

University of Cambridge

Biodiversity Action Plan 10 Year Vision

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Foreword

Message from the Vice-Chancellor.

1 Introduction

Biodiversity and the University of Cambridge

- 1.1 Biodiversity is the variety and variability of life on Earth. Biodiversity is typically a measure of variation at the genetic, species, and ecosystem level. It is alarming that biodiversity loss and declines in ecosystem health have accelerated despite increased public awareness and significant progress in strategy and policy. However, while the recent IPBES Global Assessment Report on Biodiversity and Ecosystem Services¹ confirms that current rates of biodiversity loss are unprecedented, it also tells us that it is not yet too late to reverse this trend.
- 1.2 The University of Cambridge is committed to playing an active role in halting the local, national and international decline in biodiversity. We have a long and established reputation in biological and sustainability research, including ecology and biodiversity conservation, the University continues to be a global leader in this area. The creation of the Cambridge Conservation Initiative (<https://www.cambridgeconservation.org/>), which is a unique collaboration between the University and the largest cluster of conservation organisations in the world, and Cambridge Zero (<https://www.zero.cam.ac.uk/>) are examples of our commitment and excellence in this field, and provide a unique framework for delivering conservation action.
- 1.3 Our Biodiversity Action Plan (BAP) builds on existing biodiversity commitments set out in our Environmental Sustainability Vision, Policy and Strategy (2015), Strategic Framework for the Development of the Estate (2016), Design Standards Brief and within Site Masterplans.
- 1.4 The scope of this plan includes the University's rural and operational estate but excludes the North West Cambridge development (which is represented by a separate biodiversity action plan), the Colleges, Cambridge University Press and Cambridge Assessment.

Positioning

- 1.5 The creation of the University's BAP provides an exciting opportunity for us to reinforce our global reputation by setting out a range of ambitious and scientifically robust biodiversity-focused initiatives to be delivered over a 10-year timescale.
- 1.6 The completion of a first stage Biodiversity Baseline Summary Report in 2019 summarised key findings from habitat and species data collected during 2017-18. Habitat data has come from many different sources, including Phase 1 habitat surveys, the University's Woodland Management Plan, and surveys of County and City Wildlife Sites by the Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire. This habitat data is stored in a 'Biodiversity Map' in ArcGIS Pro which covers the entire

¹ Díaz, S. *et al.* (2019) *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)*. IPBES secretariat, Bonn, Germany.

University estate. The Biodiversity Map centralises information on the type and condition of existing habitats, as well as targets for improving habitat condition.

- 1.7 This BAP provides a structure for habitat and species conservation across the University's entire operational and rural estate and details a set of principles that will underpin future decision-making relating to development of the estate. It also embraces the benefits of nature to people and helps to identify ways to better promote and engage people in biodiversity conservation, including staff and students of the University and other residents of Cambridge City.
- 1.8 This BAP is underpinned by: a thorough review of ecological baseline conditions and the digital mapping of habitats; consideration of recent regional, national and global policy and strategies; and consultation with key stakeholders. It has been prepared under the technical supervision and guidance of the University's Ecological Advisory Panel, which consists of internal and external academics and practitioners with a wide range of ecological, conservation science and policy specialisms, together with representatives from the Estates Division, who are responsible for day-to-day site development, management and maintenance.
- 1.9 This BAP aims to do the following:
 - detail a vision and a set of principles that provide a framework for biodiversity conservation on our estate;
 - identify priority habitats and species of international, national and local importance that are found within the estate to be targeted by the BAP;
 - highlight threats and issues affecting priority habitats and species;
 - take advantage of the unique conservation community within Cambridge and encourage a partnership approach to biodiversity conservation and sharing of best practice across the University and the wider community;
 - promote education, community action and participation as a key part of the biodiversity process;
 - position biodiversity conservation and enhancement (net gain) as an essential element of sustainable development;
 - reinforce our position as an international leader in biodiversity conservation through the activities and actions we undertake on the ecosystems and environments we manage.
- 1.10 This BAP proposes actions to deliver biodiversity gain over a 10-year horizon, with a formal report on progress against net gain objectives in five years. However, as delivery of many actions will be started and/or completed over a shorter timeframe, an annual checkpoint of progress against plan items will be conducted by the EAP alongside an assessment of any new internal or external factors that may influence the BAP, such as changes in policy and conservation priorities, research findings or the impact of actions already undertaken.
- 1.11 The Implementation Plan will detail management, delivery and approval of this process, as well as for communication of progress to stakeholders and the wider community.

Vision

- 1.12 Our vision is to:
Deliver a significant and measurable improvement in the biodiversity of the University of Cambridge estate, and the Greater Cambridge Area more generally, in a manner that educates and inspires an appreciation of the natural environment, and that encourages interventions, research and innovation to enhance and protect biodiversity for future generations.
- 1.13 This BAP is a dynamic document. The urgency of the biodiversity crisis both globally and locally compels us to begin target-setting and acting as soon as possible to maintain and increase biodiversity on our estate. However, we are still in the process of learning about our estate's pre-existing habitats and species, and it is likely that some of our other commitments with relevance to biodiversity, such as carbon-offsetting and farmland stewardship schemes, will change significantly in the coming years. This means that our biodiversity targets will inevitably change from what is laid out in this BAP – and, as far as possible, become more ambitious – as further habitat and species data are gathered, opportunities for management arise, and site managers are consulted.
- 1.14 We will use a modified version of Natural England's Biodiversity Metric², hereafter referred to as the Cambridge Biodiversity Metric (CBM), to quantify and set targets for biodiversity increases across existing habitats on our estate. Consultation with our Ecological Advisory Panel highlighted that Natural England's Biodiversity Metric was insufficient in light of the University's high ambitions for increasing biodiversity (especially for enhancing existing habitats on our estate outside of offsetting obligations), leading to the development of the CBM. It is felt that the CBM strengthens Natural England's Biodiversity Metric whilst being fair to our aims as a University. Details of the CBM methodology have been published separately.
- 1.15 For a proportion of habitats on our estate, there is sufficient ecological information and agreement from stakeholders to be able to apply CBM-based biodiversity targets. This includes 75 hectares (ha) of area-based habitats (e.g. grassland and woodland). The condition of 61 ha of area-based habitats will be increased relative to a 2018 baseline, with an associated target percentage CBM increase of 38%. The target year for detecting this increase will be 2030 (for grassland) or 2050 (for woodland). The condition of 14 ha of area-based habitats will be maintained at its present (good) level. Shorter-term cyclical monitoring will check that biodiversity targets are on track.
- 1.16 The condition of 10 kilometres (km) of linear habitats (e.g. hedgerows and lines of trees) will be increased relative to a 2018 baseline, with an overall target percentage CBM increase of 35%. The target year for detecting this increase will be 2030 (for hedgerows) or 2050 (for lines of trees). The condition of 5 km of linear habitats will be maintained at its present (good) level. Shorter-term cyclical monitoring will check that biodiversity targets are on track. As in the Natural England Biodiversity Metric, linear habitats have a

² Natural England (2019) *The Biodiversity Metric 2.0 (IP029)*. Documentation available at <http://publications.naturalengland.org.uk/publication/5850908674228224>

slightly different CBM calculation to area-based habitats so their respective biodiversity targets are not comparable.

