

Chilterns National Landscape Nature Recovery Plan

A strategic framework for habitat and species recovery across the Chilterns

Chilterns National Landscape

Executive Summary



Executive Summary

With the UK State of Nature report 2023 highlighting a 32% decline in wildlife abundance in England since 1970, there has never been a more pressing time to redress the impacts of human activity on nature.

The term 'nature recovery' is increasingly being used to describe efforts to help wildlife thrive, enabling resilient and diverse ecosystems to flourish. This plan aims to encourage a landscape-scale approach to nature recovery in the Chilterns National Landscape, supporting the statutory Management Plan that describes the natural beauty, special qualities, and key characteristics of the area.

Just as the Management Plan seeks to protect and enhance the landscape by informing and offering guidance to all who live, work, enjoy and make decisions affecting the landscape, we hope the Nature Recovery Plan will be used as a guide to inspire coordinated and appropriate action that supports nature recovery within the Chilterns National Landscape.

While the plan will also guide the work of the Chilterns National Landscape, it is not and cannot be a delivery plan. Success will be dependent on all stakeholders adopting positive actions and significant resources (both public and private) being made available over many years.



Corn bunting

The plan is also intended to complement the four Local Nature Recovery Strategies being developed by responsible authorities across the area. These latter documents contain detailed maps to guide the potential location of nature recovery actions. It is also important to note that, in such a varied landscape with multiple valued habitats, we adopt the principle of 'right habitat in the right place'. For example, we should avoid tree planting on existing and potential species rich chalk grassland.

The Chilterns was designated as a National Landscape (previously known as Areas of Outstanding Natural Beauty) with Special Qualities identified that contribute to this natural beauty. Section 9 of this Nature Recovery Plan addresses priorities for habitats associated with the area's Special Qualities.

These include the steep chalk escarpment with flower-rich grassland, deciduous and ancient woodlands, commons, tranquil valleys and chalk streams. A habitat-led approach to describing and restoring nature is taken in this Nature Recovery Plan, whilst recognising the need to integrate priority species throughout. Whilst special qualities are considered in turn, the plan also stresses the need for a mosaic of habitats across the landscape, alongside a landscape-scale approach to connecting wildlife-rich habitats.

The government and its nature conservation adviser, Natural England, recognise that all Protected Landscapes - National Parks and National Landscapes - have a critical role to play in the government's nature recovery network and 30by30 ambitions. The central location of the Chilterns National Landscape within the band of chalk running across England, means that it is strategically located to contribute to nature recovery at scale, while also supporting species movement in response to both land use and climate change. It is also a critical part of the country's social, economic and environmental infrastructure. As one of the most densely populated protected landscapes in the UK, with over 2000 km of rights of way, the Chilterns is a valuable asset that provides opportunities for recreation, relaxation and volunteering activities, along with a backdrop for local businesses. Also vital for success is an effective framework of legislation, regulation and resourcing.

However, a key ingredient to achieving nature recovery at the required landscape-scale is for land managers, nature conservation organisations, local authorities and local communities to work together to achieve shared outcomes and visions.

This plan has therefore been developed with the goal of highlighting the intrinsic link between heritage, people and nature, and inspiring coordinated delivery of nature recovery across the Chilterns National Landscape. Priority outcomes for working people and nature recovery are summarised in **Table 7**.

We also want to understand whether our actions across the landscape achieve the desired Environmental Improvement Plan (EIP) outcomes. Monitoring the state of nature and evaluating the success, or otherwise, of our actions is essential and the plan therefore describes how the government's Protected Landscape Targets and Outcomes Framework (PLTOF) is being introduced across National Landscapes to both set ambition for nature recovery and provide a national dataset to monitor delivery against environmental targets.

At a more regional level, we recognise the value of monitoring being explicitly linked to evaluation, so that we can explore which actions are having the greatest effect and why. In this plan we therefore also explain how, with limited resources, we are using cutting-edge research and innovative technologies to monitor nature recovery and enable evaluation of our activities at a landscape scale.



Small heath butterfly

In line with our intentions set out above, this plan outlines the outcomes that we believe are required for nature to thrive in each specific habitat found in the Chilterns National Landscape (see priority outcomes Tables **10**, **13**, **14**, **15**, **18**, **22** & **26** in Section 9).

The plan also identifies the critical knowledge gaps needing to be addressed to support and focus our nature recovery actions.



Woodlands/trees

The Chilterns National Landscape is one of the most densely wooded protected landscapes with 24% woodland cover which form a key special quality of the landscape.

This plan prioritises the protection and enhancement of woodland and tree habitats outside woodland. The loss of ancient woodland and veteran trees should be halted, woodland and tree canopy cover outside woodland increased and where new planting is taking place, the choice of species should support climate adaptation. Woodland condition needs to be improved through diversifying tree species, creating varied habitats, and by effective management of deer populations.

With regards to trees outside woodland, the numbers of native hedgerow trees, in-field and parkland trees should be maintained, traditional orchards and wood pasture maintained and expanded, and support provided to local businesses associated with woodland and trees. Priority outcomes are summarised in Table 10.



Chalk streams

A globally rare habitat supporting some of our most threatened plants and animals, the Chilterns' nine chalk streams are one of its special characteristics.

All chalk streams flowing through the Chilterns National Landscape should be identified and mapped to help raise awareness about these habitats and ensure they are recognised and protected. Despite their special characteristics, protection for these Chilterns' chalk streams is not as strong as it could be (no chalk stream in the Chilterns is designated as a Site of Special Scientific Interest, for example) and a statutory driver is required to support investment decisions in all chalk streams.

There is a need to better understand the condition of chalk streams in the Chilterns National Landscape and address gaps in the Water Framework Directive analysis. Chalk stream habitats and flows need to be restored, and abstraction reduced, alongside other measures to improve climate change resilience; and the impacts of sewage treatment works, urban and agricultural runoff on water quality should be reduced. Priority outcomes are summarised in Table 13.



Wetlands and ponds

The Thames corridor connects the Chilterns National Landscape with the North Wessex Downs National Landscape, and the River Thames floodplain is the site of many fragments of priority wetland habitat.

Elsewhere in the Chilterns, wetland priority habitat has been lost almost entirely from chalk stream floodplains. The potential to connect patches of wetland with other habitats being managed for wildlife, and to reinstate wetland areas to create riparian corridors for species migration needs assessment with feasibility studies followed by restoration and habitat creation. Priority outcomes are summarised in Table 14.

Priority ponds are permanent or seasonal waterbodies with high conservation value, supporting rare species or communities. Priority ponds in the Chilterns National Landscape should be identified and recorded as an established and recognised ecological network. Priority ponds should act as stepping stones for species to migrate in response to climate change. Priority outcomes are summarised in Table 15.



Farmed land

Farmland comprises 60% of the Chilterns National Landscape and five farmer-led farm clusters exist across the area.

Members of which are identifying and proactively supporting nature recovery, whilst maintaining viable farming businesses. These initiatives are among the most exciting and effective actions currently enabling nature to flourish, and they need on-going support.

This plan prioritises providing farmers with access to advice, support, and funding for nature-friendly farming practices, aiming to inspire and engage land managers in driving forward landscape-scale nature recovery. Key outcomes include entering existing and newly created priority habitats into agri-environment schemes, supporting farmer clusters with resources for innovation, and promoting favourable grazing management for high biodiversity. In line with government targets, nature-friendly farming should be supported on at least 15% of farmland, creating healthy soil ecosystems, linking wildlife-rich habitats with hedgerows and field margins, and supporting local nature-friendly farm businesses. Priority outcomes are summarised in Table 18.



Grassland

The Chilterns' species-rich chalk grasslands are one of its special characteristics, despite only small fragments, (comprising 1% of the total area), now remaining.

Priority chalk grasslands should be maintained, and remnants of chalk grassland restored, with opportunities for conservation grazing explored.

The identification, management, and restoration of semi-natural grasslands and scrub mosaics to enhance biodiversity and connectivity is an important priority for the area. Landowners should be encouraged and supported to create new wildlife-rich grasslands. The use of artificial pesticides and fertilisers should be reduced and an improved understanding of the value of scrub mosaics is required. Priority outcomes are summarised in Table 22.



Common land

The Chilterns' lowland commons include a range of valuable habitats but deserve their own mention as they are identified as one of the National Landscape's special qualities.

Ownership and management responsibility is often complicated, commons are generally unfenced and often open access is presumed. Commons often include land designated as Sites of Special Scientific Interest and support a range of rare plants and specialist invertebrates.

On common land, the management and enhancement of wooded areas, rides, open spaces, habitat mosaics, and heathland should be focused to achieve greater biodiversity and resilience to climate change. Woodlands should be managed for diverse tree species and varied age structure; glades maintained with open areas for woodland birds, butterflies, and plants; scrub mosaics managed and coppiced on a rotational basis; heathland and acid grassland grazing to restore historical landscape character. There is also an opportunity to raise public awareness about the importance of nature recovery through positive management of commons. Priority outcomes are summarised in Table 26.

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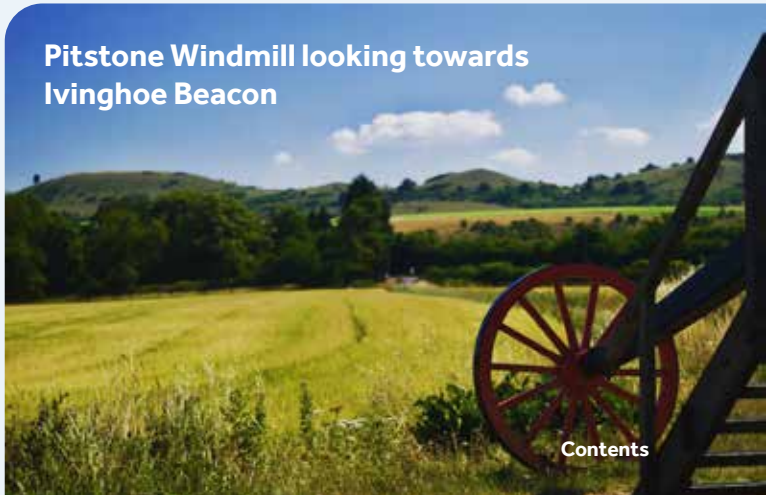
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River Pangbourne


Manor Farm, Bradenham


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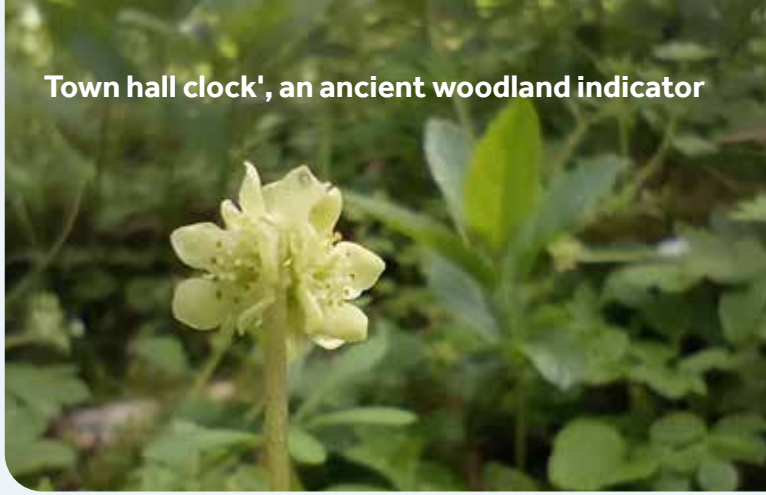
Annual Barn Owl box monitoring with the Bucks Owl and Raptor Group



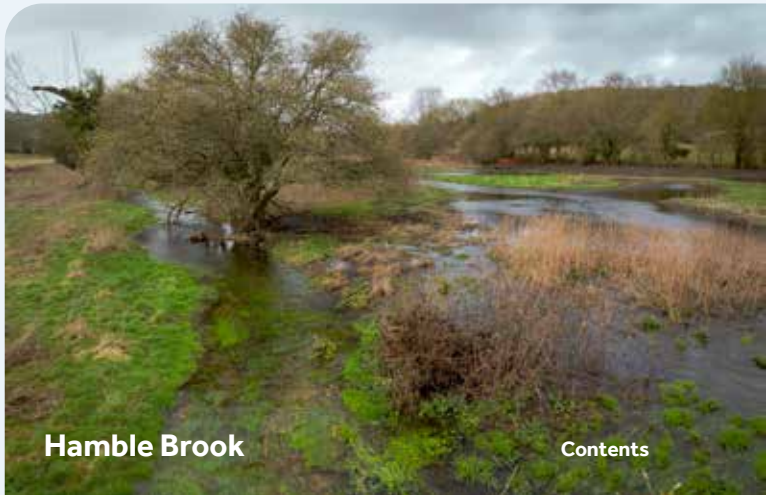
Riverfly montoring training course for new volunteers

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Town hall clock', an ancient woodland indicator


Woodland ground flora


Hamble Brook

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Traditional Lane's Prince Albert apple trees.



