocate toads where necessary;
- The translocation of white helleborine and the re-seeding of hound's tongue in alternative locations; and

- The creation / reinstatement of beech woodland, ponds and hedgerows, and the creation of log piles, bat boxes and bird boxes.

The strategy for the residential quarter will be to enhance green corridors and wildlife notes through supplementary planting, especially along the northern and western boundaries, and the protection of significant beech stands and associated plans of conservation interest (white helleborine and yellow bird's nest). Other opportunities for habitat enhancement include bird and bat boxes, and the provision of new hedgerows and wet habitat (SuDS) in ecologically appropriate locations, linked in to the other green infrastructure. The current site is mostly of limited ecological value, so the potential for ecological enhancement is good.

## **6.5 Next steps**

Further ecological surveys will be undertaken to confirm the likely presence/absence of notable or protected species. The landscape proposals will continue to evolve alongside the masterplanning proposals, in response to consultation and design improvements.

## 7 Pollution control

### 7.1 Context

In introducing a new residential population to the site, the development must ensure that the site is appropriate for the intended uses. It is also necessary to ensure that the development proposals do not pose a risk of pollution to the surrounding environment.

–Some remediation has been carried out at the site, where the former use of demolished buildings required it. Less contaminated buildings have been demolished without remediation; investigations have found that soil contamination in those areas does not extend below 0.5m depth. Other surveys have concluded that there is no evidence of beryllium contamination above natural background levels and no evidence of heavy metal / hydrocarbon contamination above natural background levels. There is potentially asbestos in some of the remaining buildings. A former liquid effluent treatment works lies within the centre of the site and will be remediated by the owner.

Areas of standing water include the Lyde Bank Brook in the northwest of the site and a pond which is part of the SuDS network, in the southwestern portion of the proposed residential quarter. Existing surface water features, as well as the groundwater, are potentially vulnerable to water or soil pollution.

Due to the site's location within an AONB, the surrounding environment is considered as 'intrinsically dark', although the campus itself is more suburban in character. To minimise impacts on the AONB, as well as on bats and other wildlife, light spill, glare and sky glow should be kept to a minimum.

Most of the ability to influence pollution control occurs at design stages later than masterplanning, for example the specification of systems and management practices.

### 7.2 Objectives

Harwell Campus objective:

*E. Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

Additional objective:

*Encourage management practices and occupant behaviour which minimises the risk of harm to the environment.*

### 7.3 Sustainability targets

Table 7-1 Sustainability targets - pollution control

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Development must not be adversely affected by noise, dust, or contamination etc, or adversely affect soil or water quality	✓		✓	✓	✓	Environmental consultant
Development at Harwell must have a minimal impact in terms of light pollution	✓			✓	✓	Landscape architect / lighting consultant
Cause no deterioration in, and ideally improve water quality		✓		✓	✓	Environmental consultant etc
Carry out a preliminary investigation, risk assessment for contaminated land, across the whole site. Develop a remediation strategy and remediate land to a level suitable for intended use	✓		✓	✓	✓	Contaminated land consultant
Comply with permitting requirements and other legislation.	✓				✓	Management

### 7.4 Outline strategy

Environmental studies prepared to support the planning application, either as part of an Environmental Impact Assessment or as standalone assessments, will enable pollution risks to be identified and appropriate mitigation measures to be designed in to the proposals or committed to. For example, a contaminated land risk assessment would identify any requirement for remediation and could be used to inform the siting of specific land uses.

While the constraints identified above have a greater impact on later design stages, the masterplan can influence them, for example by siting areas of higher activity (which require more lighting) away from the visually sensitive ridgeway to the south, and by planning the phasing of development around anticipated remediation completion. SuDS can incorporate features such as wetlands which improve water quality and, when they are designed in more detail, can incorporate pollution control measures such as sediment traps or hydrocarbon filters. Tree lines and areas of vegetation can provide local noise attenuation and air quality improvements. These might be appropriate between residential locations and roads or other areas of high activity.

A site wide code of construction practice and principles such as lighting strategies could be developed for the whole site, to set a high standard of management and pollution control that individual plots can meet as they are brought forward for development and that meets the needs of existing site users. As a large amount of data exists on the site, particularly in relation to potential contamination, the collation and management of data could assist future developers in their due diligence work and in compiling information for planning applications.

### 7.5 Next steps

Identifying areas of the site that will be kept darker (e.g. for ecological reasons) or need to be brighter (e.g. for security) will provide the starting point for a lighting strategy and will help to inform site layout principles for future development areas.

Determine the requirement for and scope of any environmental assessments needed for planning, e.g. air quality, noise, land contamination, water quality or lighting assessments.

## 8 Transport and access

### 8.1 Context

It is anticipated that a significant proportion of the new households will be home to at least one employee of Harwell Campus, who will be able to walk to work, although some of the homes will be available on the open market and most employees' families will travel to work or school elsewhere. The distance from larger settlements and the frequency of bus services will encourage some users to drive to and from the site, but there are good rail links from Didcot Parkway, six kilometres away, with buses subsidised by Harwell Campus linking the station to the site. The cycle network also links the campus to Wantage and Didcot. The proposed non-residential uses, such as the primary school and supermarket, are intended to serve the site itself and the immediate surrounding area, but will generate some trips from off-site. There will need to be sufficient access for servicing and deliveries, while minimising the impact of these on the public realm and highways network.

A transport assessment has been prepared and Harwell Campus's existing travel plan will be updated.