- 1.17 We will continue to apply the CBM across more of our estate to generate further metric-based targets, aspiring to increase the condition of habitats to their highest possible level in the CBM as is practically feasible.
- 1.18 All new development projects must seek to conserve and enhance biodiversity. For the offsetting of major projects, the University will quantify biodiversity changes using the standard Natural England Biodiversity Metric to comply with regulations. The University will adopt DEFRA and Natural England intent to ensure new development projects will deliver a biodiversity net gain in excess of the statutory 10% as measured by the Natural England Biodiversity Metric. However, the University will also interpret offsetting biodiversity changes in light of the CBM to seek biodiversity increases beyond that required under DEFRA and Natural England recommendations.
- 1.19 This BAP vision is supported by a set of biodiversity principles against which the biodiversity actions are aligned. These principles reflect the latest national research, policies and strategies concerning a best practice approach to biodiversity enhancement, including the UK Biodiversity Framework (2012), The Lawton Report *“more, bigger, better and joined”*(2010), Biodiversity 2020 (DEFRA, 2011), The Biodiversity Metric 2.0 (Natural England, 2019) and the 25 Year Environment Plan (HM Government, 2018). The principles also reflect Cambridgeshire stated policy and strategy in relation to biodiversity, conservation, development planning and green infrastructure.

Principle 1: improve our knowledge

- 1.20 All biodiversity planning and evaluation must be data- and research-driven, with a view to sharing outputs and methodology.
- 1.21 Decisions and practical actions at all levels – including new development, maintenance and management, and changes to agricultural practices and land use – will be informed by an up-to-date baseline collated through appropriate survey and assessment to help evidence net biodiversity gain, enable future biodiversity offsetting and support development of biodiversity best practice.
- 1.22 A greater connection between the research side of the University, including the University of Cambridge Botanic Garden, Cambridge Conservation Initiative (CCI), University of Cambridge Conservation Initiative (UCCRI), and the management of the University estate will enhance and underpin the identification of future innovative biodiversity interventions.
- 1.23 In delivery of this principle we seek to grow the number of people involved in biological recording through both student and community engagement.

Principle 2: protect, enhance and extend

- 1.24 Sites, habitats and features of recognised biodiversity value, including designated wildlife sites, and other undesignated areas of ecological interest, will be protected and enhanced. We recognise that it is much harder and more expensive to re-create habitat than it is to look after what we already have. Where possible, we will seek to extend the boundary and increase the size of such habitats.
- 1.25 Improving the heterogeneity and structural diversity of these habitats will in turn provide suitable niches for a wider range of species and enhance resilience to climatic and other change.
- 1.26 While maintaining and enhancing areas with recognised ecological value is a clear priority, this BAP also looks to promote the biodiversity interest of areas currently deficient in these aspects through new habitat creation and changes to existing management.
- 1.27 We will also aim to protect and enhance populations of priority and other notable species already known to exist on our estate, as well as notable species uncovered on our estate in the future.

Principle 3: connect and collaborate

- 1.28 The Lawton Report (2010) states: 'Ecological networks have become widely recognised as an effective response to conserve wildlife in environments that have become fragmented by human activities'. We will create and improve ecological connections between areas of high biodiversity value to establish ecological networks.
- 1.29 Enhancing ecological connections between existing areas of high biodiversity value is central to a step change in biodiversity enhancement, and greatly increases the opportunity for priority and other notable species to move around the landscape by making use of 'stepping stones' or wildlife corridors. It delivers a meaningful and long-term biodiversity impact that may help species cope with climatic or other environmental change and improve the genetic diversity of species' populations. Identifying opportunities and the delivery of collaborative biodiversity projects based on partnerships with colleges, owners and managers of adjacent land, and local authorities, conservation organisations and communities will be critical to achieving this principle.

Principle 4: net biodiversity gain following development

- 1.30 The Government National Planning Policy Framework states that 'Planning policies and decisions should contribute to and enhance the natural and local environment by ... minimising impacts on and providing net gains for biodiversity, including by establishing

coherent ecological networks that are more resilient to current and future pressures’ (Ministry of Housing, Communities and Local Government - February 2019).

- 1.31 We will adopt this principle and embrace DEFRA and Natural England intent to ensure new development projects will offset or deliver a biodiversity net gain in excess of 10% as measured using current Natural England Biodiversity Metric calculator. Although the CBM is compatible with offsetting, the Natural England Biodiversity Metric will be used to comply with national best practice. Nonetheless, we will interpret offsetting biodiversity changes in light of the CBM to seek biodiversity increases beyond that required under national recommendations.
- 1.32 ‘Grey to Green’ opportunities for wider biodiversity gains from enhancing the existing built environment will be identified and targeted, in particular the application of green infrastructure, ideally pioneering and supporting research initiated by the University. Continual recognition will be required of the balance between the need to reduce carbon emissions (such as the installation of PV panels and green roofs) and increase biodiversity within development schemes.

Principle 5: continually review opportunities and threats

- 1.33 This BAP is a live document and, as such, will be continually reviewed and updated to reflect and respond to key internal and external changes and influences. This might, for example, include capturing new opportunities associated with University projects, changes to teaching and areas of research, and engaging with and contributing to local projects and incentives. This BAP will also reflect and keep pace with emerging scientific ideas and policy changes in relation to wider issues such as climate change, agriculture and sustainability.

Principle 6: engage our community

- 1.34 The University has in place an initial annual pilot Biodiversity Engagement Plan (2019) and is uniquely placed to educate and communicate the importance of biodiversity amongst both students and staff, as well as the wider community, by capitalising on the existing conservation community and by utilising shared assets such as the Cambridge University Botanic Garden and Cambridge Zero.
- 1.35 The more are people engaged and enthused in the process of biodiversity enhancement, the more widespread and long-term the improvement to our environment will be. The biodiversity gain vision, objectives and targets must be understood and owned by all stakeholders.
- 1.36 Encouraging staff, students and the wider public to share their knowledge, skills and experience in ecology and natural history, and to assist in progress towards achieving the BAP actions, will be central to delivery of the biodiversity gain targets. This may include scientific research such as undergraduate projects, citizen science projects, biodiversity monitoring opportunities and the promotion of public bioblitz events.