Kingwood Common



Fly Orchid

1. Introduction



Helping life to thrive and nature to recover

1. Introduction

The harmful impacts of human activity can now be seen throughout the world, but there is much we can do to help nature recover and thrive.

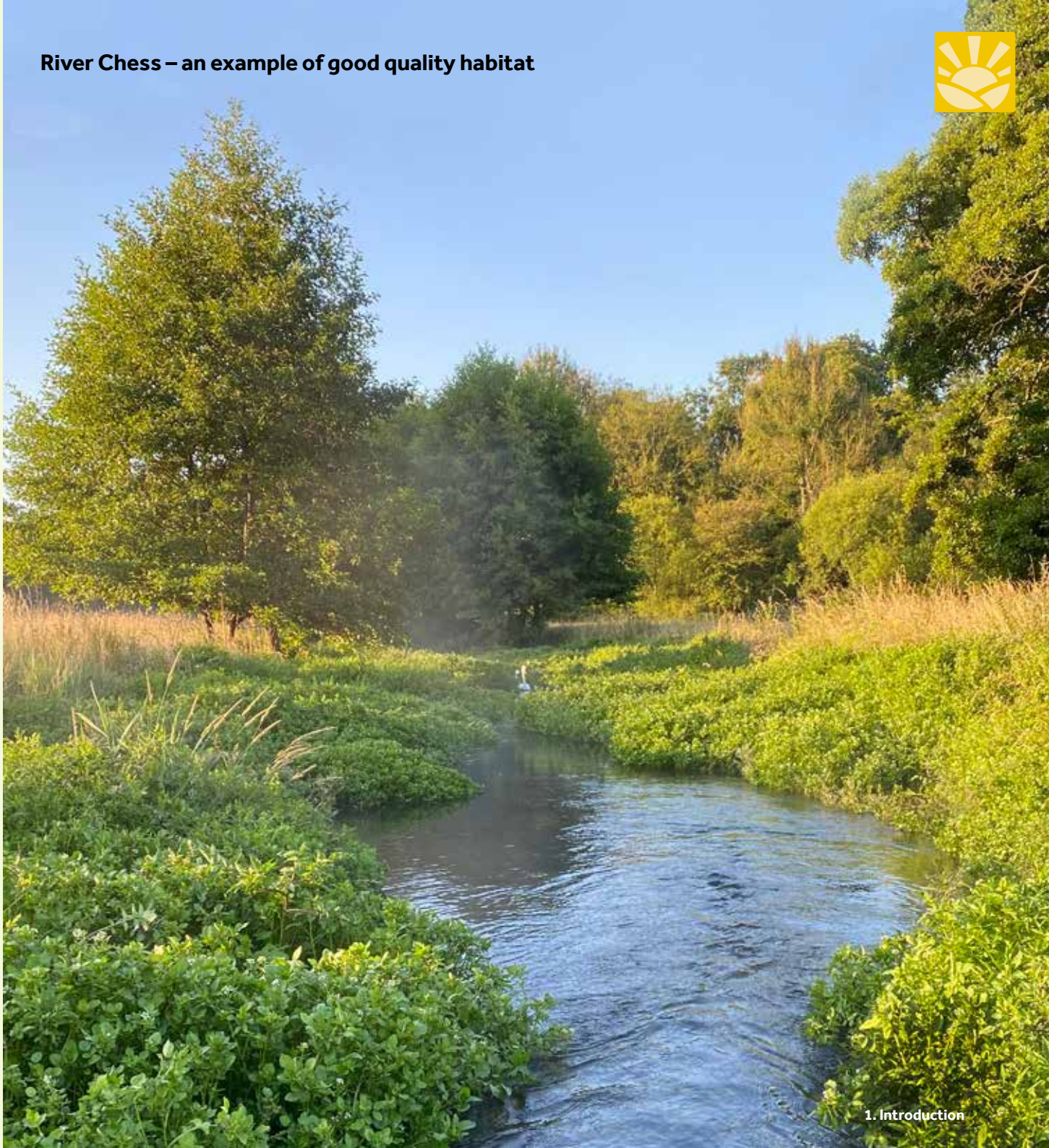
We are in a period of biodiversity crisis and elevated pollution levels, and thought to be entering a time of mass extinction.

The latest results from the UK State of Nature Report 2023 have highlighted that wildlife in England has declined in abundance by 32% on average since 1970. There are multiple reasons for the decline, but human-made pressures such as urbanisation (causing fragmentation of nature-rich habitat) and the intensive management of agricultural land have contributed to significant habitat loss, change and degradation.

The outlook might look gloomy but there is much we can do to help nature recover and thrive. The term 'nature recovery' is increasingly being used to describe our attempts to help tackle the nature crisis. So what exactly is nature recovery? The Leverhulme Centre for Nature Recovery at the University of Oxford offer a definition as:

'The activity of helping life on Earth to thrive by repairing human relationships with the rest of the natural world'.

Whilst helping life to thrive and nature to recover, we should recognise that humans are embedded within and utterly dependent on nature, and that it is unhelpful to consider them separately as this fails to acknowledge the importance of nature for humankind. Such thinking leads, for example, to a failure to consider nature in economic models and business decisions.



River Chess – an example of good quality habitat

Nature recovery is a process that seeks the protection and enhancement of both:
(i) *'the variety of life – plants, animals and microorganisms – in a particular habitat (termed biodiversity);*
(ii) *the interaction of these different forms of life with one another, and the processes they perform in their different habitats e.g. nutrient cycling in chalk streams or carbon storage in ancient woodlands (termed ecological function).*

– Leverhulme Centre for Nature Recovery

Nature recovery works at many scales (local action to global policy), and it is not about seeking to return nature to a past state, because this is impossible in the context of climate change, but instead aims to enable resilient and diverse ecosystems to flourish.

This plan focuses on how to help nature recover in the Chilterns National Landscape (formerly called an 'Area of Outstanding Natural Beauty') in response to the global and national crisis in biodiversity. It supports the statutory Management Plan which describes the natural beauty, special qualities and key characteristics of the Chilterns National Landscape.

The purpose of this plan is to provide more detailed information than the Management Plan on the special qualities and key characteristics where they relate to nature and wildlife. It has been developed as a partnership plan for the many people, land managers and organisations working to deliver nature conservation across the Chilterns National Landscape because nature recovery in our area will only be realised if we all work together to achieve shared outcomes.

The plan does not duplicate, but instead is designed to complement, the four Local Nature Recovery Strategies and accompanying opportunity maps that will soon be actionable across the Chilterns National Landscape area. As such, it does not attempt to spatially map all the opportunities for actions to improve wildlife and increase biodiversity. Instead, it is intended as a guide to help people and organisations make the best choices that will benefit wildlife in a coherent and connected manner across the varying habitats of the National Landscape. After all, to truly thrive, plants and animals need connecting habitats that support their movement and growth.

The plan outlines the latest policies (international to national) relating to nature recovery to set the scene for the priorities and desired outcomes, paying special attention to both the Government's 30by30 pledge (see section 2.1.1) and the Protected Landscape Targets and Outcomes Framework announced by Defra in 2024.

It summarises our joint vision for the National Landscape and signposts the other reports and initiatives, such as local catchment plans, that have also evolved over time to help nature flourish. Heritage and people's understanding, and enjoyment of the landscape are critical components of National Landscapes so the plan also explains how heritage, people and nature are intrinsically linked. For the purposes of explaining desirable nature recovery outcomes the report considers special qualities separately by broad habitat type (woodlands and trees; rivers, streams and wetlands; farmed land; grassland and common land) and outlines critical actions to be undertaken.

There is also widespread recognition that the pace of connected action to tackle climate change and an associated transition to a sustainable, low-carbon economy needs to accelerate if we are to limit global warming to 1.5°C by 2100 and prevent the worst impacts of the climate crisis. Climate change and nature recovery cannot be decoupled, and National Landscapes will be incorporating or linking Climate Change Adaptation Management Plans to their Management Plans by 2028.


Loddon Lilies


A walking group


Chalkhill Blue on Greater Knapweed

For this reason, a general overview of the probable impacts of climate change in relation to nature recovery in South East England is provided, but then the sensitivity of each special characteristic of the Chilterns National Landscape to climate change is considered in turn. It is envisaged that the production of the Climate Change Adaptation Plan will enable a more detailed analysis of areas vulnerable to the impacts of climate change alongside an action plan to implement the adaptation measures for the landscape.

Enabling nature to flourish will require difficult and challenging choices around land use and land management, recognising the pressure on England's finite area of land. Sustainable food production that enables food security, future-proofing housing and infrastructure to be climate resilient, and advancing renewable energy infrastructure that tackles climate change are all examples of critical land use requirements. This plan focuses on nature recovery whilst recognising the urgent need for a joined-up approach that considers how we can best support future land use for multiple benefits.

Overall, this document should be considered as the Chilterns National Landscape call-to-arms to help nature recover and thrive. Case studies provide examples of the many impactful initiatives that are already underway to tackle the biodiversity crisis and help identify multiple opportunities for working together to help nature recover.

It is our hope and ambition that this plan will inspire coordinated action and delivery of nature recovery across the Chilterns National Landscape.



Otter

2. The policy framework



National and local action must now follow the international commitment to prevent continued and irrecoverable declines in nature

2.1 International Policies of relevance

Nature Recovery policy in the UK is underpinned by international targets and analysis. Here, three of the most pertinent reports and pledges are outlined, highlighting important links between nature recovery and economic growth and sustainable development at the global scale.

2.1.1 30by30: an international pledge for nature recovery

In recognition that there is an international nature crisis, more than 100 countries, including the UK, have signed up to a global target (included in the Kunming-Montreal Global Biodiversity Framework) to protect 30% of the planet (land, rivers, lakes, wetlands and sea) for nature by 2030. The '30by30' pledge aims to reverse biodiversity decline and increase resilience to climate change.

National and local action must now follow the international commitment to prevent continued and irrecoverable declines in nature. As of October 2024, it is estimated that only 7.1% of England's land contributes to the target, so there is much work to be done to ensure that our most important wildlife-rich habitats benefit from long-term management for nature. The target also includes wildlife-rich habitat being created or restored as part of long-term projects, and importantly, nature-friendly farming can also play a role to support 30by30 (see criteria published in **30by30 on land in England: confirmed criteria and next steps**).

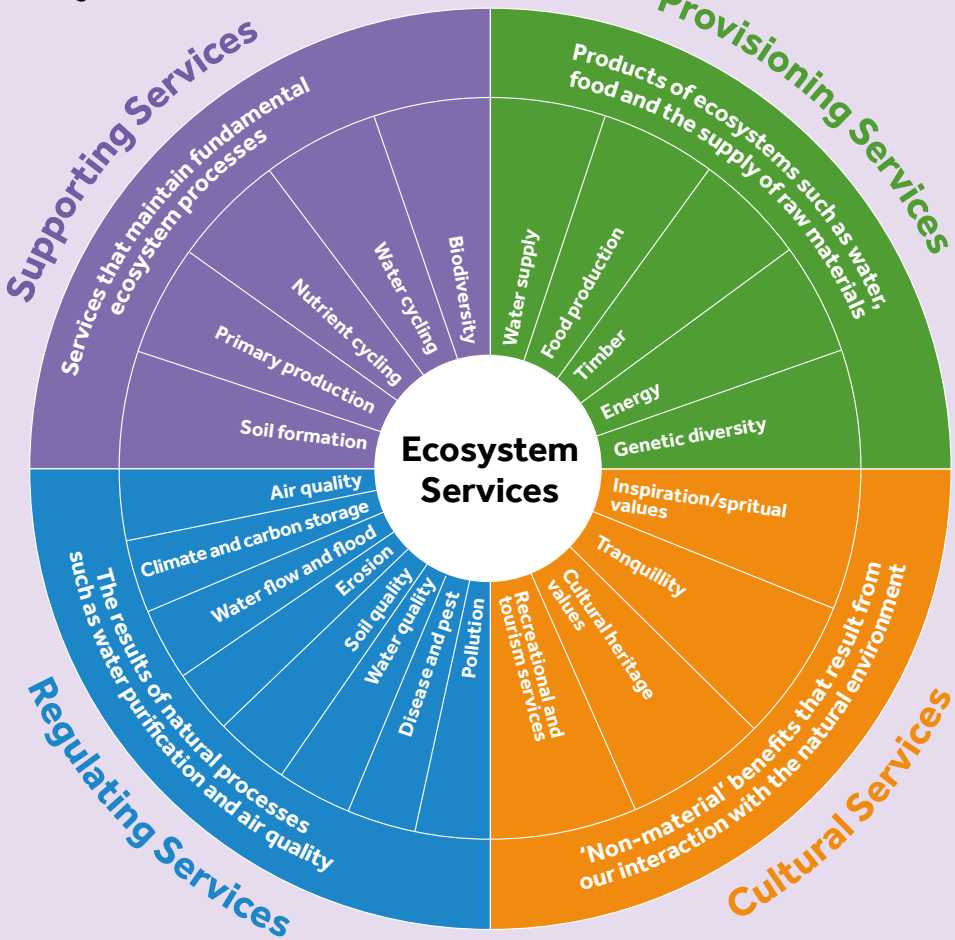
Defra 30by30 guidance indicates that Protected Landscapes (National Parks, National Landscapes and the Broads) should form the backbone to 30by30 in England and we should go further in these areas than others to meet our 30by30 pledge. The guidance emphasises that National Landscapes (which cover 15% of England by area) should make a significant contribution to 30by30. This Nature Recovery Plan is part of this collective call-to-arms, and so Section 4.5 considers in further detail how the Chilterns National Landscape can play its part.