### 8.2 Objectives

Harwell Campus objective:

*E. Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*



### 8.3 Sustainability targets

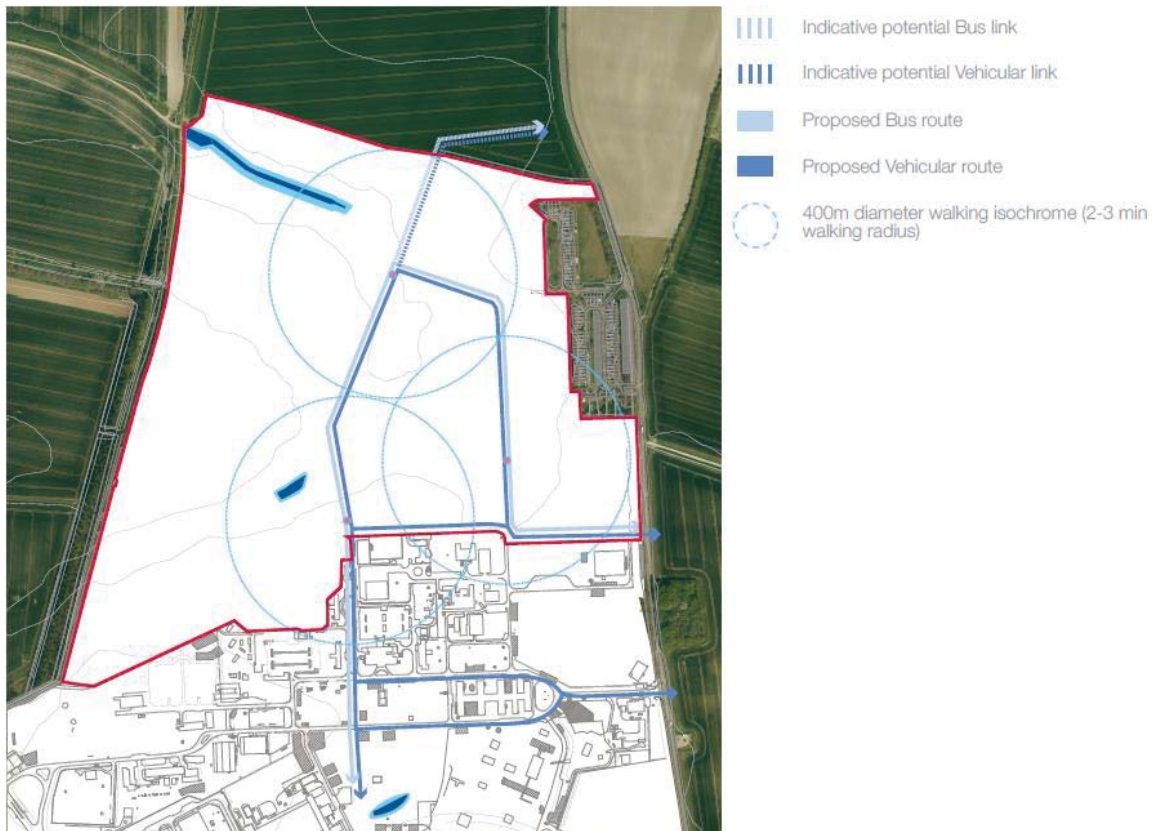
Table 8-1 Sustainability targets - transport and access

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Provide safe and convenient access for all users / modes and prioritise pedestrians, cyclists, public transport users and those with impaired mobility	✓		✓	✓		Transport consultant / masterplanner
Provide specific measures designed to deliver more sustainable transport choices	✓		✓	✓		Transport consultant / masterplanner
Carry out a Transport Assessment and ensure compliance with the Harwell Campus travel plan	✓		✓	✓		Transport consultant
Link new pedestrian and cycle routes with strategic networks such as public rights of way and the national cycle network, and create direct and attractive connections between places.		✓	✓	✓		Transport consultant / masterplanner
Effectively manage access to and availability of car parking, to encourage more sustainable modes of travel.		✓		✓	✓	Transport consultant / management
Design roads and public realm that provide for unloading, circulation and servicing, have road layouts that naturally calm traffic, don't cause congestion on local roads. Provide an appropriate level of parking.		✓		✓		Transport consultant / masterplanner
Identify pedestrian desire lines, provide adequate footpaths and road crossings, and provide cycle parking and facilities.		✓		✓		Transport consultant / masterplanner

### 8.4 Outline strategy

The transport strategy for the residential quarter follows the same principles as the strategy for the wider campus, with road loops which allow access by cars and buses, and a network of pedestrian and cycle routes. Centres of activity (transport nodes, community facilities etc) have been sited to allow convenient access for people living and working at the site. Access to the site will be provided from the A4185 Newbury Road via Curie Avenue, which enters the southeast of the residential quarter, and via a new link road in the northeast. The Thompson Avenue entrance to the main part of the campus will also provide a link into the residential quarter from the south. An internal bus route would form a loop from the main campus entrance at Fermi Avenue to Curie Avenue within the residential quarter. The movement strategy is shown in Figure 8-1.

While the provision of car parking is based on anticipated need as a result of the location and existing public transport services, as the population on the site grows and improvements are made to transport provision off-site, an increase in frequency of public transport services to the campus will become more viable and the proportion of site users arriving by car can be reduced.



**Figure 8-1 Movement strategy**

Sustainable travel (walking, cycling, public transport, car sharing and non-fossil fuel powered cars) will be encouraged where possible, whilst providing sufficient parking and vehicle access for essential car trips and servicing etc. A network of cycling and walking routes will be incorporated into the residential quarter, as shown in Figure 8-2.