Principle 7: be SMART – specific, measurable, achievable, relevant and timed

- 1.37 This BAP is intended to deliver a measurable improvement in biodiversity over a 10-year horizon. Any proposed biodiversity initiative must be SMART and make a measurable contribution towards achieving this objective. Ongoing monitoring will establish an evidence-based approach to enable the progress and impact of specific initiatives to be assessed and ensure the BAP is on track. Best practice and successful initiatives can be adopted more widely, whilst any initiative not delivering our desired results can be adjusted or enhanced.
- 1.38 This BAP will be formally reviewed after five years to assess progress against aspiration. It will be underpinned by updated baseline biodiversity data in priority locations and include an assessment of delivery. This will be underpinned by an annual check of progress against deliverable items, and a horizon scan of any new internal or external factors for consideration and reflection in the BAP, including policies, research and results to date.

Threats and opportunities

- 1.39 A number of the BAP principles and key actions are a direct response to the threats and opportunities associated with the conservation and enhancement of biodiversity within the rural and operational estates. These are discussed in turn below.

Climate change

- 1.40 Climate change presents a pressing threat to biodiversity. Changes in climate can have a profound impact on the suitability of the local environment to support priority species and to allow priority habitats to flourish. Such changes can be gradual over many years or sudden during periods of extreme weather that in turn can trigger catastrophic events such as grass and woodland fires which, in a worst-case scenario, lead to local extinctions. Extreme weather events could also impact species directly by breaching their physiological limits.
- 1.41 Changes in climate also facilitate the arrival and/or expansion of non-native invasive species that can degrade habitat and endanger priority species. Conversely, a changing climate can also create more favourable conditions for certain priority species that benefit from fewer cold winters and a warmer climate: for example, bats are showing a northerly expansion in the UK from their south-west stronghold, probably due to warmer winters.
- 1.42 Enabling species to migrate or disperse across an environment by improving ecological networks through habitat protection, restoration and creation is an important response to such changes. Enhancing biodiversity through tree-planting (ensuring that the correct

types of tree are planted in the correct place) can also lessen the impact of higher urban temperatures and improve air quality.

Invasive species and diseases

- 1.43 The spread of invasive species is not only driven by climate change but also direct human introduction, with a number of non-native species (e.g. Himalayan balsam *Impatiens glandulifera*) having become a well-established component of many habitats in the UK and associated with a long history of habitat degradation and displacement.
- 1.44 The invasive plant species cotoneaster *Cotoneaster* spp., giant hogweed *Heracleum mantegazzianum*, New Zealand pigmyweed *Crassula helmsii*, Nuttall's waterweed *Elodea nuttallii*, Himalayan balsam, parrot's-feather *Myriophyllum aquaticum*, rhododendron *Rhododendron ponticum* and Virginia creeper *Parthenocissus quinquefolia* have all been found on our estate and have the potential to cause ecological and/or socio-economic harm if they are not controlled appropriately.
- 1.45 Pests and diseases are a significant risk to trees across our estate. Ash dieback caused by the fungus *Hymenoscyphus fraxineus* can block the water transport system of ash *Fraxinus excelsior* trees, and cause leaf loss, lesions and ultimately the dieback of the crown which can lead to the quick death of young trees and a cycle of infection before the death of older trees. While some standing deadwood is beneficial to a variety of invertebrate species and birds that nest in tree holes, ash dieback represents a significant threat to woodland composition and continued woodland presence, destroying habitats of high ecological and historic value that will take a generation to replace fully. One response to this threat is proactive early intervention such as progressive and selective thinning of dying and dead standing ash, alongside restocking through (for example) propagating vegetative material from existing trees within the woodland (e.g. pedunculate oak *Quercus robur* and elm *Ulmus* spp.).
- 1.46 Other pests and diseases currently damaging trees on our estate (and the native wildlife that utilises them) include muntjac *Muntiacus reevesi*, grey squirrel *Sciurus carolinensis*, acute oak decline, *Agrilus* beetles, Dutch elm disease *Ophiostoma novo-ulmi* and elm zigzag sawfly *Aproceros leucopoda*.

Agriculture practices and policy

- 1.47 Changes to environmental and agricultural policies and subsidies are a key economic driver of land use and farming practices and could represent a threat and opportunity to biodiversity within our rural estate. Current Government statements on the environment imply a real intent to encourage and reward practices that protect the natural environment and reverse historic damage to the countryside by advocating a 'public money for public goods' philosophy. This will hopefully promote efficiency, innovation and sustainability in farming, and embed an increase in biodiversity as part of future subsidy payments.
- 1.48 There is, therefore, an opportunity to embrace and engage with this positive new approach, by working in tandem with the academic community to develop practices that

have a demonstrable net gain in biodiversity in the rural environment and provide a best practice approach for adoption elsewhere. Significant future opportunities for land use change and new habitat creation could be driven by changes to national agricultural policy, incentives, market conditions and technological advances.

- 1.49 Intensive farming is compatible with biodiversity enhancement where intensification allows the separation of land used for production and conservation. Intensification can allow larger, better-connected, higher quality habitats to be spared for biodiversity. However, agricultural practices associated with intensive farming, such as the use of chemical pesticides, can threaten local biodiversity. Selecting approaches to reduce the use of such products, such as the adoption of cultural control measures, and providing wildlife-friendly boundaries (e.g. hedgerows and wet ditches), arable margins and buffers, would help to reverse this biodiversity loss.

Planning policy

- 1.50 Within the built environment, changes to planning policy can have a significant impact on the level of development-related biodiversity loss. Current Government positioning on this threat to biodiversity appears to be positive with the introduction of new net biodiversity gain targets and measurement mechanisms, and a move towards a natural capital approach to ensure that the natural environment is treated in a similar way to other forms of valued capital.
- 1.51 The University is fully empowered to manage this threat, and this BAP presents an opportunity to set out appropriate impact avoidance and mitigation in key internal documents, including the Design and Standards Brief and Site Masterplans, in order to avoid or reduce the potential risk of such impacts occurring and to ensure delivery of targets set.

Expertise and influence

- 1.52 In delivering this BAP, the University has an important opportunity to draw on its existing expertise and influence, including the Cambridge Conservation Initiative, professional academic staff and undergraduates, as well as seek to strengthen partnerships with the Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire, Cambridge City Council, Cambridge University Hospitals and other relevant interested groups and charities.