2.1.2 The Dasgupta Review: recognising that economics needs to value nature

The landmark Dasgupta review is a global analysis describing a blueprint to bring economics and biodiversity together to help save the natural world. It shows us how most economic models currently exclude effects on nature (or natural capital) focusing instead on accumulation of produced capital (roads, machines, buildings etc.) and human capital (health and education).

The Dasgupta Review describes how humanity has been degrading our natural capital (nature and biodiversity) at an unprecedented rate and explains that economic growth has been the reason for this degradation.

Figure 1 Ecosystem Services



It highlights recent estimates suggesting that we would need 1.6 x Earths to maintain humanity's current way of life, and this is simply not sustainable. It asks us to recognise that nature and biodiversity sustains our economies, livelihoods and well-being, so our economic decision-making must consider the true value of goods and services that we derive from it.

The review asserts that economics needs to be reconstructed to include nature as an ingredient. The economic value of Natural Capital and Ecosystem Services should be embedded into our decision-making.

2.1.3 UN Sustainable Development Goals: tackling nature recovery and inequalities together

In 2015 United Nations Member States adopted the 2030 Agenda for Sustainable Development which incorporates 17 Sustainable Development Goals (SDG). These goals are a call for action to address nature recovery and climate change in conjunction with strategies to reduce inequalities and improve health and education.

The 2023 SDG Report outlines the scale of the task ahead, highlighting the lack of progress to date, with international inequalities deepening and key targets stalling. The report highlights areas for urgent action including calls for targeted policies to end the 'war on nature', and a recommitment from governments to accelerated and sustained transformative action to deliver on the promise of Sustainable Development Goals.

2.2 National Policies and Reports of relevance

There is a proliferation of relevant reports on the current nature crisis in the UK, reflecting the seriousness of the situation for our biodiversity. In this section we outline a small selection of reports and government policies that are driving our current ambitions for nature recovery in the Chilterns National Landscape.

2.2.1 2010 Lawton 'Making Space for Nature'

The Lawton Report '[Making Space for Nature: A review of England's Wildlife Sites and Ecological Network]' concluded that, as of 2010, England's wildlife sites were too small and isolated to support many of England's characteristic species in the face of land use pressures and climate change; and that this was resulting in marked species decline and loss of biodiversity. The report describes wildlife sites as fragmented due to development and intensive agricultural practice, preventing the movement and adaptation of species.

Figure 2 United Nation Sustainable Development Goals



A critical recommendation of the report was to establish a landscape-wide network of larger, wildlife sites of higher ecological quality with connections between them to enable species to move. This is often described as a call for 'more, bigger, better and joined up' spaces for nature at a landscape level.

The report also described how such an ecological network would give more people access to nature and improve the ability of the environment to provide for people's experiential and mental health needs. Since the report was published, there has been increasing scientific evidence of the value of accessing and experiencing nature for people's mental health and well-being, and the provision of other health benefits such as cleaner air and cooling effects.

In 2020 Prof Sir John Lawton and the panel members highlighted three overarching actions that are particularly needed if nature is to flourish again in England:

- Better protect and manage our remaining wildlife sites
- Deliver ecological restoration at scale with large blocks (> 5000 ha) of contiguous habitat
- Bring nature to people

The Lawton Report has been particularly influential in UK nature policy, informing the Natural Environment White Paper 2011 which committed government support to protecting and enhancing the environment; the Biodiversity 2020 Strategy; and the National Planning Policy Framework. Most recently the main conclusions of the Lawton report have also informed Defra's 25 Year Environment Plan (25YEP).

2.2.2 Defra 25 Year Environment Plan (25YEP)

In 2018 Defra set out goals for improving the environment in 'A Green Future: Our 25 Year Plan to Improve the Environment'. This report, often referred to as the 25 Year Environment Plan (25YEP), set out a vision for a healthier environment including thriving plants and wildlife and identified six key areas around which action would be focused including:

- Using and managing land sustainably
- Recovering nature and enhancing the beauty of landscapes
- Connecting people with the environment to improve health and well-being

The plan was to be refreshed periodically, and the Environmental Improvement Plan (EIP) 2023 was the first revision of the report.



Wildflowers at Manor Farm, Local Wildlife Site

2.2.3 Environmental Improvement Plan (EIP) 2023

The ultimate goal of the EIP2023 is to halt the decline in biodiversity to achieve thriving plants and wildlife. To achieve this vision the EIP2023 describes the ten environmental goals articulated in 25YEP.

- **Goal 1:** Thriving plants and wildlife
- **Goal 2:** Clean air
- **Goal 3:** Clean and plentiful water
- **Goal 4:** Managing exposure to chemicals and pesticides
- **Goal 5:** Maximise our resources, minimise our waste
- **Goal 6:** Using resources from nature sustainably
- **Goal 7:** Mitigating and adapting to climate change
- **Goal 8:** Reduced risk of harm from environmental hazards
- **Goal 9:** Enhancing biosecurity
- **Goal 10:** Enhanced beauty, heritage, and engagement with the natural environment

To restore nature the report argues that we will need to improve the quality of our environment (**Goals 2,3,4**), improve our use of natural resources (**Goals 5,6**), improve climate change mitigation measures and reduce harm from the hazards that climate change exacerbates (**Goal 7,8**), enhance biosecurity **(Goal 9)** and enhance beauty and engagement with the natural environment (**Goal 10**).

This Nature Recovery Plan is most concerned with **Goals 1, 7 and 10.**

2.3 Protected Landscape Targets and Outcomes Framework (PLTOF)

The Protected Landscapes Targets and Outcomes Framework sets the ambition for protected landscapes to achieve three outcomes from the Environmental Improvement Plan which are considered as most relevant to National Landscapes' statutory purpose. The framework sets out ten targets, of which seven are considered in this Nature Recovery Plan. Targets 9 and 10 are considered in our Management Plan, and Target 6 will be the focus of our future Climate Change Adaptation Plan. The targets are expressed at a national level for all 44 landscapes together.

Figure 3a How EIP goals link to PLTOF – Goal 1 thriving plants and animals

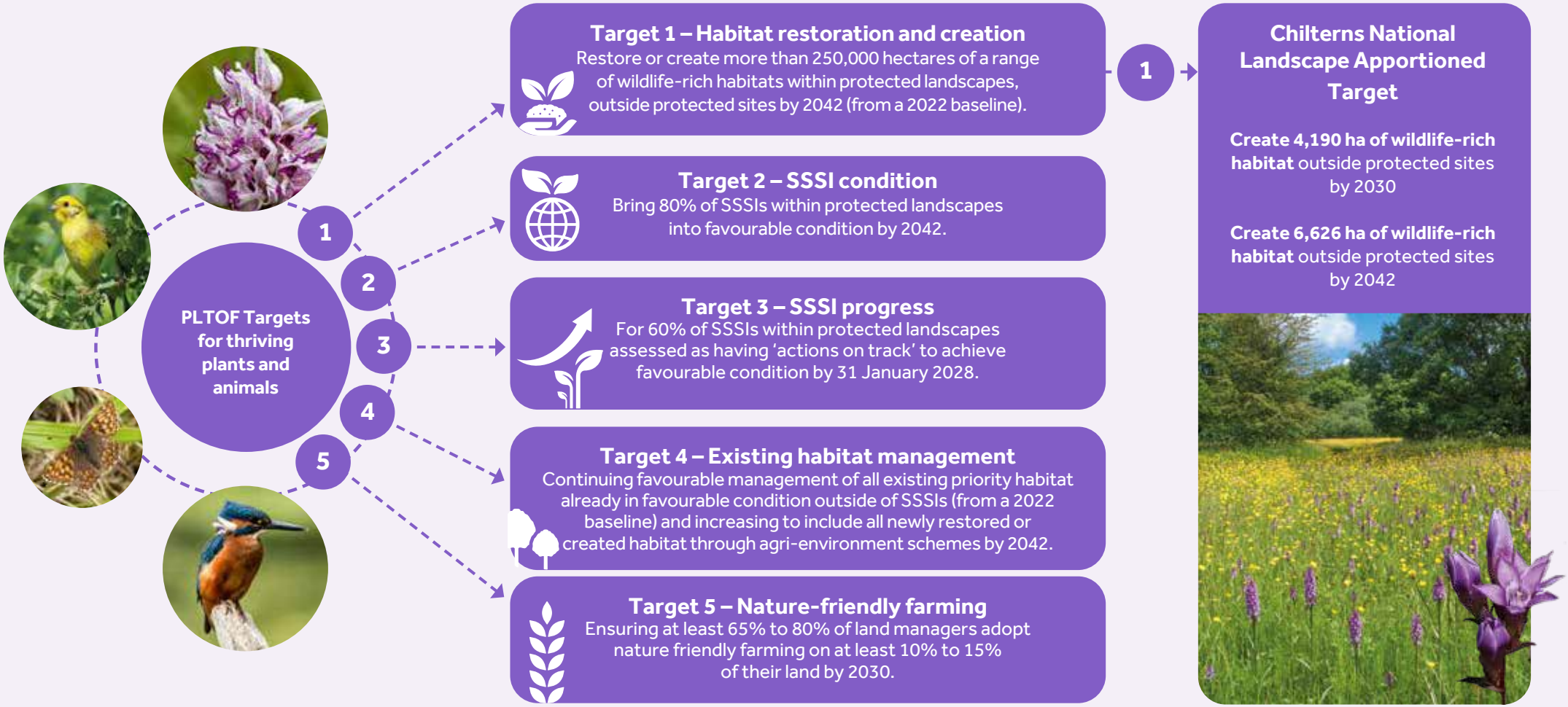


Figure 3b How EIP goals link to PLTOF – Goal 7 mitigating and adapting to climate change





PLTOF Targets for mitigating and adapting to climate change targets

6

7

8

Target 6
Reduce net greenhouse gas emissions in protected landscapes to net zero by 2050 relative to 1990 levels.

Target 7
Restore approx. 130,000 hectares of peat in protected landscapes by 2050.

Target 8
Increase tree canopy and woodland cover (combined) by 3% of total land area in protected landscapes by 2050 (from 2022 baseline).





8

Chilterns National Landscape Apportioned Target

Establish a combined total of 286 hectares of additional trees outside woodland and woodland habitat by 2030, and 1,000 hectares by 2050.