**Figure 8-2 Walking and cycling network: existing (left) and proposed (right)**

A number of further approaches to managing transport across the campus may be explored, for implementation at a later stage, for example:

- Provide transport for internal circulation within the campus e.g. bicycle loan, hop on – hop off vehicles, or electric vehicles, possibly in collaboration with on-site companies;
- Separate the internal and external vehicle circulation networks, to keep fossil fuelled vehicles out of the public realm and reduce the convenience of cars, e.g. keep car parks on the edges of the site, and combine transport hubs with activity / distribution hubs. The interface between internal and external networks needs to be carefully considered, however, and allowance made for essential door to door trips e.g. school pick up to weekly shop to home;
- Provide shared hybrid vehicles and/or electric bicycles for residents to access nearby towns; and
- Restrict vehicles speeds / remove vehicles from public realm in residential areas to enhance public realm e.g. for playing.

## **8.5 Next steps**

The Transport Assessment and travel plan will be further developed as the proposals progress towards a planning application.

## 9 Climate change adaptation

### 9.1 Context

The open landscape surrounding Harwell Campus and its position on higher ground mean that the site can feel exposed in some weather conditions. Although the site is not at risk of flooding from watercourses, a flood risk assessment would be required for planning applications greater than 1 hectare in size, to demonstrate that development will not result in an increased risk of flooding on or off site. Climate change predictions for the UK anticipate warmer wetter winters, hotter drier summers, and more extreme weather events.

Developing a greenfield site can alter the local microclimate by changing the way heat is reflected from surfaces, funnelling wind and changing ground level wind speeds, and reducing the permeability of the ground surface. The layout and massing of buildings also affects amount of solar gain experienced inside the building and the ease with which the building can be shaded. Generally, for residential buildings, winter solar gain is desirable, while summer sun should be shaded (see Chapter 3 Energy).

### 9.2 Objectives

Harwell Campus objective:

*E. Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

### 9.3 Sustainability targets

**Table 9-1 Sustainability targets - climate change adaptation**

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Take appropriate measures to evaluate and manage flood risk (see Chapter 4)	✓		✓	✓		Flood risk consultant
Reduce potable water demand through building specification and landscape management (see Chapter 4)		✓		✓	✓	Building services engineer / landscape architect
Prepare an energy strategy which takes into account the requirement for heating, shading, ventilation and cooling, and influences building layout, orientation, massing and form accordingly (see Chapter 3).		✓	✓	✓		Energy consultant
Consider how the prevailing wind may affect microclimate and mitigate by considering street alignment, topography or landscape.		✓	✓	✓		Wind consultant / architect
Overcome the urban heat island effect by careful positioning of green spaces and shade.		✓	✓	✓		Landscape architect

## 9.4 Outline strategy

Climate change mitigation can be incorporated into landscaping proposals, by ensuring that as much of the site is vegetated and permeable as possible, to minimise the urban heat island effect and enable sustainable drainage techniques. The provision of spaces appropriate to a range of climates, for example with differing degrees of shelter, shade and openness, will allow people to seek out comfortable conditions when outside.

The drainage strategy incorporates sustainable drainage systems (SuDS), including infiltration trench soakaways, permeable paving and/or swales. The strategy seeks to provide attenuation up to and including the 1 in 30 year storm event, with additional storage of peak storm water (1 in 100 year event) by allowing car parks and areas to flood, safely (see Chapter 4 Water Resources).

Generally in the UK, the prevailing wind is from the southwest, although strong winds also occur from other directions. Wind data for Harwell is needed to confirm the wind profile at the site. Wind can be considered further as the proposals develop, for example building massing should be stepped down in the direction of the prevailing winds, to avoid high ground level winds. Features which would collect and funnel the stronger winds should also be avoided. Surrounding buildings and vegetation can deflect and slow down wind speeds, and planting can be used as additional shelter where winds are strong.

As outlined in Chapter 3, solar gain needs to be controlled to prevent overheating from becoming a problem, especially where there are likely to be high internal heat gains (e.g. computers / machinery / lots of people). Solar gain is easier to shade and manage on south or north facing facades, therefore buildings should be arranged so that the smaller facades face east / west and larger facades are within 15 degrees of north / south. Natural ventilation requires maximum floor plates depths of 15-16 metres.

The landscaping proposals provide for a range of green spaces and public realm, from more open landscapes to areas where trees will provide shelter and shade, particularly along the roads. Overall, the site will be quite green and the urban heat island effect is not expected to be an issue.

## 9.5 Next steps

As the scheme design develops, the emerging energy strategy and consideration of potential wind and shading effects will be used to inform the building orientation, massing and form etc.

The flood risk assessment will be updated and submitted with the planning application, and the utilities strategy will consider water demand (see Chapter 4).

## 10 Place-making, townscape and community

### 10.1 Context

In addition to the five key objectives (A to E) captured in the objectives sections of this report, the Harwell Campus Vision states:

*Harwell is a campus with local, regional, national and international status and importance, which is growing to become recognised as a globally significant hub for science and innovation. The campus sits within the Science Vale UK: an area where internationally competitive science-based employment will receive continued support and encouragement from government, including the strategic delivery of high quality homes, supporting community facilities, and enhanced infrastructure.*

*To capture and support this momentum, Harwell will attract inward investment to a world class environment which transcends its role as a science and innovation park and delivers an exceptional quality of life for those who live and work at the Campus, whilst looking beyond its boundary to connect with and tap into the wider Science Vale. Harwell will foster the development of a work-live-play community and cultivate a strong sense of community and pride that celebrates the Campus's unique setting and pivotal influence in science and technology. Harwell will benefit from strong links to public sector organisations and leading academic institutions and encourage cross fertilisation of talent and ideas.*

The residential quarter will play a key role in achieving this vision, bringing homes and facilities to the campus, and creating a high quality place that fosters community. The characteristics of the site are an asset and will contribute to the sense of place; these include:

- The AONB landscape and features such as the ridgeway and Icknield Way;
- Proximity to nearby towns and villages; and
- Historic buildings within the campus and mature network of green spaces which provide an attractive setting for development, as well as supporting biodiversity, recreation and amenity.