Advances in technology

- 1.53 A range of other threats and opportunities can be recognised that affect biodiversity at a broader scale. Specifically, advances in technology offer an important opportunity to improve the ability to capture, manage, share and interrogate biodiversity data to raise understanding and ensure timely interventions. It can also help raise awareness of biodiversity issues and increase engagement through social media. Equally, it represents a threat if technology, through advances in virtual reality and other online sources of entertainment, disconnect people from direct interaction with the natural environment, reducing appreciation, understanding and therefore a desire to protect. It is important

to leverage the core academic role of the University as a centre of research and education to grasp the opportunities technology provides, and use the assets at the University's disposal, such as the Cambridge University Botanic Garden and other University green spaces, to help reverse the trend of fewer young people spending time outside engaging with nature.

2 The BAP area

Overview

- 2.1 The BAP area (**Figure 2.1**) covers 1,211 ha and can be divided into the rural and mainly urban operational estate. In contextual terms, the majority of the BAP area lies in the Bedfordshire and Cambridgeshire Claylands Natural Character Area (NCA³), which is characterised by large-scale arable farmland and consists of a broad and gently undulating lowland plateau dissected by shallow river valleys that gradually widen as they approach The Fens NCA in the east. The southern part of Cambridge forms part of the East Anglian Chalk NCA which is characterised by the narrow continuation of the chalk ridge that runs south-west to north-east across southern England.
- 2.2 The operational estate comprises a mix of established teaching, research, administrative, maintenance and support facilities, situated mainly in southern and western Cambridge, including:
- ADC Theatre
 - Addenbrooke's Hospital Site
 - Cambridge University Botanic Garden
 - Cambridge University Library site (Cambridge)
 - Cambridge University Library Offsite Storage Facility (near Ely)
 - Centre for Mathematical Sciences
 - Department of Chemistry
 - Department of Engineering site
 - Downing Site
 - Faculty of Education
 - Fitzwilliam Museum
 - Hills Road
 - Kettle's Yard
 - Laundry Farm
 - Madingley Rise
 - New Museums Site
 - Old Addenbrooke's Site
 - Old Schools Site
 - Quayside
 - Sidgwick Site
 - Silver Street / Mill Lane
 - University Cricket Club and Lawn Tennis Club (buildings only)
 - West Cambridge Site
 - Wilberforce Road Sports Ground
 - Wollaston Road
 - private residential houses and gardens occupied by senior University staff

³ NCAs divide England into 159 distinct natural areas. Each is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity.

- 2.3 The rural estate includes substantial areas of farmland mainly located to the north-west of Cambridge, especially on the Madingley Estate, but also at Yarmouth Farm near Lolworth, Girton, Whittlesford, and south of the West Cambridge Site.
- 2.4 Non-operational rural land also comprises areas of woodland and permanent non-agricultural grassland, including the substantial Lord's Bridge site near Harlton.