Figure 3c How EIP goals link to PLTOF – Goal 10 enchancing beauty, heritage and engagement with the natural environment

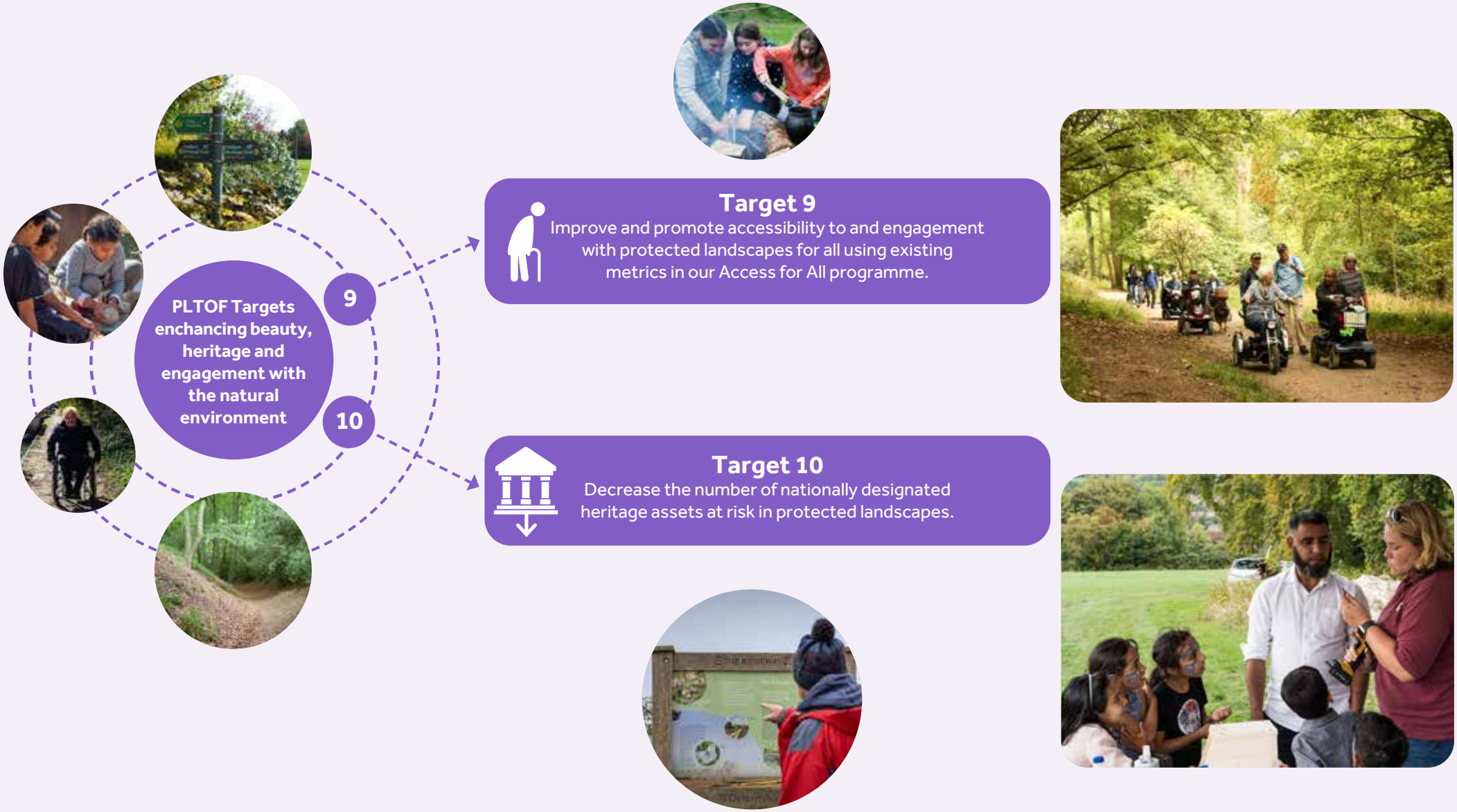


Table 1 PLTOF Targets and Chilterns National Landscape baseline statistics

Target No.	PLTOF target	Chilterns baseline statistic
Thriving plants and wildlife targets		
1	Restore or create more than 250,000 hectares of a range of wildlife-rich habitats within protected landscapes, outside protected sites by 2042 (from a 2022 baseline).	To be released by Natural England.
2	Bring 80% of SSSIs within protected landscapes into favourable condition by 2042.	CNL has 58.9% of SSSI features in favourable condition (cf. average of 41.3% for all 34 NLs).*
3	For 60% of SSSIs within protected landscapes assessed as having 'actions on track' to achieve favourable condition by 31 January 2028.	CNL has 29.4% of actions 'on track' to achieve favourable condition (cf. average of 20.7% for all 34 NLs). **
4	Continuing favourable management of all existing priority habitat already in favourable condition outside of SSSIs (from a 2022 baseline) and increasing to include all newly restored or created habitat through agri-environment schemes by 2042.	To be released by Defra.
5	Ensuring at least 65% to 80% of land managers adopt nature friendly farming on at least 10% to 15% of their land by 2030.	To be released by Defra.
Mitigating and adapting to climate change targets		
6	Reduce net greenhouse gas emissions in protected landscapes to net zero by 2050 relative to 1990 levels.	Estimated net annual greenhouse gas emissions from CNL were 613.6 kt CO_2e in 2022 compared to 1,072.8 kt CO_2e in 2005 (Data published by Department for Energy Security and Net Zero, June 2024). Data for 1990 are not yet available for National Landscapes.
7	Restore approx. 130,000 hectares of peat in protected landscapes by 2050.	Not of relevance to the Chilterns National Landscape due to landscape setting.
8	Increase tree canopy and woodland cover (combined) by 3% of total land area in protected landscapes by 2050 (from 2022 baseline).	Total ha of National Forest Inventory woodland in CNL is 19,423 ha. Tree cover outside woodlands (including orchards) is 4,043 ha (Forest Research, 2023).***
Enhancing beauty, heritage and engagement with the natural environment targets		
9	Improve and promote accessibility to and engagement with protected landscapes for all using existing metrics in our Access for All programme.	For consideration in Management Plan.
10	Decrease the number of nationally designated heritage assets at risk in protected landscapes.	For consideration in Management Plan.

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** © Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right 2025.
*** © Forestry Commission copyright 2023. © Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right 2023.

PLTOF statistics are a new baseline against which to measure nature recovery and, in most cases, are calculated using a different methodology from previous statistics that were provided to protected landscapes on an annual basis. This makes it difficult to carry out any trend analysis prior to the baseline data described above.

In this report, key opportunities for nature recovery are considered in relation to special characteristics of the Chilterns. **Table 2** matches Targets relevant to this nature recovery plan to these special qualities. Key points here are as follows:

- No chalk streams in the Chilterns are designated as SSSIs so Targets 2 and 3 are not currently relevant to chalk streams and their riparian corridors.
- Chalk grassland habitats should not be under consideration as areas to meet increased tree or woodland planting targets (Target 8).

2.3.1 Apportionment of Targets 1 & 8 for the Chilterns National Landscape
The Protected Landscape Targets are expressed as national ambitions, but three of the targets (Target 1,7 and 8) are expressed by area so can be subdivided for each National Landscape. The Chilterns National Landscape does not contain deep peat, so we will only consider Targets 1 and 8 here.

Table 2 Special qualities of the Chilterns in relation to PLTOF targets

Special quality of the Chilterns	Target No.					
	1	2	3	4	5	8
Farmed land	x	x	x	x	x	x
Chalk streams and their riparian corridors	x			x	x	x
Woodland	x	x	x	x	x	x
Grassland	x	x	x	x	x	
Wetlands	x	x	x	x	x	
Ponds	x	x	x	x	x	
Common land	x	x	x	x	x	x

Table 3 Apportioned Targets 1 and 8 for the Chilterns National Landscape

Target	Pro rata on basis of area without local factors	Chilterns target taking local factors into account
Restore or create more than 250, 000 ha of wildlife-rich habitats within protected landscapes outside protected sites by 2042 (from a 2022 baseline).	6,621 ha. 331 ha per year between 2022 and 2042.	6,626 ha by 2042 (4,190 ha by 2030).
Increase tree canopy and woodland cover (combined) by 3% of total land area in protected landscapes by 2050.	2,515 ha. 90 ha per year between 2022 and 2050.	1,000 ha by 2050 (286 ha by 2030).

Target 1



What is needed to achieve Target 1?

2.3.1.1 To meet our interim **Target 1** of 30% wildlife-rich habitat in the Chilterns Nature Recovery Network, 5% or 4,190 ha of habitat creation or restoration is required outside priority habitat areas by 2030.

By 2042 we should be more ambitious with our targets and increase wildlife-rich habitat by 7.9% to reach a total of 32.9% in the landscape. This would require 6,626 ha of habitat creation or restoration outside priority habitat in total over 20 years.



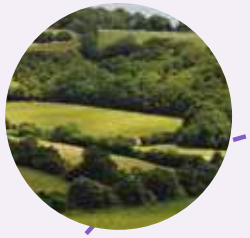


The focus will be:

- Nature recovery action where farmers and landowners are willing and able (e.g. through the work of farmer clusters and FiPL).
- Improvement in the condition of 493 ha of 'good quality semi-improved grassland (GQSIG)' identified on MAGIC by Natural England. This habitat does not meet the standard criteria for wildlife-rich habitat (pers. comm. from National Landscape Association, 060525).
- Habitat creation in the 1,029 ha identified on MAGIC by Natural England as having 'No main priority habitat'. This habitat does not meet the standard criteria for wildlife-rich habitat (pers. comm. from National Landscape Association, 060525).
- Trees outside woodland and deciduous woodland in Plantations on Ancient Woodland Sites (PAWS). The latter currently cover 3,945 ha of the Chilterns National Landscape (see **Target 8**).

Ambition at this scale will not be achievable without both policy and financial support. The caveats for both interim and final targets are as follows:

- This scale of areal target for the creation of wildlife-rich habitat necessitates improving biodiversity on farmed land. This can only be achieved through working with farmers and landowners, recognising that food production and nature recovery need to be considered together.
- A long-term Defra funding commitment to agri-environment schemes is essential to establish the confidence needed for land managers to invest in nature recovery (House of Commons Environmental Audit Committee, May 2025).
- It takes time for habitat creation actions to yield wildlife-rich habitat. So, whilst the 2030 target is ambitious, as required to achieve 30by30 commitments, it relies not only on adequate funding mechanisms and policy support, but also on rapid uptake and rapid habitat response, so may not be practically feasible.
- A focus on areal targets largely ignores the benefit of valuable linear habitats such as chalk streams, the Thames Corridor and associated wetland habitats, and the roles of hedges with edges which enable species movement. These habitats will also be the focus of action to help connect wildlife-rich areas.



Target 8

What is needed to achieve Target 8?

2.3.1.2 **Target 8** requires a combined total of an additional 286 ha of trees outside woodland, and woodland[1] habitat to be established by 2030; and 1,000 ha by 2050.





The focus will be:

In the Chilterns, habitat creation at scale will focus largely on grassland, partly wooded habitats (e.g. traditional orchards and wood pasture), and mosaic habitats that include trees outside woodland (see **Target 8** for trees).

Mosaic habitats (mixed grassland with tree/shrub habitats) will become increasingly important given their role in improving climate resilience (Natural England, 2013).

Meeting our interim and final targets would need the following factors to be in place:

An increase in tree planting schemes with appropriate funding, noting that local authority efforts to plant trees will be hampered by closure of Forestry Commission schemes such as Local Authority Treescape Fund.

Provision of specialist advice with funding (such as FiPL) to support planting of traditional orchards, wet woodland, agroforestry initiatives and maintenance for trees in hedgerows amongst others.

Deer management to reduce pressure from browsing.

[1]'Woodland' is defined as woodland of at least 0.5 ha with a minimum width of 20 metres and at least 20% canopy cover. Tree canopy cover is the area covered by the branches and leaves of a tree viewed from above. Trees outside woodland are: areas of trees of at least 0.1 ha which are not woodland and not hedgerows; single trees or groups of trees more than 2 m in height with an area < 0.1 ha, not including hedgerows; and hedgerow trees. Energy forestry is not included in the target.

3. Our vision for the Chilterns National Landscape



A place where communities live, work and breathe. A haven for people and wildlife.

3. Our vision for the Chilterns National Landscape

Our vision for the Chilterns National Landscape, as articulated in the Management Plan, is:

'that the Chilterns will be cared for, forever and for everyone. A place where people are inspired by its distinctive natural beauty, space and tranquillity, to enjoy and care for the landscape. A place where natural beauty and cultural heritage is celebrated and enhanced.

A place which gives space for nature to flourish and which provides us with the ingredients for healthy living, such as clean water, healthy soils and thriving wildlife. A place where communities live, work and breathe. A haven for people and wildlife.'

The Chilterns National Landscape (formerly the Chilterns Area of Outstanding Natural Beauty, AONB) covers over 838km² (324 square miles) across Buckinghamshire, Oxfordshire, Hertfordshire and Bedfordshire. It was originally designated in 1965 and subsequently extended slightly in 1990. It is one of 34 National Landscapes in England, designated on the basis that their area is of such outstanding natural beauty that steps should be taken to conserve and enhance that natural beauty. In relation to natural beauty, the criteria for designation are the same as for England's 10 National Parks (including the Broads).