Place-making and fostering community are a key focus of the masterplanning and landscape design work.

### 10.2 Objectives

Harwell Campus objectives:

*B. Foster an exceptional and high quality physical environment that integrates the Campus's built form into the surrounding AONB landscape whilst meeting the needs of existing and future occupiers;*

*C. Deliver an integrated residential neighbourhood at Harwell to support the Campus and the wider Science Vale, strengthening the community of residents and employees whose lives are enriched by the Campus's distinct sense of place and range of services; and*

*D. Create opportunities for clustering to facilitate natural collaboration and cross-fertilisation between different technologies, with the potential to catalyse new scientific discoveries and investment that will improve the human condition.*

### 10.3 Sustainability targets

Table 10-1 Sustainability targets - place-making, townscape and community

Target	Priority		Stage			Responsibility
	Mandatory	Aspiration	Masterplan	Building	Management	
Provide productive landscapes, communal gardens, communal all age play space, pedestrian priority areas, and space for collective meeting, creating, and growing.		✓	✓	✓		Landscape architect
Instil a sense of history and sense of place at Harwell, restoring and enhancing historic features where possible		✓		✓		Architect
Social 'nodes' created for community interaction and integration		✓	✓	✓		Masterplanner / landscape architect
Play spaces for all ages and new variety of populations		✓	✓	✓		Landscape architect
A variety of recreational spaces to accommodate social exchange and meeting, as well as contemplation, activity and play		✓	✓	✓		Landscape architect
Non-business uses will only be permitted if they are small scale and clearly for the users of the site, to not affect the vitality / viability of nearby towns/villages	✓		✓			Planning consultant
Identify stakeholders and prepare a consultation plan. Consult, give feedback and act upon consultation responses		✓	✓	✓	✓	Project team
Design should reinforce local identity or establish a distinct identity, create a high quality townscape / landscape, provide a clear and permeable structure of streets, and be built to last.		✓	✓	✓		Masterplanner / architect
Provide 15% of the residential area as public open spaces, including arrangements for its future management and maintenance.		✓	✓		✓	Landscape architect / management

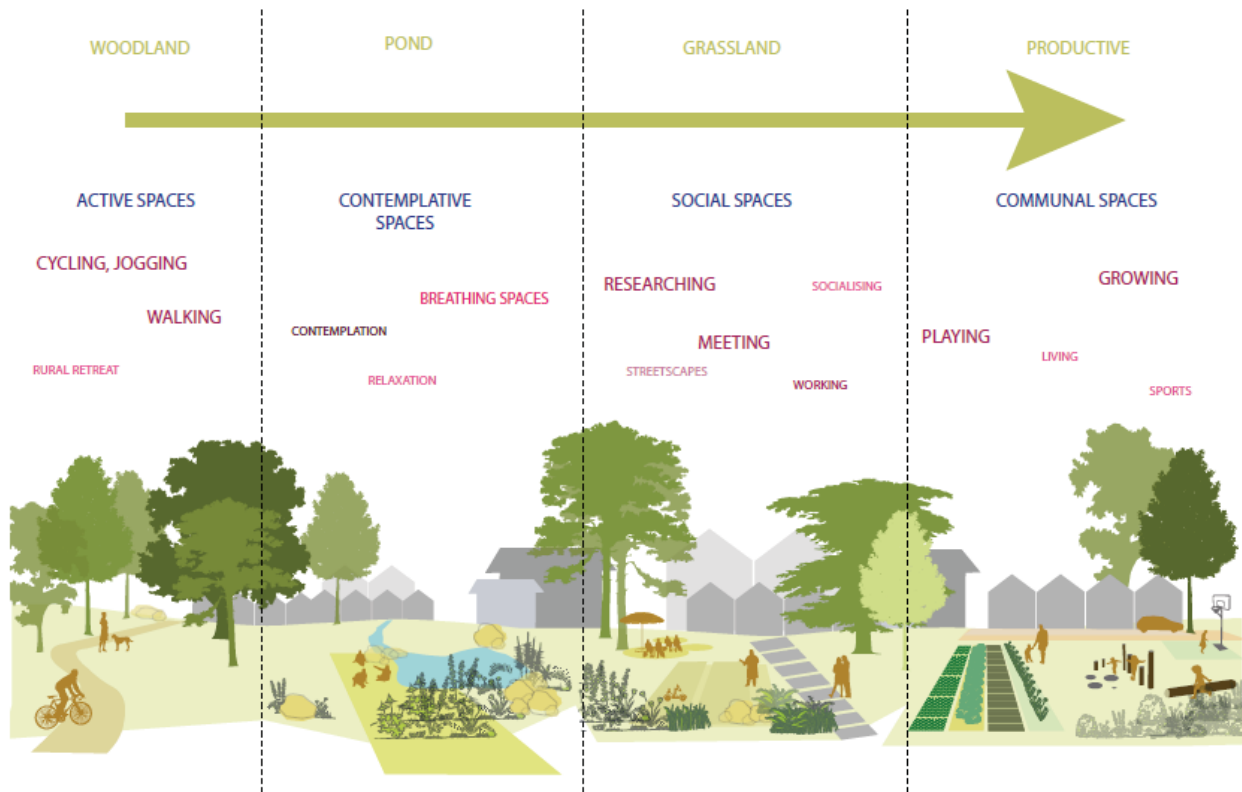
### 10.4 Outline strategy

The landscape strategy is based on a vision which includes:

- Integrating into the campus and AONB context;
- Unifying the campus landscape;
- Enhancing and protecting character;
- Defining green infrastructure and green spaces; and
- Providing a legible hierarchy of spaces and routes.