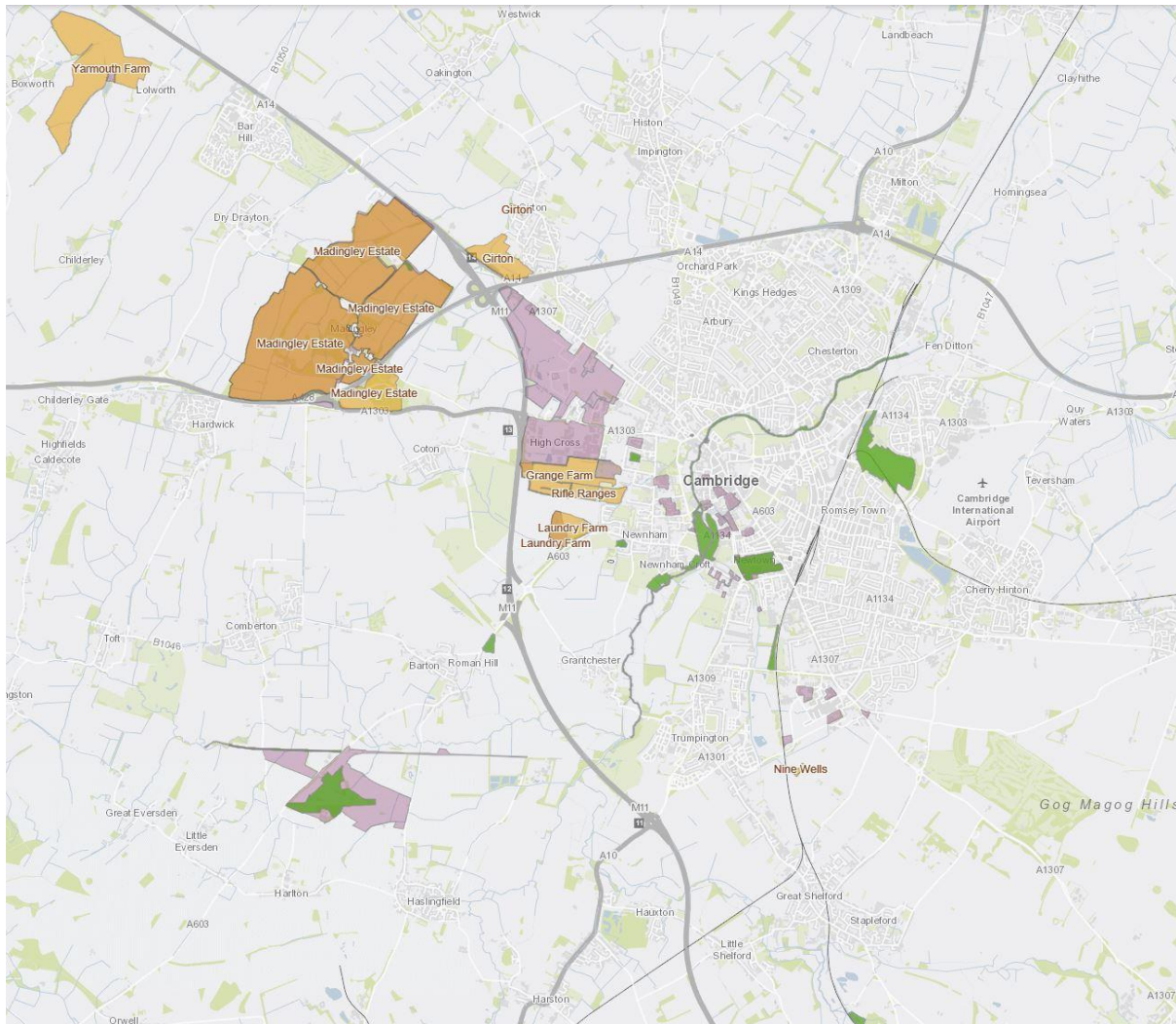
Notable habitats and species

- 2.5 Our estate supports many habitats of particularly notable conservation value, including habitats prioritised in the UK Biodiversity Action Plan (UKBAP). Although succeeded by The Joint Nature Conservation Committee (JNCC) and DEFRA UK Post-2010 Biodiversity Framework in July 2012, the UKBAP lists of priority habitats and species still remain an important reference source. Priority habitats on our estate include lowland mixed deciduous woodland, wet woodland, wood pasture and parkland, traditional orchard, hedgerows, lowland meadow, lowland calcareous grassland, arable field margins and ponds.
- 2.6 Individual species may be classified as 'notable' for a number of reasons, including their threat status, rarity, or special legal protection and other external obligations (e.g. national or local action plans). Further survey work is required to confirm the range of species associated with some areas of the estate. Nonetheless, our estate is known to support numerous notable species, including:
- The type specimens of Madingley goldilocks buttercup *Ranunculus rotundilobus*, Madingley elm *Ulmus madingleyensis* and cut-leaved elm *U. incisa*. Madingley elm is not known from any other site globally, whilst cut-leaved elm is only known from two other sites outside our estate;
 - UKBAP priority species such as yellowhammer *Emberiza citrinella*, grass snake *Natrix helvetica* ssp. *helvetica* and great crested newt *Triturus cristatus*;
 - Cambridgeshire and Peterborough Local Biodiversity Action Plan priority species such as skylark *Alauda arvensis*, barbastelle *Barbastella barbastellus* and brown hare *Lepus europaeus*;
 - UK red-listed bird species such as house sparrow *Passer domesticus*, grey partridge *Perdix perdix* and song thrush *Turdus philomelos*, and other species threatened nationally, such as the arable weed spreading hedge-parsley *Torilis arvensis*;
 - Nationally Rare or Nationally Scarce species such as the liverwort fringed heartwort *Ricciocarpos natans*, large yellow-faced bee *Hylaeus signatus* and the moth mere wainscot *Photedes fluxa*;
 - Specially protected species such as bluebell *Hyacinthoides non-scripta* and badger *Meles meles*.
- 2.7 The full list of notable species known from our estate can be found in the Biodiversity Baseline Summary Report.

Designated wildlife sites

- 2.8 A number of designated wildlife sites are present within the BAP area and make a significant overall contribution to the biodiversity value of our estate (see **Figure 2.1**). These include the nationally important Madingley Wood Site of Special Scientific Interest (SSSI), six County Wildlife Sites (CWS), one City Wildlife Site (CiWS) and one Local Nature Reserve (LNR). The north garden wildflower meadows at Madingley Hall, although not designated, are also considered a significant biodiversity resource. These designated wildlife sites are a priority for action in relation to 'Principle 1: improving our knowledge' and 'Principle 2: protect, enhance and extend'.
- 2.9 There is significant variation in the depth of biodiversity knowledge and the level of ongoing management and biodiversity monitoring associated with each designated site. Actions associated with each location are therefore site-specific and reflect the overall intent to raise quality and consistency of data capture, monitoring, reporting and management. The designated wildlife sites are listed in **Table 2.1**, together with an assessment of the quality of their existing baseline data, survey priority, condition and management priority.
- 2.10 Madingley Brickpits CWS and Coton Path Hedgerow CWS are considered to be priority sites for management to address biodiversity decline, and Lord's Bridge Observatory CWS is considered a high priority for management on the basis that its potential biodiversity interest is likely to be greater than is currently present. These three sites are therefore specifically featured in the BAP actions section below.
- 2.11 Scrub east of M11 Verge CiWS is considered to be in poor condition due to habitat loss and development pressure rather than management neglect and degradation, and it is therefore not considered to be of the highest management priority.

Figure 2.1: The BAP area.



Key - Operational estate sites - pink, rural estate – yellow, City and County Wildlife Sites - green (not all of these are within University ownership).

Notes - There are a number of additional sites not shown below including the Library Off-site Storage Facility at Ely and Hamilton Kerr. The operational sites include the Eddington housing development although this site will not feature in any of the University's biodiversity target-setting.

Table 2.1: Designated wildlife sites and an assessment of current baseline data, survey priority, condition and management priority.

Designated site and <i>relevant BAP theme</i>	Designation/ <i>importance</i>	Key designated features	Coverage and quality of existing baseline data	Supplementary survey priority	Existing condition	Management regime change priority
Madingley Wood (<i>woodland and scrub</i>)	SSSI (statutory) - <i>national</i>	Ancient woodland which supports ancient woodland plants (including rare elms <i>Ulmus</i> spp.), and is important for bryophytes, bats and birds.	Good	Medium	Good	Low
Nine Wells (<i>woodland and scrub</i>)	LNR (statutory) - <i>county</i>	Chalk springs and woodland. This site is co-owned but not managed by the University.	Moderate	Medium	Poor	High
Cambridge University Botanic Gardens (<i>built environment</i>)	CWS (non-statutory) - <i>county</i>	Bryophytes and invertebrates.	Good	Low	Good	Low
Madingley Brickpits (<i>wetland and water</i>)	CWS (non-statutory) - <i>county</i>	Invertebrates.	Good	Low	Poor	High
Coton Path Hedgerow (<i>non-agricultural grassland</i>)	CWS (non-statutory) - <i>county</i>	Notable plants (slender tare <i>Vicia parviflora</i> and yellow vetchling <i>Lathyrus aphaca</i>).	Moderate	Medium	Poor	High
Hedgerows east of M11 (<i>farmland</i>)	CWS (non-statutory) - <i>county</i>	Notable plants (slender tare <i>Vicia parviflora</i> and spreading hedge-parsley <i>Torilis arvensis</i>).	Good	Low	Moderate	Medium
Lord's Bridge Observatory (<i>non-agricultural grassland</i>)	CWS (non-statutory) - <i>county</i>	Notable plants (slender tare <i>Vicia parviflora</i>) and neutral/calcareous grassland.	Moderate	High	Moderate	High
Cambridge-Bedford Disused Railway (Harlton) (<i>non-agricultural grassland</i>)	CWS (non-statutory) - <i>county</i>	Neutral/calcareous grassland.	Good	Low	Moderate	Medium
Scrub east of M11 Verge (<i>woodland and scrub</i>)	CiWS (non-statutory) - <i>city</i>	Species-rich scrub and hedgerow.	Moderate	High	Poor	Medium

Table 2.1 KEY

Coverage and quality of existing baseline data: poor = no or very little data; moderate = some data, but inadequate or from a considerably long time ago; good = data reasonably comprehensive and up-to-date in relation to interest features.

Supplementary survey priority: a relative scale based on the scores in 'Coverage and quality of existing baseline data' and the suspected current habitat condition.