National Landscapes (legally still referred to as AONBs) are designated by the government under the Countryside and Rights of Way (CRoW) Act 2000 (prior to 2000, designation was under the National Parks and Access to the Countryside Act 1949).

In November 2023, all AONBs were renamed National Landscapes to make clear their national significance, though AONB remains the legal definition and term used in most areas of legislation, policy and guidance.



Hughenden Valley

The statutory purposes of the Chilterns Conservation Board (CCB), as set out under Section 87 of the Countryside and Rights of Way Act 2000, are as follows:

1. The CCB's key responsibility is to further the purpose of conserving and enhancing the natural beauty of the Chilterns.
2. In addition, where doing so would not conflict with that key responsibility, the CCB will:
   - Promote the understanding and enjoyment of the special qualities of the Chilterns.
   - Seek to foster the economic and social wellbeing of local communities by working with local authorities and other relevant organisations.
   - Have regard to the needs of agriculture, forestry, and the local economy.
   - Ensure that water resources, both surface and underground, are protected from pollution, especially in coordination with the Environment Agency and water companies.

Section 245 (Protected Landscapes) of the Levelling-up and Regeneration Act 2023 (LURA) amends the duty on relevant authorities so that they must now 'seek to further the purpose of conserving and enhancing the natural beauty of the area' and the intention of the amendment is to facilitate better outcomes for National Landscapes.

3.1 A Nature Recovery Network for the Chilterns

Habitat creation and restoration in the Chilterns should contribute to a Nature Recovery Network (NRN) for England, based on the Lawton principles (Bigger, Better, More and Joined). The aim of the NRN is to create connected wildlife-rich spaces that allow wildlife to move and thrive, to sustain vital ecosystem services, and to improve resilience to climate change. Delivery of a Nature Recovery Network within the Chilterns National Landscape, should include the following actions described in Isaac *et al.* (2018):

- Improve the condition of protected areas
- Increase the area of habitat under long-term protection for nature
- Improve the condition of landscapes not currently protected for nature conservation (e.g. land used for housing and food production)
- Establish large habitat areas linked to existing wildlife-rich site by creation and/or restoration
- Improve the quality and extent of habitat connectivity

The protection of 30% of land and ocean for nature by 2030 (the 30by30 target described in the Kunming-Montral Global Biodiversity Framework) outlines the minimum amount of land needed to reverse the decline of nature in the UK, and Defra's policy paper '30by30 on and in England: confirmed criteria and next steps' articulates the ambition for protected landscapes such as the Chilterns National Landscape to be a core focus of this activity. 30by30 provides us, therefore, with an interim target to help achieve a functioning Nature Recovery Network across the the Chilterns.

In the longer term, we need to go above this target as part of the National Landscapes family, and recommendations vary according to different sources. For example, analysis by the National Landscape Association advocates a change in land use for each National Landscape of 7% to create and connect new wildlife-rich habitat (Winney & Fisher, 2025).

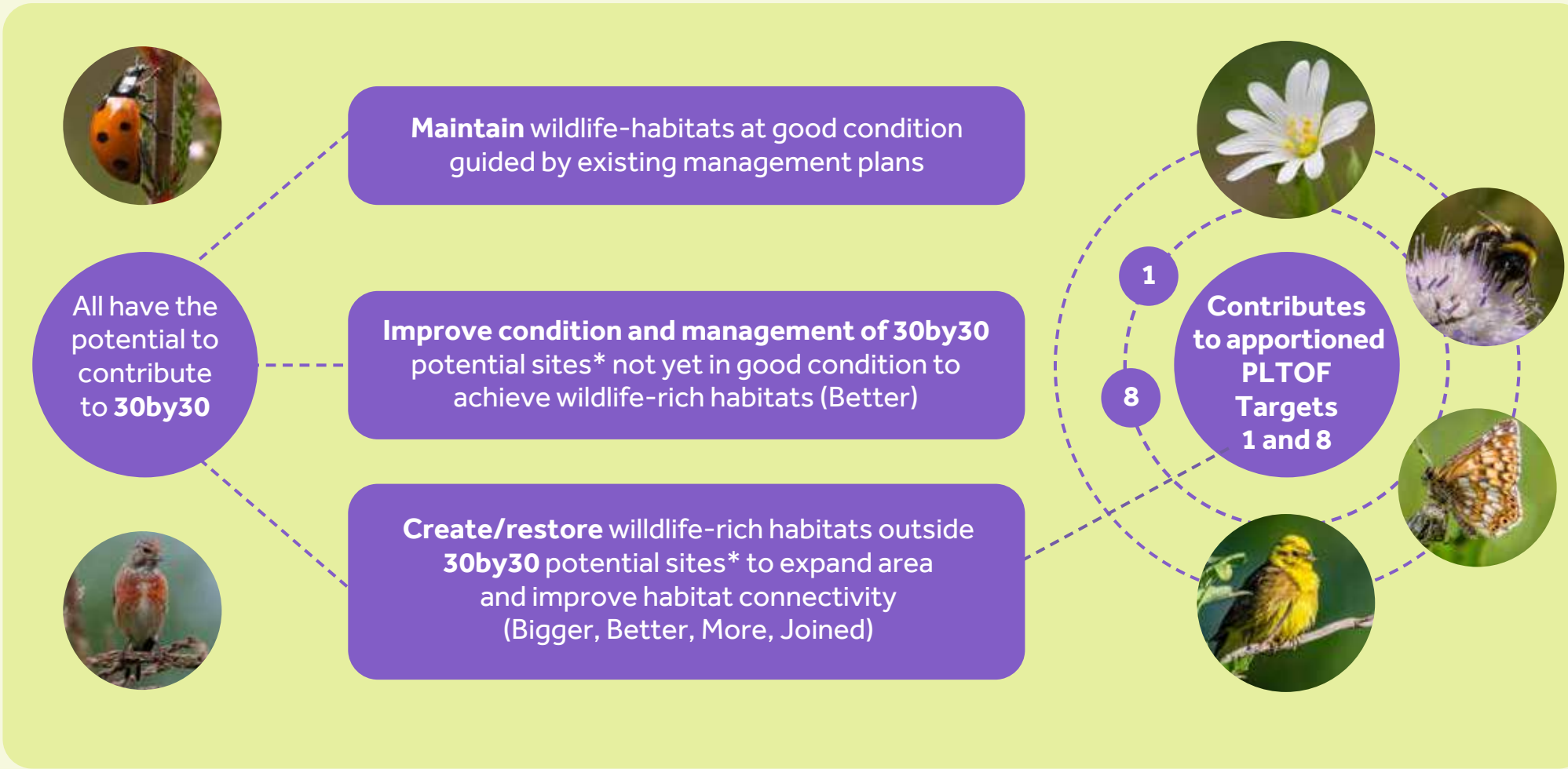
Whilst Isaac et al. (2018) suggest that the expansion of high quality semi-natural habitat to cover 40%, rather than 30%, of protected landscapes would enable these areas to be the foci of resilient ecological networks across England.

These recommendations for a thriving nature recovery network underpin our longer-term ambition for nature recovery in the Chilterns National Landscape, whilst we also recognise the multiple demands on our land and the need, to balance nature recovery against other land use needs, such as food production.


Kidney Vetch

Figure 4 describes the necessary components of a Nature Recovery Network for the Chilterns National Landscape, focusing on the need to (i) maintain existing wildlife-rich habitat in good condition; (ii) improve the condition and management of semi-natural habitat not yet in good condition; and (iii) create and restore wildlife-rich habitat outside protected areas to improve habitat connectivity.

Figure 4 Components of a resilient Nature Recovery Network for the Chilterns National Landscape showing relationship to 30by30 and PLTOF Targets 1 and 8



4. Nature in the Chilterns National Landscape



Many habitats and species of the Chilterns reflect the influence of the calcareous soils and chalk bedrock

Nature-Calling-Community workshop

4. Nature in the Chilterns National Landscape

The Chilterns National Landscape is largely underlain by chalk geology, and many of the habitats and species reflect the influence of the calcareous soils and chalk bedrock. For example, the porous soils and rock mean that much of the rainfall in the area percolates into the ground rather than moving across the soil surface, and the wildlife-rich chalk streams are thus sourced predominantly from groundwater rather than surface flows.

4.1 Priority habitats

The habitats associated with the Chilterns are often a by-product of traditional management (grazing, woodland management and quarrying) over millennia. Chalk grasslands, for example, are a characteristic habitat arising from past grazing regimes, particularly valued for their high biodiversity and natural beauty. Ancient beech woodlands, managed by humans for timber and fuel for centuries, survive predominantly on valley tops underlain by clay-with-flint, and as 'hanging woods' on steep valley slopes. The area is particularly noted for rare arable weeds found in calcareous soils, which are a characteristic of some arable farmland.

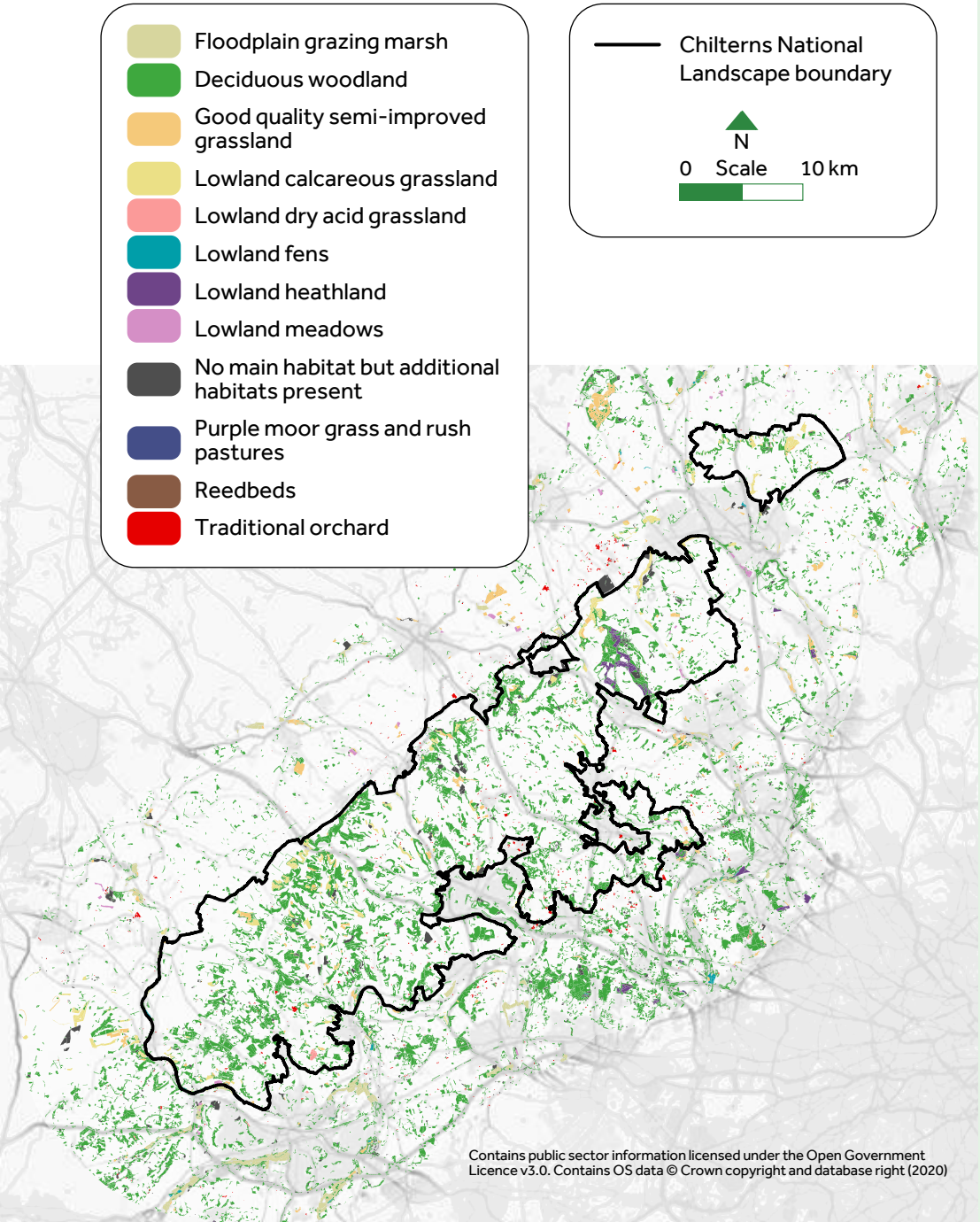
The topography of the area is complex due to repeated advances and retreats of ice sheets during Palaeolithic. The consequent local variations in soil type and management practice have also given rise to rich habitat mosaics of box woodland and juniper scrub.