The landscape proposals provide for a mix of open space types, including streets and low/no traffic home zones, communal and private gardens, and public open space, including play areas (Figure 10-1). The public space will be maximised by minimising the provision of front gardens, providing shared space roads, and creating village greens and social spaces. A clear hierarchy of streets will aid legibility, with a network of pedestrian routes and rights of way. The site will be well-vegetated, supporting a rural character appropriate to the AONB, as set out in Chapter 6.





**Figure 10-1 Landscape strategy - hierarchy of spaces**

The urban design incorporates the following principles designed to contribute positively to place-making, townscape and community (as described in Chapter 1 and shown in Figure 1-4); these will be further developed as the design progresses.

## 10.5 Next steps

The development mix, along with the landscape and urban design strategies will be further developed in consultation with VoWH, design review panel, and following further studies.



## 11 Education and employment

### 11.1 Context

The primary reason for incorporating residential development into Harwell Campus is to attract and retain employees and investment. Research into an appropriate mix of housing types and necessary supporting infrastructure, which could include a primary school, is ongoing.

### 11.2 Objectives

Harwell Campus objectives:

- A. *Support the delivery of a range of modern business environments, which enable Harwell to generate substantial economic benefits and maximise the inherent potential of the Campus as an internationally significant centre, attractive to innovation and science based research and business – from start-up enterprises to major companies and institutions; and*
- C. *Deliver an integrated residential neighbourhood at Harwell to support the Campus and the wider Science Vale, strengthening the community of residents and employees whose lives are enriched by the Campus's distinct sense of place and range of services.*

### 11.3 Sustainability targets

Sustainability targets for education and employment are still to be developed.

### 11.4 Outline strategy

The strategy is still to be developed.

### 11.5 Next steps

Further discussion with VoWH and research into Campus requirements to determine appropriate aspirations for the site.

## 12 Summary

This sustainability strategy report provides a summary of the sustainability principles which are driving the design of the residential quarter. This work is ongoing. At the outline planning stage, we will consider the performance of the development proposals against the objectives and targets identified within this document and will report this within a sustainability statement for planning.

Table 12-1 illustrates how the Campus sustainability objectives align with the topics in this strategy and the next steps required to progress the sustainability strategy.

**Table 12-1 Summary of objectives and next steps**

Topic	Harwell Campus objective*					Next steps (to outline planning)
	A	B	C	D	E	
Energy					✓	Campus energy strategy, determine BREEAM requirement, explore massing options.
Water resources					✓	Update flood risk assessment and SuDS strategy.
Waste & materials					✓	Ensure space for waste infrastructure.
Biodiversity & landscape		✓				Further ecological surveys and development of mitigation and landscaping proposals.
Pollution control					✓	Identify requirement for and scope of environmental assessments; develop initial lighting strategy.
Transport & access					✓	Update transport assessment and travel plan as proposals develop.
Climate change adaptation					✓	Massing to be informed by emerging energy strategy and wind/shading considerations; update flood risk assessment and utilities strategy.
Place-making, townscape and community		✓		✓		Development mix, landscape and urban design strategies to be further developed.
Education & employment	✓		✓			Targets and strategy to be determined.

\*the Campus objectives are:

- A. *Support the delivery of a range of modern business environments, which enable Harwell to generate substantial economic benefits and maximise the inherent potential of the Campus as an internationally significant centre, attractive to innovation and science based research and business – from start-up enterprises to major companies and institutions;*
- B. *Foster an exceptional and high quality physical environment that integrates the Campus's built form into the surrounding AONB landscape whilst meeting the needs of existing and future occupiers;*
- C. *Deliver an integrated residential neighbourhood at Harwell to support the Campus and the wider Science Vale, strengthening the community of residents and employees whose lives are enriched by the Campus's distinct sense of place and range of services;*

- D. *Create opportunities for clustering to facilitate natural collaboration and cross-fertilisation between different technologies, with the potential to catalyse new scientific discoveries and investment that will improve the human condition; and*
- E. *Provide resilient user-friendly infrastructure systems including energy, drainage, waste and transport, to minimise resource use, improve efficiency and reduce environmental impacts.*

## Appendix A - Relevant policies (from framework masterplan)

Key:

Source	
Local Plan 2011	LP11
Sustainable Design & Construction SPD	SDC
Draft Local Plan 2031	LP31
Design Guide SPD	DG
Status	
Mandatory at planning	✓
Good practice	✓✓