Existing condition: a relative scale based principally on surveys by the Wildlife Trust for Cambridgeshire, Bedfordshire & Northamptonshire and comments from local expert naturalists. Note that the certainty of the condition categorisation depends on the coverage and quality of baseline data.

Management regime change priority: high = improved management urgently required; medium = improved management could be beneficial; low = no major changes to current management required.

3 Actions

Introduction

- 3.1 Actions are divided into the five broad habitat themes with estate-wide items representing overarching actions that relate to more than one habitat theme. Additional information on these actions and associated deliverables is provided in the Implementation Plan. Separate sections are included below on actions regarding University policy coordination, monitoring and metric-based biodiversity targets.

University policy coordination

- 3.2 A key role of the BAP Implementation Plan is to ensure that, as appropriate, the BAP principles and key actions are reflected in related University policy documents, frameworks and guidelines to ensure alignment of purpose and increase the likelihood that the BAP delivers on its vision and targets.
- 3.3 We will ensure that our Ecological Advisory Panel continues to support delivery of the BAP, alongside effective communication of the BAP to the wider University community. The onus for ensuring cross-compliance should be shared equally with current policy and guideline owners and the EAP.
- 3.4 Our Strategic Framework for Development of the Estate (2016) contains strategic goals to enhance biodiversity. Outputs from the BAP concerning the built environment will be captured in a new strategic estate masterplan that will be developed in 2020/21. BAP outputs will also feed into reviews of site masterplans and the Design and Standards Brief to ensure positive outcomes for biodiversity with the capital projects programme and beyond. The EAP will provide expertise and advice to inform appropriate decision-making and communication mechanisms. In addition, existing guidelines relating to building and grounds management and maintenance will also require revision.
- 3.5 Consideration will be given within biodiversity-focused schemes to their operational practicality as well as their ambition. We will work with grounds maintenance teams on issues with potential adverse environmental impacts, e.g. by addressing watering requirements and chemical inputs.
- 3.6 There will be situations in which achievement of cross-compliance necessitates existing guidelines and policies to be adjusted. Such changes may require escalation to the EAP for decisions when the current guidelines are in conflict with the new recommendations.

Monitoring

- 3.7 Ongoing monitoring will be integral to the delivery of the BAP and will demonstrate if the University is meeting its biodiversity targets. Habitat surveys will ideally follow the bespoke methodology required by the Cambridge Biodiversity Metric (although its methodology is very similar to that required for the Natural England Biodiversity Metric). Any surveys of individual species will follow standardised, repeatable methodology.
- 3.8 All habitat types will be subject to cyclical monitoring. Grassland, wetland and ditches will be re-surveyed every 5 years. Woodland, scrub, hedgerows and lakes/ponds will be re-surveyed every 10 years.
- 3.9 The University will maximise opportunities for delivering broader engagement with students, staff and other volunteer networks by encouraging them to support monitoring programmes. Communications with existing schemes such as Bioblitz and Biodiversiteams will increase awareness-raising.
- 3.10 The University will work collaboratively with other University departments, with the Environment and Energy team (in association with the Cambridge and Peterborough Records Centre) acting as a central point for data and information storage and collation.
- 3.11 The University will adopt the following principles for species records made on its estate:
- Species records should be accurate.
 - Spatial resolution of species records should ideally be at a habitat parcel/compartiment level (as defined within the University's Biodiversity Map on ArcGIS Pro) or higher.
 - Species records should ideally have a 'life beyond the University', such as being incorporated into national recording schemes.

Metric-based targets

- 3.12 For a proportion of habitats on the University estate, there is sufficient ecological information and agreement from stakeholders to be able to apply metric-based biodiversity targets using the Cambridge Biodiversity Metric (CBM). The CBM calculations for area-based habitats (such as grassland and woodland) and linear habitats (such as hedgerows and lines of trees) are performed in a slightly different way. Metric-based targets for area-based and linear habitats are not comparable. The CBM is a simplified proxy for biodiversity, and numerical outputs from the CBM may not reflect actual increases in species diversity, genetic diversity, etc. Some of the targets set, particularly those concerning woodlands on the estate other than Madingley Wood and Madingley Park, are contingent on the availability of funding for management.
- 3.13 Details of metric-based targets for individual habitat parcels will be held in the Biodiversity Map.

- 3.14 We will continue to apply the CBM across more of our estate to generate further metric-based targets, aspiring to increase the condition of habitats to their highest possible level in the CBM as is practically feasible. The overall target percentage CBM increase on the estate may change as more habitats are set targets, and possibly decrease (e.g. because other habitats are already close to ideal condition), but we will still aim to at least meet the CBM targets described in this action plan. The target *absolute* CBM increase across the estate will continually increase as further targets are set.

Table 3.1: Details of Cambridge Biodiversity Metric (CBM) targets for broad habitat types on the University estate.

Habitat type	Area or length of habitat with CBM target	Area or length of habitat whose condition will be increased	Target percentage CBM increase (%)	Target year for measuring target percentage CBM increase	Area or length of habitat whose condition will be maintained at its present (good) level	Target year for checking that CBM targets are 'on track'
Grassland	2 ha	N/A	N/A	N/A	2 ha	2025
Scrub	7 ha	2 ha	150	2030	5 ha	2030
Woodland	66 ha	59 ha	36	2050	7 ha	2030
Hedgerows	12.4 km	7.9 km	24	2030	4.5 km	2030
Lines of trees	2.4 km	2.1 km	123	2050	0.3 km	2030

Table 3.1 KEY

Area is measured in hectares (ha) and length in kilometres (km). The baseline year for all changes in habitat condition is 2018.

Estate-wide actions

3.15 Estate-wide actions are cross-habitat and are typically required to underpin delivery of the BAP.

Table 3.2: Estate-wide actions.