Other habitats of particular significance in the area include internationally important acidic woodlands and grasslands such as the Ashridge Commons and Woods Site of Special Scientific Interest (SSSI) which forms part of the wider Chilterns Beechwoods Special Area of Conservation (SAC). Natural England's inventory of priority habitats is a starting point to understand the most valuable habitats that remain in the Chilterns National Landscape area, with the caveat that some habitats are under-surveyed, and fragmented remnants will remain that are not captured by this database. These figures also capture discrete blocks of habitat, but many of these habitats will be found in combination with one another as mosaics.



The Ridgeway near Aston Rowant

Map 1 Priority habitats within 10 km of the Chilterns National Landscape boundary



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Table 4 Priority habitats in the Chilterns National Landscape

Priority habitat	Area (ha)	Priority habitat as % of total land area
Deciduous woodland	14,151	16.99
Lowland calcareous grassland	1309	1.57
Lowland heathland	289	0.35
Traditional orchard	142	0.17
Lowland meadows (dry)	51	0.06
Floodplain grazing marsh	49	0.06
Lowland dry acid grassland	38	0.04
Lowland fen	17	0.02
Purple moor grass and rush pasture	4	0.004
No main habitat [a,b]	1029	1.235
Good quality semi-improved grassland [b]	493	0.592
Total	**17,572**	**21.1**

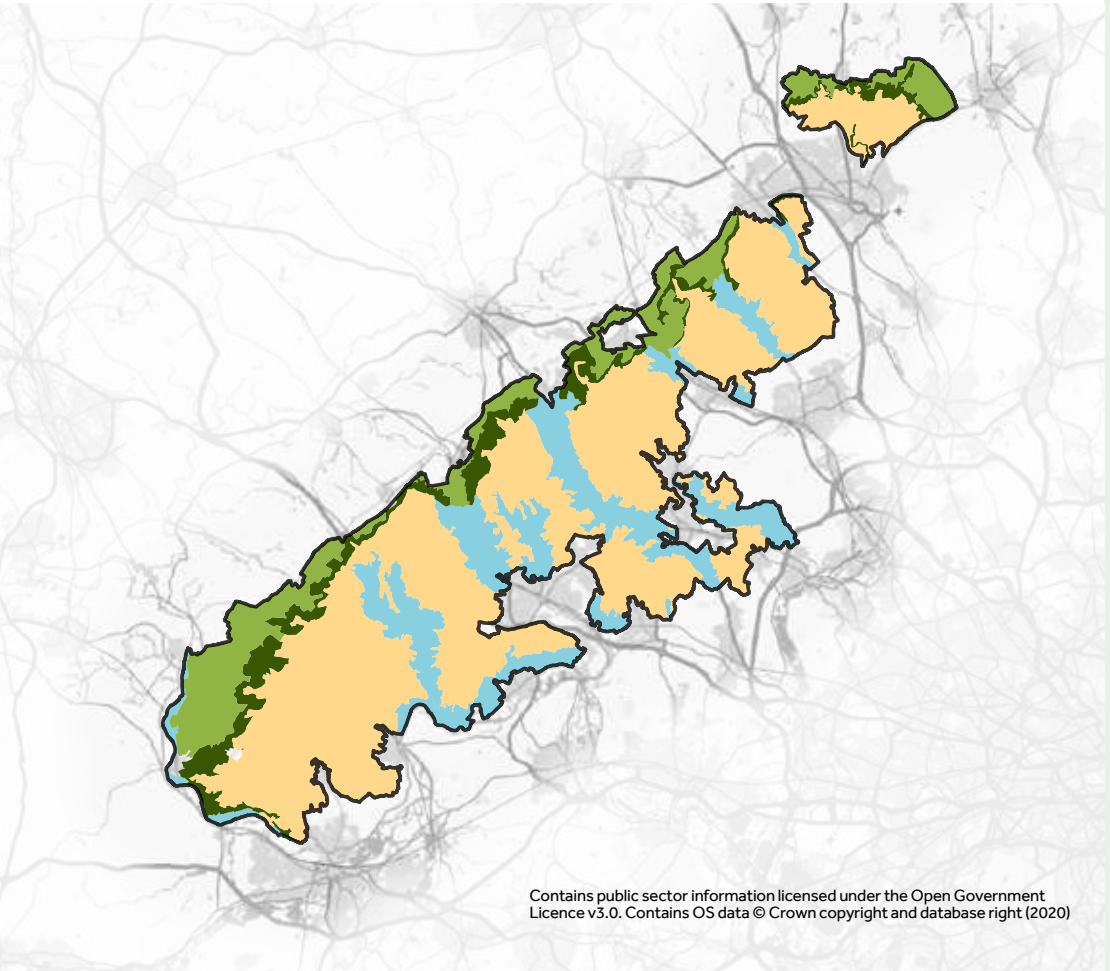
[a] Defra's MAGIC mapping identifies "No main habitat" where a priority habitat is present but it is not the primary or most significant habitat within that specific area. Other habitat types or features may be more extensive or characteristic of the area.

[b] This habitat does not meet the standard criteria for wildlife-rich habitat (pers. comm. from National Landscape Association, 060525).

The table shows priority habitats on an area basis but we will stress the importance of linear habitats, including our internationally important chalk streams, ancient and species rich hedgerows, later in this plan (Section 9).

In this report we have grouped priority habitat according to the special qualities of the Chilterns and consider the actions needed to help each of these in turn.

Map 2 Landscape Character types within the Chilterns National Landscape boundary



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4.2 Landscape Character Assessment

Protected landscape areas, which include National Parks and National Landscapes, are designated for landscape quality, not for wildlife, but they sustain many habitats and provide significant opportunity to contribute to nature recovery. The Chilterns National Landscape is of high scenic value with wildlife and cultural heritage an intrinsic part of the character. Natural England's Landscape Character Assessment (LCA) is a tool to identify the combinations of features that make each type of landscape distinctive and special to those who live and work in it, and those who visit for recreation and well-being.

The Chilterns National Landscape does not have a single landscape character assessment, instead each local authority has multiple assessments. These have been produced by different consultants at different times and do not always follow the same methodology. Whilst the current Chilterns Management Plan describes four main 'Landscape Character Types' (Scarp foothills and Vale fringes; Chalk scarp; Plateau and dip slope; and River valleys), there are over 30 different Landscape Character Types within the Buckinghamshire Chilterns alone.

4.3 Overview of species lists

For each 'Special Quality' of the Chilterns we have created a list of species considered to be a priority for nature recovery in the Chilterns. It should be noted that the species listed for 2025 will change over time as new data becomes available.

They have been selected according to several criteria as follows:

- Their occurrence in International Union for Conservation of Nature (IUCN) lists where they are Critically Endangered, Endangered and Vulnerable. Near Threatened species have sometimes been included depending on whether they feature in other criteria.
- Species listed under Section 41 of the Natural Environment and Rural Communities Act 2006. Also known as Species of Principal Importance (SPIs) or Priority Species.
- Occurrence in other policy documents (such as Natural Character Areas and Countryside Stewardship species priorities for the Chilterns).
- Occurrence in programmes such as 'Back from the Brink'[1].
- Occurrence in lists such as Birds of Conservation Concern (BoCC).

[1] The Back from the Brink programme (2017-21) was a nationwide partnership that aimed to save some threatened species from extinction and reverse their fortunes to put them back on the road to recovery, working through a suite of 19 conservation projects across England.

In addition, consideration has been given to whether species are in need of conservation effort (this may be apparent in more specific studies compared to their IUCN status for example); able to respond to conservation effort; characteristic of important habitats; considered a flagship species; are recordable; and are useful indicators of change. Lastly, some species are more aspirational targets for nature recovery and would require reintroduction or large-scale improvements in habitat condition and connectivity. The number of these species has been limited lest attention is pulled away from the very real issue of rapid decline of species still present in the Chilterns National Landscape.

Appendix 1 lists species in alphabetical order that have been considered in line with the above criteria and includes both those included in the main text of this document as well as those not short-listed. This list will be kept under review.

Appendix 2 shows a screenshot of the spreadsheet approach used to aid in the identification of Chilterns priority species associated with each Special Quality/habitat in the National Landscape.

It is intended that the species listed broadly reflect the definitive Local Nature Recovery Strategy lists, which will have been more rigorously researched with county recorders. However, there are some more specialist taxa (such as fungi, lichens, bryophytes, Diptera, Coleoptera) which we recognise are not fully represented and are beyond the scope of this work. For these taxa we recommend consulting the relevant Local Nature Recovery Strategies. In addition, it is likely that for fungi, there will be species which are not recorded because of a lack of obvious and easily recordable fruiting bodies.

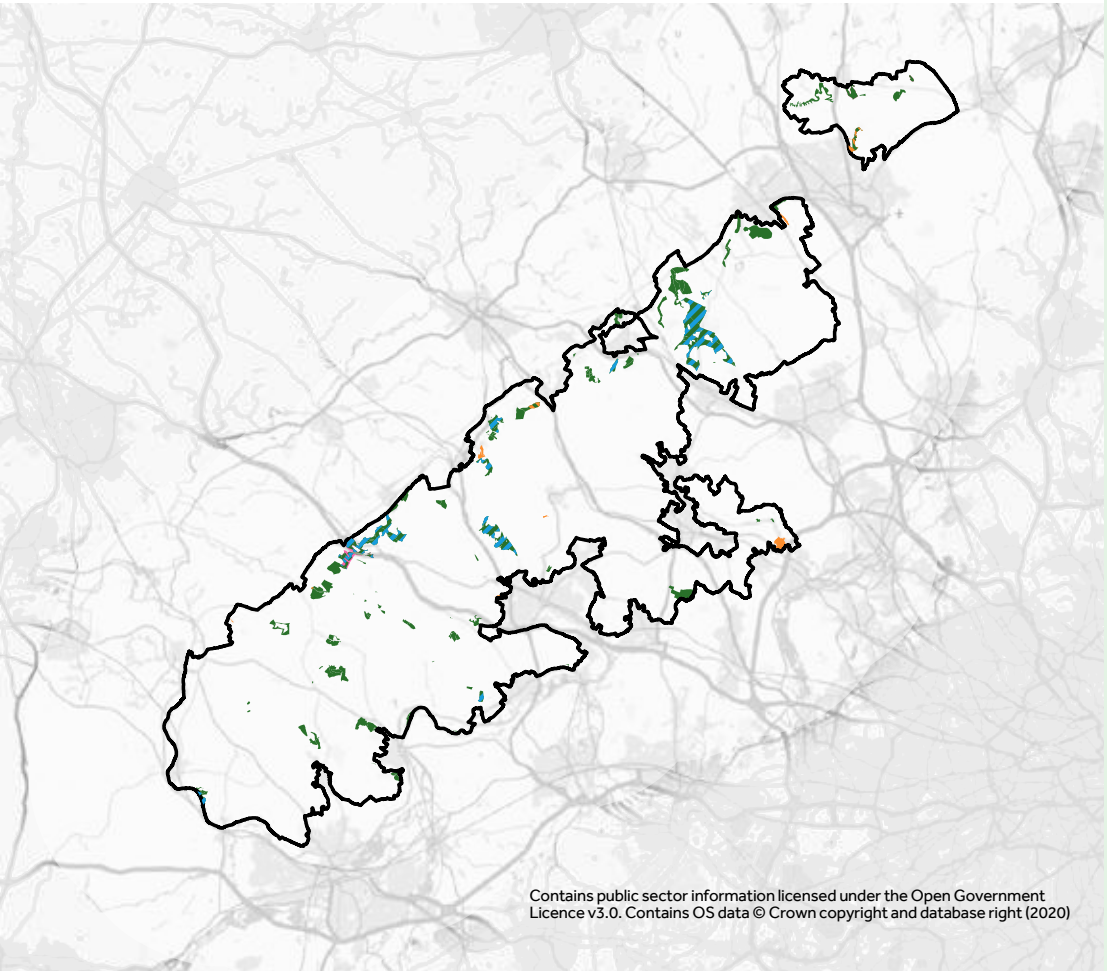
There are several species in need of conservation effort which have not been listed by Special Quality because they are more strongly associated with buildings and / or forage over much wider areas of the landscape. These are listed as follows:

Group	Common name	Latin name
Birds	House sparrow Swift House martin	*Passer domesticus* *Apus apus* *Delichon urbicum*
Mammals	Hedgehog Serotine bat	*Erinaceus europaeus* *Eptesicus serotinus*



Serotine bat
(Cnephaeus serotinus)

Map 3 Chilterns National Landscape different levels of protection – SSSI, SAC, NNR + LNR



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4.4 How is wildlife currently protected?