Source	Status	Target
General		
SDC	✓✓	Para 3.5: All new developments are required to achieve a level of performance equivalent to BREEAM Excellent (Very Good will be accepted only in those cases where there are robust arguments why an Excellent rating is not viable).
		Para 3.7/3.16: All new developments over 1,000 square metres / 10+ dwellings will need to incorporate renewable energy generation systems capable of offsetting a minimum of ten percent of the predicted annual carbon emissions arising from operational** energy use of the proposed building(s). This target is likely to change as commercial viability and performance of these technologies change as well as other factors such as changing regional and national targets. (** Operational in this context means energy use associated with the building and the operations inside the building.)
Energy		
LP11	✓	Policy DC2: In new developments, consideration should be given to measures to conserve energy. These may include passive solar design, energy efficient technologies.
	✓✓	Para 3.8: The council encourages developers to provide CHP (and ideally biomass CHP) for commercial developments where there is local demand for heat and electricity.
SDC	✓✓	<ul style="list-style-type: none"><li>Have the buildings been designed to maximise passive solar gain?</li><li>Will the development incorporate district heating (CHP or CCHP)?</li></ul>
LP31	✓✓	Core Policy 41: The Council encourages schemes for renewable and low carbon energy generation. Planning applications for renewable and low carbon energy generation will be supported provided that they do not cause a significantly adverse effect to: i. landscape, both designated AONB and locally valued ii. biodiversity, including protected habitats and species and Conservation Target Areas iii. the historic environment, both designated and non-designated assets, including by development within their settings iv. the visual amenity and openness of the Green Belt v. local residential amenity, and vi. the safe movement of traffic and pedestrians.
DG	✓✓	Principle DG20: Applicants should develop an energy strategy for the development. Applicants should demonstrate that alternative, site-wide, local energy generation has been considered within the design process.
		Principle DG10: Maximise the site resources by utilising the solar potential of the site; making full use of rain water and drainage systems and harnessing wind energy.
		Principle DG11/12: The layout of development should maximise the benefits of daylighting and passive solar gains.
		Principle DG30: Applicants should develop an energy strategy for the development and demonstrate that alternative, site-wide, local energy generation has been considered within the design process.
Water Resources		
LP11	✓	Policy DC2: In new developments, consideration should be given to measures to conserve the use of resources. These may include water conservation.
		Policy DC12: Where a risk from flooding is identified, new development will not be permitted unless a FRA has been carried out and mitigation measures developed.
SDC	✓✓	Reduce > Reuse > Recycle

Source	Status	Target
		<p>Carry out an assessment to determine which Sustainable Urban Drainage System (SUDS) technique will be appropriate for the site and ensure adequate measures are in place for future maintenance and that ground water regulations are complied with. Hard surfaces should be permeable, and drainage should be designed to safely dispose of predicted excess surface water flows. Developers should ask the Environment Agency for further advice on SUDS.</p> <p>Appendix 1: As well as SUDs such as permeable paving and swales / basins, larger developments may also be able to incorporate ponds and wetlands, or infiltration trenches, basins and filter drains, or green roofs.</p> <p>Water conservation measures should be included as standard and should achieve the targets set out in the Code for Sustainable Homes and BREEAM. Water storage measures can be used in conjunction with water conservation.</p> <ul style="list-style-type: none"> <li>Will the development incorporate rainwater harvesting?</li> <li>Will the development incorporate greywater recycling?</li> <li>Will the development use SUDS?</li> </ul>
LP31	✓✓	<p>Core Policy 42: site specific flood risk assessment will be required for all developments of 1 hectare and greater in Flood Zone 1 and for all proposals for new development, including minor development and change of use in Flood Zone 2 and 3 and in Critical Drainage Areas, and also where proposed development or a change of use to a more vulnerable class that may be subject to other forms of flooding. Appropriate mitigation and management measures will be required to be implemented.</p> <p>All development proposals must be assessed against the Vale of White Horse and South Oxfordshire Strategic Flood Risk Assessment and the Oxfordshire Local Flood Risk Management Strategy to address locally significant flooding. Appropriate mitigation and management measures must be implemented.</p> <p>All development will be required to provide a drainage strategy. Developments will be expected to incorporate sustainable drainage systems and ensure that run-off rates are attenuated to greenfield run-off rates. Higher rates would need to be justified and the risks quantified. Developers should strive to reduce run-off rates for existing developed sites.</p> <p>Sustainable drainage systems should seek to enhance water quality and biodiversity in line with the Water Framework Directive</p> <p>Core Policy 43: All development proposals will be required to make provision for the effective use of natural resources where applicable, including making efficient use of water, for example through rainwater harvesting and grey water, and causing no deterioration in, and where possible, achieving improvements in water quality.</p> <p>Principle DG14: Where practically possible surface water features should be retained, enhanced and/or re-established as positive features contributing to the character, ecological value and biodiversity of new development. Development proposals should incorporate the use of sustainable urban drainage as an integral part of the landscape structure. SUDS should be designed into the development from the outset as features such as ponds, retention planters/basins, green back lanes and wetlands, and combined with good landscape to make a positive contribution to the character and appearance of a development. Infiltration methods should be used wherever soil conditions permit. Maximise the amount of porous hard surfacing to enable infiltration.</p>
<b>Waste &amp; materials</b>		
LP11	✓	<p>Policy DC2: In new developments, consideration should be given to measures to conserve the use of resources. These may include maximising the use of recycled and waste materials.</p> <p>Policy DC7: Provide for sorting, storage and collection of waste, including sustainable waste management initiatives as appropriate.</p> <p>Prevent &gt; Minimise &gt; Reuse &gt; Recycle &gt; Recover &gt; Dispose</p>
SDC	✓✓	<ul style="list-style-type: none"> <li>Has the development been designed to facilitate future re-use?</li> <li>Will waste and recycling facilities be provided?</li> </ul> <p>Core Policy 43: All development proposals will be required to make provision for the effective use of natural resources where applicable, including minimising waste and making adequate provision for the recycling of waste on site.</p>
LP31	✓✓	Principle DG99: A Waste Strategy specific to the end users should be produced and provided to the Local Planning Authority for written approval prior to the occupation of each building. Each tenant should have access to adequate, hygienic, space in which to segregate the waste into various recycling streams and thus minimise landfill.
<b>Biodiversity</b>		
LP11	✓	<p>Policy DC6: Maximise opportunities for nature conservation and habitat creation in landscaping.</p> <p>Policy NE5: Development likely to have an effect on protected species will not be permitted unless the adverse effects can be mitigated.</p>