Estate-wide actions		BAP principle(s) supported
1.1	Establish an Implementation Plan (under EAP guidance) to ensure actions are implemented, threats/opportunities are reviewed, key stakeholders are engaged and ownership and delivery is shared across the community.	<ul style="list-style-type: none"> Continually review opportunities and threats SMART
1.2	Create a Biodiversity Knowledge Hub to maintain biodiversity baseline data to evidence net gain, enable future offsetting and support development of biodiversity best practice. Ensure all supporting data is held on a central University database and Geographic Information System (GIS) and that GIS-mapping of baseline habitat data is completed.	<ul style="list-style-type: none"> Improve our knowledge SMART
1.3	Develop a Biodiversity Engagement Programme building on the existing Biodiversity Engagement Plan (2019) and supporting the DEFRA Biodiversity 2020 objective to engage more people in biodiversity issues and increase their involvement.	<ul style="list-style-type: none"> Engage our community
1.4	Deliver greater consistency and sharing of best practice in relation to the management and biodiversity monitoring of University-owned designated wildlife sites (summarised in Table 2.1) and ensure a clear line of responsibility for every site.	<ul style="list-style-type: none"> Improve our knowledge Protect, enhance and extend Engage our community SMART
1.5	Establish the feasibility of creating an ecological network to connect areas of high biodiversity value through physical habitat corridors or 'stepping stones' and maximising opportunities for buffering, in partnership with colleges, local authorities and other adjoining landowners.	<ul style="list-style-type: none"> Connect and collaborate Engage our community
1.6	Implement a co-ordinated tree-planting and hedgerow restoration programme within the non-tenanted rural and operational estate in support of the national aspiration to increase woodland cover and hedgerow restoration by 2050.	<ul style="list-style-type: none"> Protect, enhance and extend Connect and collaborate Engage our community
1.7	Implement estate-wide coordinated protected species promotion and monitoring programmes focused on target protected bird and bat species.	<ul style="list-style-type: none"> Improve our knowledge Protect, enhance and extend Engage our community SMART
1.8	Continue to develop the Cambridge Biodiversity Metric. Establish a methodology for quantifying habitat connectivity in the Cambridge Biodiversity Metric (published updates to the Natural England Biodiversity Metric may provide a suitable methodology).	<ul style="list-style-type: none"> Improve our knowledge Protect, enhance and extend SMART

Built environment actions

- 3.16 The built environment actions encompass activities to support delivery of ‘Principle 4: net biodiversity gain following development’ and ‘Principle 6: engage our community’, establishing initiatives that ‘green’ the urban areas of our estate.
- 3.17 Further to our ambitious net gain pledge to ensure that any minimum offsetting biodiversity targets set by DEFRA are exceeded, it is essential that such important commitments are translated and embedded into key internal policy and guidance documents, including the University’s Design and Standards Brief.

Table 3.3: Built environment actions.

Built environment actions		BAP principle(s) supported
2.1	Adopt DEFRA and Natural England intent to ensure new development projects will deliver a biodiversity net gain in excess of 10% (as measured using the current (v2.0) Natural England Biodiversity Metric calculator).	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Net biodiversity gain following development
2.2	Conduct two high-profile demonstration projects within the operational estate with the aim of promoting and informing further enhancement projects by the University, Colleges and the wider public (10-year project).	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Engage our community
2.3	‘Grey to Green’ – develop a prioritised, phased and costed 10-year programme of green infrastructure enhancement opportunities (e.g. replacing hard standing with multifunctional green infrastructure, including new landscaping, Sustainable Urban Drainage System (SUDS), green roofs, green ‘barriers’ such as hedges and trellises) that can be applied retrospectively to existing buildings and other built areas.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Net biodiversity gain following development
2.4	Maximise opportunities for biodiversity enhancement from the West Cambridge Site project.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Net biodiversity gain following development
2.5	Establish a ‘Biodiversity in your Back Garden’ initiative to create an ecological network across the built environment of Cambridge , connecting areas of higher ecological value by extending outside the University estate to create stepping stones for nature across the City.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Connect and collaborate ● Engage our community
2.6	Improve the biodiversity of amenity and formal greenspaces through targeted interventions , including: the relaxation of grassland cutting, allowing shrubs to develop greater structural diversity and to flower and fruit freely for the benefit of invertebrates and other wildlife; tree-planting; and contributing to the bird and bat box scheme.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Engage our community

Farmland actions

- 3.18 A large proportion of the rural estate fits within the broad habitat theme of farmland. This includes arable land, permanent agriculture grassland, hedgerows and ditches.
- 3.19 Given that the primary function of the University Farm is to support the Department of Veterinary Medicine, there are some inherent limitations on the scope to enhance farmland biodiversity within the rural estate. In light of these constraints, principle opportunities currently relate to enhancing field boundary habitats, e.g. planting substantial lengths of boundary hedgerow and standard hedgerow trees, holding water in field drainage ditches to create permanent aquatic habitats (linear ponds), and extending arable field margins specifically to benefit wildlife.
- 3.20 In addition, we are already committed to improving the environmental value of our farmland through Higher Level Stewardship (HLS) and Entry Level Stewardship (ELS) agreements that run until 2023. The ELS/HLS agreements cover features for biodiversity (bird seed, nectar mixes, over wintered stubbles, etc.), grass grown under HLS/ELS prescriptions and buffers provided to protect hedges, margins and watercourses.
- 3.21 There is a strong indication from Government that new approaches to providing financial support for farmers will be introduced that go further in rewarding activities that increase biodiversity and encourage wildlife. We will keep up-to-date with such developments and opportunities and help to identify and implement best practice enhancements to assist in this debate.

Table 3.4: Farmland actions.

Farmland actions		BAP principle(s) supported
3.1	Identify opportunities to enhance “wildlife corridors” on University-owned farmland through: hedgerow extension; drainage ditch permanent aquatic habitat (linear pond) creation; promotion of biodiverse arable field margins; and, where possible, selective tree planting and grassland creation on less productive areas of land.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Connect and collaborate
3.2	Deliver a biodiversity enhancement programme for existing arable farmland that is forward-thinking but feasible without compromising the primary support function for the Department of Veterinary Medicine, or the farm’s overall commercial viability.	<ul style="list-style-type: none"> ● Protect, enhance and extend
3.3	Improve the quality of permanent agricultural grassland , including at Madingley Park.	<ul style="list-style-type: none"> ● Protect, enhance and extend

Non-agricultural grassland actions

- 3.22 Grassland areas that are included within the non-agricultural grassland theme are typically characterised by higher-value grasslands often with recognised botanical value and with non-statutory wildlife site designation.
- 3.23 The priority for this habitat theme is to ensure that all grassland areas are managed appropriately to retain and enhance their current biodiversity values in the long-term. In this context, two County Wildlife Sites (CWS) that are notable for their grassland interest have been identified as high priorities for management, namely Coton Path Hedgerow CWS and Lord's Bridge Observatory CWS.
- 3.24 Coton Path Hedgerow CWS is currently in poor condition and no longer supports its notified plant species, while Lord's Bridge Observatory CWS has a relatively poor and incomplete biodiversity baseline picture and will benefit from a considered assessment of optimal management proposals.

Table 3.5: Non-agricultural grassland actions.