Within the Chilterns National Landscape there are two levels of protection for wildlife:

4.4.1 Level One: Areas with Statutory protection

These include Sites of Special Scientific Interest (SSSIs), Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). Within these sites, measures that enable wildlife to survive and flourish should receive priority. Unfortunately, the last fifteen years have seen no noticeable improvement in the condition of SSSIs across England.

Natural England has recently changed its methodology for assessing the condition of SSSIs. Instead of sub-dividing SSSIs into units and making assessments at the unit scale, Natural England now assesses the condition of features across the whole of an SSSI to understand what is affecting these special features and how SSSIs function as part of their wider landscape. Of the 163 SSSI features in the Chilterns National Landscape, 96 (58.9%) are recorded as in favourable condition whilst 50 (30.7%) are classed as in unfavourable recovering condition (PLTOF data, April 2024).

Local Nature Reserves (LNRs) are declared (and usually owned) by local authorities because of their local special natural interest and/or educational and community value. They are a statutory designation (i.e. designated using a legal mechanism) made under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities, however their protection from development varies by site and is decided through local planning policy. LNRs support and protect both habitats and species and enable public contact with nature, and as such they can help deliver health and well-being benefits. Their management may be passed on to others such as Wildlife Trusts. Managers care and protect the natural features and make at least part of the land publicly accessible.

0.2% (199 ha) of the Chilterns National Landscape is declared as a Local Nature Reserve, comprising 10 sites across four local authority areas. They form an important, but fragmented, network of wildlife sites across the landscape.

4.4.2 Level Two: Areas with Non-Statutory protection

Whilst Local Wildlife Sites (LWS) lack the status of national sites and are not protected in law, they can have just as much wildlife value and are recognised in national planning policies which set out requirements for protection through local policy and plans. Overall though, Local Wildlife Sites are not well protected in planning policy. They are identified and selected locally by partnerships of conservation organisations based on the most important, distinctive and threatened species and habitats within a national, regional and local context.

Case study: Mimram Catchment, Hertfordshire





A RAG-mapping approach to Local Wildlife Site surveys to enable prioritisation of work

Local Wildlife Sites (LWS) are areas of substantive nature conservation value in a county context. While they lack statutory designation, many are of comparable quality to statutory Sites of Special Scientific Interest (SSSI). Hertfordshire currently has 1,575 habitat-based LWS. Alongside SSSIs, these sites support both locally and nationally threatened species and habitats, playing a crucial role in the development of ecological networks.

A major challenge is the limited knowledge of the condition of most Local Wildlife Sites. Many sites were originally identified in 1997 and may not have been surveyed since. This is due to insufficient resources and expertise needed to carry out surveys and provide specialised management guidance to landholders, the majority of whom are private individuals. With resources being scarce, it is essential to determine how best to allocate them to ensure the effective prioritisation of efforts. In 2024, funding from the Environment Agency enabled Herts and Middlesex Wildlife Trust to appoint a Chalk River and Farm Advisory Officer for the Mimram catchment. This project, funded through to 2027, has employed a RAG (Red-Amber-Green) mapping approach to prioritise Local Wildlife Sites within the catchment for re-surveying.

RAG mapping involves mapping and assessing risks, assumptions, and gaps using a red-amber-green status system. The following system is being used in this project:

Green	Amber	Red
Local Wildlife Sites surveyed within the past 10 years that meet Local Wildlife Site Criteria, presumed to be in favourable condition.	Sites not surveyed in the past 10 years, leaving their condition unknown.	Sites surveyed within the past 10 years that do not meet Local Wildlife Site Criteria.
61 of **191**	**130**	**16**

Mimram Catchment, Hertfordshire – assessed in 2025

When assessed in 2025, 61 of 191 Local Wildlife Sites in the Mimram Catchment were given green status, 130 amber status and 16 red status. This approach helps streamline efforts to focus on sites that require immediate attention – red and amber – while maximising the impact of available resources.

Find out more about Local Wildlife Sites by following the links in Table 5 and see www.wildlifetrusts.org/local-wildlife-sites for national data

Local Wildlife Sites are important in many ways: they can protect wildlife near or adjacent to protected areas; they can be ecological corridors enabling species movement; and they are often privately owned with limited access, which enables wildlife to thrive and provides vital ecosystem services to people.

Almost 9% (7,460 ha) of the Chilterns National Landscape is designated as Local Wildlife Sites; however, in some areas we know little about the condition of these sites, and a lack of management due to limited resources is the greatest threat to these important stepping stones and corridors for wildlife.

Together all these sites can support core wildlife populations of local, national and international importance to biodiversity. They can be the focus of re-introduction efforts when species have disappeared from the landscape due to land use and other pressures. They will also support new species whose range is shifting northwards due to climate change. There is a need for partners in conservation organisations to work together to produce a framework and action plan to assess the condition of Local Wildlife Sites across the Chilterns National Landscape.

Table 5 Websites to find out more about Local Wildlife Sites

Wildlife sites	Website addresses
Buckinghamshire: The Local Wildlife Site Project (BMERC & Bucks and Milton Keynes NEP)	www.buckinghamshire.gov.uk/environment/ecology-and-biodiversity/ecology-projects/the-local-wildlife-sites-project/
Oxfordshire Wildlife Sites Project (BBOWT & TVERC)	www.bbowt.org.uk/what-we-do/landscape-recovery/local-wildlife-sites
Hertfordshire Local Wildlife Sites (HMWT & HERC)	www.hertswildlifetrust.org.uk/working-wider-countryside
Bedfordshire County and District Wildlife Sites (BRMC)	www.bedscape.org.uk/BRMC/newsite/index.php?c=sites_cws

4.5 Nature Recovery Networks and 30by30 criteria

Since publication of the Lawton report in 2010 and the Biodiversity 2020 report, there has been increased recognition of the need to create networks of wildlife-rich habitat at landscape-scale to support nature recovery. The Lawton principles of '*Bigger, Better, More and Joined*' are considered as the way to create networks that are fit for purpose, but we also need to ensure that the right habitats and species are protected or created in the right place so that the development of one habitat does not damage another.

The Government's Nature Recovery Network, described in EIP2023, is an aspiration to create a national network of wildlife-rich places that are bigger, better and joined-up, supporting the international commitment to 30by30. As a key component of the Nature Recovery Network (NRN), Local Nature Recovery Strategies (see Section 4.5) will be central to targeting where in the English landscape nature recovery should take place.

As described earlier, National Landscapes such as the Chilterns will have a particularly important role to play in the NRN; accordingly, they have been set ambitious nature recovery targets under the Protected Landscapes Targets and Outcomes Framework and have been identified as locations which should contribute more to 30by30. So here we examine what 30by30 might look like in the Chilterns National Landscape.

There are three criteria that need to be met for land to contribute towards 30by30:

- Purposes of management objectives for the area should ensure the delivery of in-situ conservation outcomes
- Conservation of the area should be secured for at least 20 years through legal or other effective means
- Areas should be effectively managed and able to demonstrate overall progress towards in-situ conservation outcomes

Protected sites such as Sites of Special Scientific Interest (if in favourable or unfavourable recovering condition and under positive management), Special Areas of Conservation and National Nature Reserves, alongside areas of woodland and associated open habitat that is protected and positively managed for biodiversity, already count towards 30by30 because they meet the above Purpose, Protection and Management criteria.


Sunken Lane up to Grangelands and Pulpit Hill

A recent study by the Protected Landscapes Partnership[2] has estimated that the Chilterns has the potential to contribute a total of 25% of land to nature conservation if all sites and habitats in Table 6 can meet the three criteria.

The mapped potential 30by30 areas includes regions which already have some protections or management in place, and/or habitats with important biodiversity value. The criteria used to identify these areas help determine which regions and habitats have the potential to contribute towards the 30by30 goal without significant land use changes, given support from landowners, land managers, targeted action, and investment. The term 'potential 30by30 areas' refers to broad areas and does not imply that these entire areas will be able to contribute to 30by30 in the future.

Table 6 Potential percentage of land in the Chilterns National Landscape that could contribute to 30by30

Site/habitat	Caveats	Potential %
Designated sites (SSSIs, SACs, SPAs)		3.8%
Reserves (Local or National Nature Reserves)		0.2%
Deciduous woodland (National Forest Inventory and Ancient Woodland)		16.2%
Woodland pasture and parks		2.1%
Priority habitat		2.5%
Surface water, including chalk streams.	Areal measurements do not reflect the importance of our internationally rare chalk streams	
Total		**25%**

[2] '30by30 Potential in Protected Landscapes' by Leonora Fisher, Protected Landscapes Partnership, June 2024

4.5.1 Biodiversity Networks: BONs, BOAs, CTAs and Ecological Networks

Prior to the announcement of a national Nature Recovery Network in 2023, biodiversity networks have been developed in different areas of the Chilterns using different methodologies, but all with the aim of following the Lawton principles. For example, each of the four local authority areas within the Chilterns National Landscape have developed its own biodiversity network.

Buckinghamshire has used expert judgement to identify Biodiversity Opportunity Areas as important spatial locations where there are substantial opportunities to make significant gains for biodiversity. The locations were identified by considering concentration and important areas for UK Biodiversity Action Plan habitat and species, alongside the potential for habitat restoration and geology, topography and hydrology. BOAs are designed to inform conservation strategies and place planning.

Oxfordshire's equivalent to BOAs, Conservation Target Areas (CTAs), identify biodiversity hotspots where conservation efforts can be most effective.

The use of CTAs aims to enhance biodiversity by maintaining, restoring and creating priority habitats. The Oxfordshire Nature Recovery Network (NRN) mapping identified connectivity between CTAs, assessing how woodlands, grasslands and wetlands are connected physically and functionally to identify:

- areas essential for wildlife movement;
- blockages hindering movement; and
- gaps in the network.

The Local Nature Recovery Strategy opportunity mapping will develop this work further.

Biodiversity opportunity network areas in the Bedfordshire area of the Chilterns National Landscape are those parts of the landscape where landform, soils and habitat distribution suggest there is the greatest opportunity to rebuild a landscape rich in biodiversity. In 2008, the Bedfordshire and Luton Biodiversity Forum published a map defining these opportunity areas which buffer priority habitats with special ecological requirements (such as wet woodland, heathland, acid and calcareous grassland) and have the potential to create new habitat blocks as stepping stones, allowing species to move more easily between habitat patches. Between 2020 and 2022, this approach was developed further as part of the 'Chalkscapes' project. Five 'Focus Areas' (covering 4,825 ha) were identified as key opportunity areas for biodiversity (see case study, section 10.2).

In 2014 Hertfordshire, recognising the importance of restoring or creating the 'right habitat in the right place', produced a series of '**Hertfordshire Ecological Network**' maps to guide decision about potential habitat creation. Areas closer to existing priority habitats were weighted higher as candidate areas for habitat creation than those further away. The maps enable users to identify how habitats are spatially related to one another, and the highest priorities and greatest opportunities for expanding and linking them together.