Source	Status	Target
SDC	✓✓	<ul style="list-style-type: none"> <li>Does the development include measures for the conservation and enhancement of existing wildlife habitats, both during and after construction?</li> <li>Will the development include green corridors and planting strategies of native species?</li> <li>Will the development incorporate measures to enhance biodiversity?</li> <li>Will the development retain, enhance or create features of nature conservation value?</li> <li>Will the development mitigate impacts on nature conservation where it has not been possible to avoid all adverse impacts?</li> <li>Where some harm is unavoidable, will the development compensate for the loss of features of nature conservation value?</li> </ul>
LP31	✓✓	<p>Core Policy 45: A net gain in Green Infrastructure, including biodiversity, will be sought either through on site provision or off-site contributions and the targeted use of other funding sources. A net loss of Green Infrastructure, including biodiversity, through development proposals will be resisted. Proposals for new development must provide adequate Green Infrastructure in line the with Green Infrastructure Strategy.</p> <p>Core Policy 46: Development that will conserve, restore and enhance biodiversity in the district will be permitted. Opportunities for biodiversity gain, including the connection of sites, large-scale habitat restoration, enhancement and habitat re-creation will be actively sought. A net loss of biodiversity will be avoided.</p> <p>Principle DG18: Landscape features that have high biodiversity/ecological value should be retained and incorporated within the proposals. All applications should seek no net loss of biodiversity as a minimum and if possible incorporate net gains.</p>
<b>Pollution Control</b>		
LP11	✓	<p>Policy DC10: Development will not be permitted if it is likely to be adversely affected by existing or potential sources of noise / vibration, smell / dust / heat / gases or other emissions, pollution / contamination of the site or its surroundings.</p> <p>Policy DC12: Development will not be permitted if it would adversely affect the quality of water resources, including groundwater, rivers and lakes, as a result of abstraction, or the nature of related surface or waste water discharge, or the disturbance of contaminated land.</p> <p>Policy E7: Development at Harwell must have a minimal impact in terms of light pollution.</p>
	✓✓	<p>Appendix 1: Prepare a site management strategy to reduce impacts on neighbours from noise, odour and dust during construction; avoid products/materials that have the potential to release harmful chemicals into the environment; identify any hazardous materials on site (e.g. asbestos) and employ a licensed contractor to carry out disposal; where decontamination of land is necessary, seek the most environmentally benign solution; if the development will lead to the introduction of processes that create high noise levels, incorporate mitigation measures such as building insulation or earth bunds; specify heating plant with low nitrous oxide (NOx) emissions; plant trees to 'neutralise' the release of CO2 and help to absorb pollutants (including noise); specify building materials with low toxicity which are benign both during use and on disposal.</p>
SDC	✓✓	<p>Core Policy 43: All development proposals will be required to make provision for the effective use of natural resources where applicable, including having regard to air quality; and ensuring that the land is of a suitable quality for development and that remediation of contaminated land is undertaken where necessary.</p>
<b>Transport &amp; Access</b>		
LP11	✓	<p>Policy DC5: Provide safe and convenient access for all users / modes; do not cause safety, congestion or environmental problems on local network; provide for (un/)loading, circulation, servicing; provide vehicle and bike parking; provide for off site improvements where necessary; prioritise pedestrians, cyclists, public transport users and those with impaired mobility.</p> <p>Policy TR2: Proposals for development which would be likely to increase traffic will be required to include provision of specific measures designed to deliver more sustainable transport choices.</p> <p>Policy E7: Development at Harwell Campus will be permitted subject to the development being in accordance with the campus travel plan and measures to reduce car usage, and appropriate contributions to nearby road upgrades.</p>
	✓✓	<p>Appendix 1: Identify pedestrian desire routes early in the process; liaise with public transport officers at the local authority and transport operators; consider road layouts that naturally calm traffic without the need for humps/cushions (for example homezones);</p>
SDC	✓✓	<ul style="list-style-type: none"> <li>Will the development include easy and safe access to public transport?</li> <li>Will there be adequate provision of footpaths and road crossings for pedestrians?</li> <li>Will the development facilitate cycling?</li> <li>Will the development include or enable working from home?</li> <li>Will the development include good access to the public highway?</li> <li>Will a Travel Plan be adopted?</li> </ul> <p>Core Policy 35: New development should be located close to existing public transport corridors, be designed to encourage walking as the preferred means of transport within and to/from the development, encourage and enable cycling, provide adequate parking in line with Oxfordshire County Council's standards, and (for major development) be accompanied by a Transport Assessment and Travel Plan.</p>