Non-agricultural grassland actions		BAP principle(s) supported
4.1	Establish a biodiversity enhancement project at Lord's Bridge Observatory CWS to bring the level of biodiversity understanding, management and monitoring in line with other University designated sites.	<ul style="list-style-type: none"> ● Improve our knowledge ● Protect, enhance and extend
4.2	Establish a biodiversity enhancement project at Coton Path Hedgerow CWS to bring the level of biodiversity understanding, management and monitoring in line with other University designated sites.	<ul style="list-style-type: none"> ● Improve our knowledge ● Protect, enhance and extend
4.3	Improve and manage the grassland plot at New Farm Seven specifically for turtle dove <i>Streptopelia turtur</i>.	<ul style="list-style-type: none"> ● Protect, enhance and extend

Woodland and scrub actions

- 3.25 Areas included within the woodland and scrub theme include nationally and locally important woodland and scrub, orchards and a range of other rural estate farm woodland blocks and copses.
- 3.26 A significant issue relating to woodland is the threat posed by tree pests and diseases. As such it is recommended that the predicted effects of tree pests and diseases, including ash dieback, on woodland composition are considered and appropriate actions and responses set out as part of the University's 2022 Woodland Management Plan review (or sooner if required) to ensure that the integrity and biodiversity value of the woodland resource is retained and enhanced.
- 3.27 Nine Wells LNR (co-owned but not managed by the University) falls within the remit of the BAP and, although the University does not own or have any control over land adjoining the LNR, the principle of its expansion is supported by this BAP.

Table 3.6: Woodland and scrub actions.

Woodland and scrub actions		BAP principle(s) supported
5.1	Anticipate and respond to predicted effects of tree pests and diseases on woodland survival and composition , including Madingley Wood SSSI.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Continually review opportunities and threats
5.2	Conduct a Madingley Wood SSSI management review.	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Continually review opportunities and threats
5.3	Support Cambridge City Council with the potential to explore, influence and deliver new habitat buffers to Nine Wells LNR to reduce recreational pressure, damage and disturbance to the reserve.	<ul style="list-style-type: none"> ● Protect, enhance and extend
5.4	Establish a biodiversity enhancement project at Scrub east of M11 Verge CiWS to bring the level of biodiversity understanding, management and monitoring in line with other University designated sites.	<ul style="list-style-type: none"> ● Improve our knowledge ● Protect, enhance and extend
5.5	Conduct a baseline assessment and review of management options at Laundry Farm orchard.	<ul style="list-style-type: none"> ● Improve our knowledge
5.6	Continue the routine management of woodland parcels on the Rural estate as set out in the Woodland Management Plan and Parkland Management Plan.	<ul style="list-style-type: none"> ● Protect, enhance and extend

Wetland and water actions

- 3.28 The areas included within the wetland and water theme includes the Madingley Brickpits County Wildlife Site (CWS), and the lakes and ponds at Madingley Hall and Park.
- 3.29 The priorities for this habitat theme relate to opportunities for the restoration and improvement of existing lakes and ponds, together with an assessment of the feasibility to create ponds within the rural estate (that reflect historic pond locations) and retain water in field drainage ditches to create a linear network of permanent aquatic habitats that will increase biodiversity across the rural estate by new habitat and wildlife corridor creation.

Table 3.7: Wetland and water actions.

Wetland and water actions		BAP principle(s) supported
6.1	Establish a biodiversity enhancement project at Madingley Brickpits CWS to bring the level of biodiversity understanding, management and monitoring in line with other University designated sites.	<ul style="list-style-type: none"> ● Improve our knowledge ● Protect, enhance and extend
6.2	Implement restoration and enhancement proposals in lakes and ponds at Madingley Hall and Park.	<ul style="list-style-type: none"> ● Protect, enhance and extend
6.3	Investigate opportunities for historic pond creation within the rural estate to increase the extent of aquatic habitats for the benefit of aquatic wildlife.	<ul style="list-style-type: none"> ● Protect, enhance and extend
6.4	Investigate opportunities for creating permanently wet drainage ditches (linear ponds) across the rural estate (also mentioned in 'Farmland actions').	<ul style="list-style-type: none"> ● Protect, enhance and extend ● Connect and collaborate

Annex B

Stakeholders engaged during development process

Members of Ecological Advisory Panel (current and previous)

Dr Mike Rands (Chair), Executive Director, Cambridge Conservation Initiative

Prof Andrew Balmford, Conservation Science, Department of Zoology, University of Cambridge

Prof David Coomes, Head of Forest Ecology and Conservation Group, Department of Plant Sciences, and Director of the University Conservation Research Institute, University of Cambridge

Prof Brian Eversham, CEO, The Wildlife Trust BCN

Dr Chantal Helm, Higher Education and Research Impact Co-ordinator, Cambridge University Botanic Garden

Prof Ian Hodge, Department of Land Economy, University of Cambridge

Kate Howlett, Student Representative

Dr Chris Sandbrook, Senior Lecturer and Director of the Masters in Conservation Leadership
Department of Geography, University of Cambridge

Cecile Thiaucourt, Student Representative

Dr Edgar Turner, Curator of Insects, University Museum of Zoology

University Estates Division

Michael Aston, Site Development Manager, Cambridge Biomedical Campus

Sam Buckton, Biodiversity Assistant

Joanna Chamberlain, Head of Environment and Energy

Mark Coulson, Building and Grounds Maintenance Manager

Stuart Gray, Development Manager

Deborah Griffith, Project Lead

Phil Hopper, Cambridge University Farm Business and Commercial Manager

Mark Jermy, Senior Grounds Supervisor

Andrew Lloyd, Site Development Manager, New Museums Site, Old Press Mill Lane and Fitzwilliam Museum

Paul Milliner, Head of Estate Strategy

Dr Amy Munro-Faure, Living Laboratory for Sustainability Coordinator

Mark Osbourn, Planning Manager

Alex Reeve, Sustainable Buildings Advisor

Ian Scrivener, Senior Buildings Surveyor

Rachel Steward, Environmental Manager

Heather Topel, North West Cambridge Project Director

Peter Wilderspin, Rural Surveyor

Wider University

Kirsty Allen, Chief Operating Officer, University Libraries

Dr Sam Brockington, Curator, Cambridge University Botanic Garden

Prof Beverley Glover, Director, Cambridge University Botanic Garden

Prof Becky Kilner, Director, University Museum of Zoology

Site Team Cavendish Astrophysics (Lord's Bridge) including Professor John Young

External Partners

Guy Belcher, Biodiversity Officer, Cambridge City Council

Dr Richard Hales, Energy and Sustainability Manager, Cambridge University Hospitals,
Addenbrookes Cambridge Biomedical Campus

Operational and Grounds Maintenance teams / Green Impact leads

Ady Powell, Head of Facilities Cambridge University Library and Storage Facility

Simon Halliday, Building Project Supervisor and Green Impact team led, Cambridge University Library