Source	Status	Target
LP31	✓✓	Core Policy 37: New development will be expected to be well connected to provide safe and convenient ease of movement by all users, ensuring that the needs of vehicular traffic does not dominate at the expense of other modes of transport including pedestrians and cyclists, or undermine the resulting quality of places; and ensures a sufficient level of well-integrated car and bicycle parking and external storage.
		Principle DG21: Within larger proposals a mix of uses should be provided, including local facilities close to public transport to promote walking, cycling and bus use. Streets should be designed so that pedestrians and cyclists can safely and easily use the network. Encourage/promote home working and live / work units to reduce car trips. Link new pedestrian and cycle routes with 'strategic' networks such as 'safe routes to school' and the national cycle network.
DG	✓✓	Principle DG22: New development should link with existing routes and access points, creating direct and attractive connections between public transport, footpaths, cycle routes and local facilities. Future proof by providing streets that later phases of development can connect into at the edges of development sites.
<b>Health, Safety &amp; Wellbeing</b>		
LP11	✓	Policy DC3: Building layout and open spaces should deter crime.
		Policy H16: On sites capable of accommodating 10 or more dwellings, 10% of dwellings should be designed to meet lifetime homes standards (subject to viability)
		Appendix 1: Development proposals should take into account the following issues: Noise insulation and abatement techniques; provision of private space; access to recreational facilities for both young and old; good site practices; external lighting provision; crime reduction techniques; site specific crime reduction features; fire reduction techniques/installations.
SDC	✓✓	Appendix 1: Design to Secure By Design principles, for example: communal areas with natural supervision, clear boundaries and defined spaces, lighting etc.
		<ul style="list-style-type: none"> <li>Will the development include noise insulation and abatement measures?</li> <li>Will the development include the provision of outdoor space?</li> <li>Will the development include access to recreational facilities for both young and old?</li> <li>Will the development include well-designed external lighting?</li> <li>Will the development include crime reduction measures?</li> <li>Will the development include fire reduction measures?</li> </ul>
		Core Policy 37: New development will be expected to create safe communities and reduce the likelihood and fear of crime; and secure a high quality public realm with well managed and maintained public areas that are overlooked to promote greater community safety, with clearly defined private spaces.
LP31	✓✓	Principle DG17: Applicants should link existing and proposed landscapes and open spaces together to form open space networks.
DG	✓✓	Principle DG20: Create a network of safe and well-designed streets and public spaces that can have a social function as well as accommodating vehicular movement. Provide opportunities for play and recreation. Consider opportunities to encourage local food growing such as community orchards, provision of allotments or other community garden projects.
<b>Climate Change Adaptation</b>		
LP11	✓✓	<p>Appendix 1: Key climate change adaptation measures to consider for all types of development are:</p> <ul style="list-style-type: none"> <li>Location – take appropriate measures to evaluate flood risk, plan to overcome the urban heat island effect by the careful positioning of green spaces and shade.</li> <li>Site Layout – Ensure the development does not increase flood risk, minimises summer solar gain, maximises natural ventilation, maximises natural vegetation, takes account of increased risk of subsidence, and provides appropriate outdoor natural space.</li> <li>Sustainable Drainage (see water resources)</li> <li>Outdoor Space – Provide shaded outdoor spaces and use vegetation which can cope with expected weather conditions and requires less water. Arrangements need to be made for storing waste which will prevent problems of smells occurring in hotter weather conditions.</li> <li>Connectivity – Developments need to be designed to be connected to transport networks (roads, footpaths and cycle paths), and networks need to be resilient to expected future weather conditions. Paths and roads need to be properly marked and surfaces need to remain serviceable.</li> </ul>
SDC	✓✓	Core Policy 37: New development will be expected to be sustainable and resilient to climate change by taking into account landform, layout, building orientation, massing and landscaping to minimise energy consumption and mitigate water run-off and flood risks.
LP31	✓✓	Core Policy 40: All new development, including building conversions, refurbishments and extensions, should seek to incorporate climate change adaptation and design measures to combat the effects of changing weather patterns. Wherever practicable, measures to provide resilience against higher temperatures and intense rainfall should be used and their application to the development outlined in the Design and Access Statement.
		Principle DG11/13: Applicants should consider how the prevailing wind may affect the micro-climate of any proposals. Effects can be mitigated through consideration of street alignment / orientation topography or the use of landscape. The topography of the site can also be used to provide natural shelter from wind and therefore prevent heat loss in winter.

Source	Status	Target
<b>Placemaking &amp; Design</b>		
LP11	✓	Policy DC1: Development must be of high quality and inclusive design...(and) take into account local distinctiveness and character.
		Policy DC6: Protect and enhance visual amenity and important landscape features.
		Policy NE6: Development in the AONB will only be permitted if the natural beauty of the landscape will be conserved or enhanced. Must not detract from views from public viewpoints.
		Policy H23: Housing developers will usually be required to provide 15% of the residential area as public open spaces, including arrangements for its future management and maintenance.
		Policy L11: Development will not be permitted if it would diminish enjoyment of the ridgeway.
		Policy E7: Development at Harwell will not be permitted in structural areas of open space or perimeter landscaping. Development must be in accordance with a comprehensive landscape plan for the whole campus. Buildings and structures must not unacceptably harm the character and appearance of the surrounding area.
		Policy E13: Non business uses at key employment sites (incl. Harwell) will only be permitted if they are small scale and clearly for the users of the site and would not adversely affect the vitality / viability of town/village centres or shopping centres.
		<p>All proposals for new development will be expected to be of high quality design that:</p> <ul style="list-style-type: none"> <li>• Responds positively to the site and its surroundings, cultural diversity and history and reinforces local identity or establishes a distinct identity whilst not preventing innovative responses to context</li> <li>• Creates a distinctive sense of place through high quality townscape and landscaping that physically and visually integrates with its surroundings</li> <li>• Provides a clear and permeable structure of streets, routes and spaces that are legible and easy to navigate through because of the use of street typology, views, landmarks, public art and focal points</li> <li>• Incorporates and/or links to high quality Green Infrastructure and landscaping to enhance biodiversity and meet recreational needs including Public Rights of Way Core Policy 37: Design and Local Distinctiveness</li> <li>• Is built to last, functions well and is flexible to changing requirements of occupants and other circumstances</li> <li>• Addresses the needs of all in society by incorporating mixed uses and facilities as appropriate with good access to public transport and a wide range of house types and tenures is visually attractive and the scale, height, density, grain, massing, type, details and materials are appropriate for the site and surrounding area.</li> </ul>
LP31	✓✓	Principle DG10: Use the physical characteristics of a site including topography, orientation, landform, geology, drainage patterns, field patterns, boundaries and vegetation cover to influence the form and layout of new development.
DG	✓✓	Principle DG25: Density should be appropriate to the location, respond to and/or enhance the character of the existing settlement.





Katherine Sydney  
Buro Happold Limited  
Camden Mill  
Lower Bristol Road  
Bath  
BA2 3DQ  
UK

T: +44 (0)1225 320 600

F: +44 (0)870 787 4148

Email: [katherine.sydney@burohappold.com](mailto:katherine.sydney@burohappold.com)