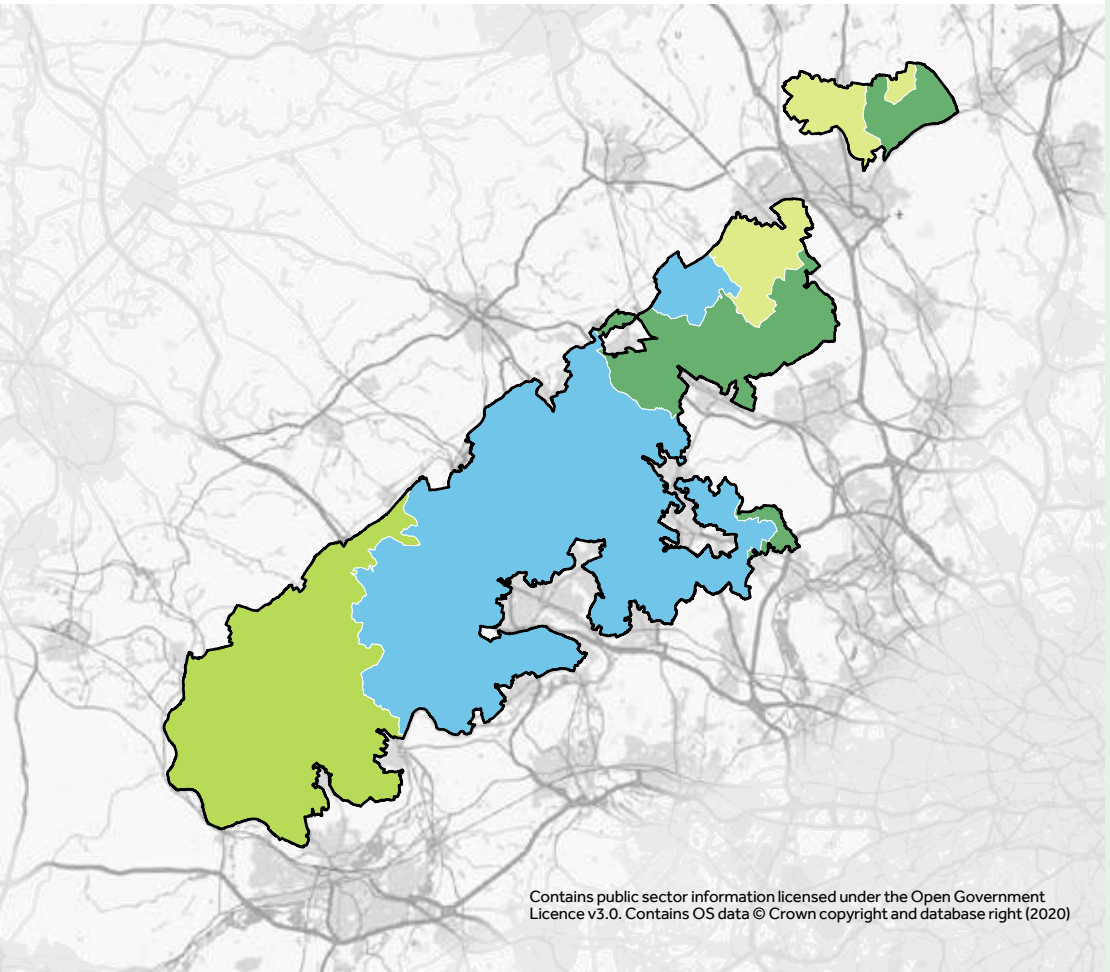
The maps, held under licence by the Hertfordshire Environmental Records Centre, are used as a strategic dataset by local planning authorities in a development management context to inform the appropriateness of development where there is a significant positive contribution or negative impact on the integrity of an ecological network, and to guide decisions around Biodiversity Net Gain. They have also been used to guide local plan production by informing, for example, how sensitive a site's development might need to be to the existing habitat, and the opportunities at a site to strengthen an ecological network.

Over the next few years, these networks may be superseded by, or subsumed within, the four Local Nature Recovery Strategies currently being developed across the Chilterns National Landscape. However, at the current time they help inform nature recovery and planning decisions across the Chilterns National Landscape, so are important networks to acknowledge.



Carrying out soil assessments

Map 4 Four Local Nature Recovery Strategy areas covering the Chilterns National Landscape



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Explore Local Nature Recovery Strategies

Explore the Local Nature Recovery Strategies covering the Chilterns to see where action is being prioritised and how you can contribute to nature recovery across the area.

Bedfordshire LNRS map and priorities

Buckinghamshire & Milton Keynes LNRS map and priorities

Hertfordshire LNRS map and priorities

Oxfordshire LNRS map and priorities

4.6 Local Nature Recovery Strategies (LNRS)

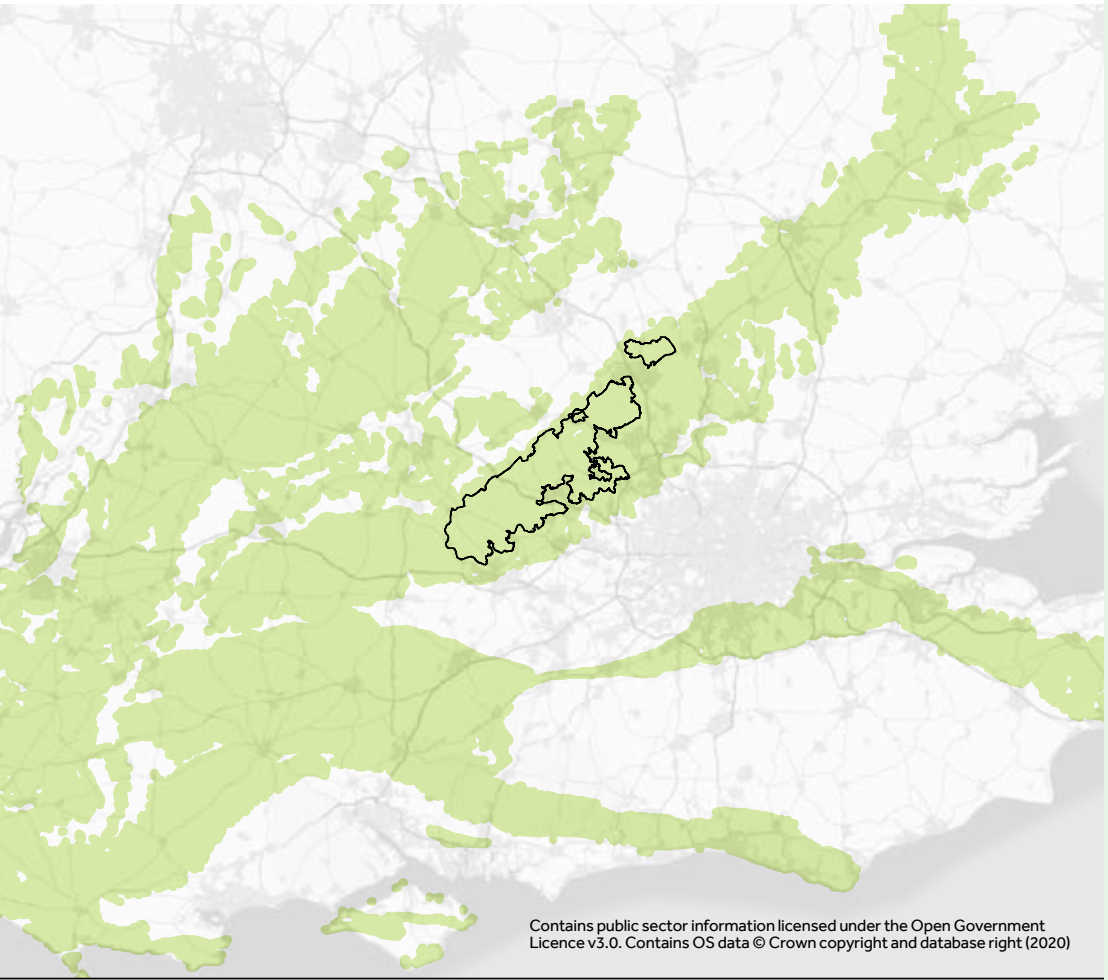
Local Nature Recovery Strategies (LNRS) are a new system of spatial strategy arising from the Environment Act 2021, designed to:

- Support efforts to recover nature across England
- Help planning authorities incorporate nature recovery objectives
- Support the delivery of Biodiversity Net Gain
- Help deliver national environment targets

Each LNRS is produced by a Responsible Authority (RA). The Chilterns National Landscape area is covered by four different LNRS: Bedfordshire, Buckinghamshire and Milton Keynes, Hertfordshire and Oxfordshire. The purpose being to identify locations, alongside the actions needed at these locations (e.g. creating new habitat, improving existing habitat), to support nature recovery and deliver the greatest benefit for the environment. Actions might include nature-based solutions (NbS) which use nature to provide social and environmental benefits e.g. creation of a wetland for flood attenuation. At the centre of each LNRS is a map to identify where actions might be taken, and environmental benefits realised.

All public bodies must have regard to the relevant Local Nature Recovery Strategy under the strengthened biodiversity duty in the Environment Act (2021). Therefore, this Nature Recovery Plan should be aligned with the four LNRS covering the National Landscape area, and similarly the LNRS should reflect the Nature Recovery Plan.

Map 5 Big Chalk area in relation to the Chilterns National Landscape



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Species rich-grassland

4.7 Regional Context of the Chilterns National Landscape for Nature Recovery

For the purposes of nature recovery, the Chilterns National Landscape should not be considered in geographical isolation but instead recognised as an important component of England's wider chalk landscape.

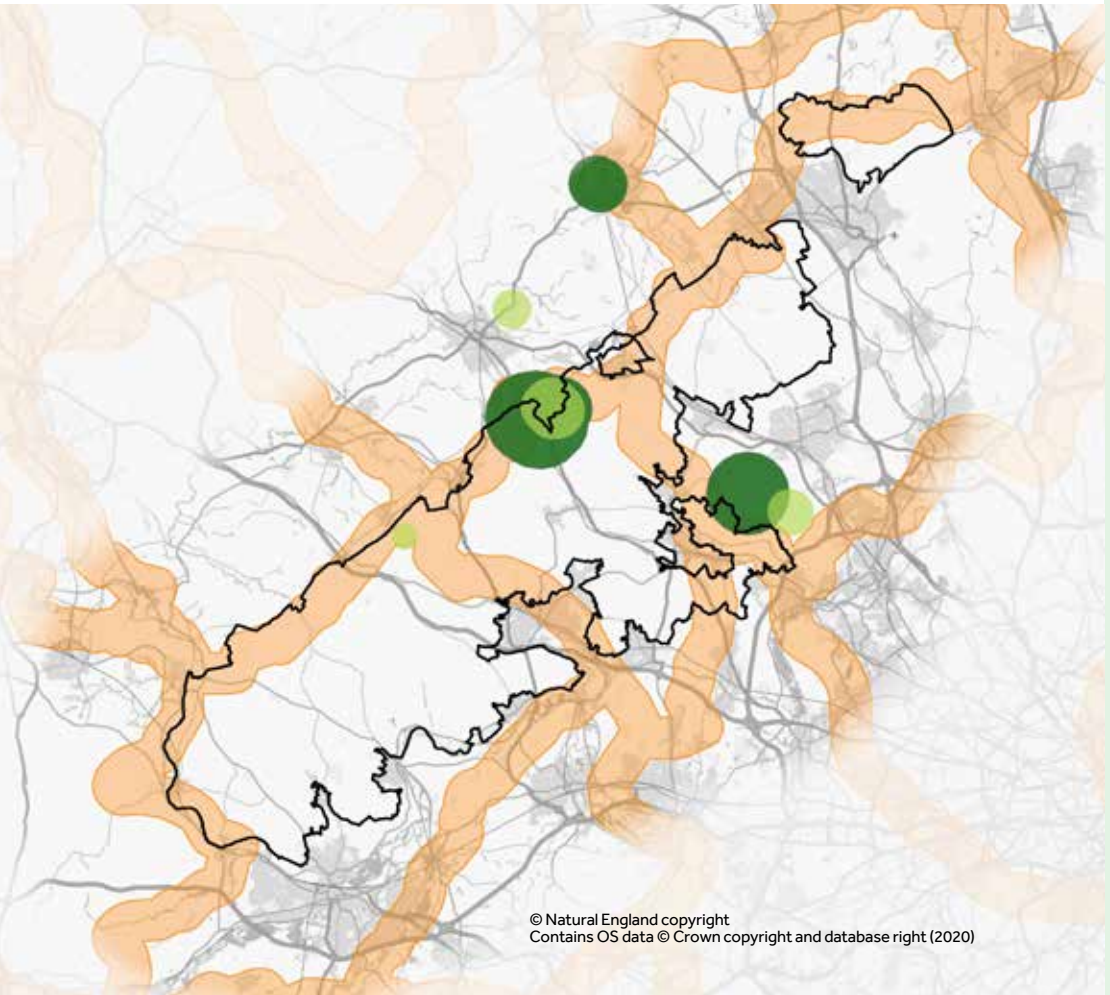
Big Chalk is a partnership initiative that recognises the global importance of chalk and limestone geology in England for nature and people. The programme is designed to forge vital connections between nature recovery projects on a geographical scale larger than the usual local boundaries, across the chalk and limestone landscapes of southern England. Covering a fifth of England (25,000 km^2), 14 protected landscapes, 26 Local Nature Recovery Strategies, and 80% of the world's chalk streams, it aims to build a core section of the national nature recovery network that will be central to the pledge to protect 30% of land and halt the decline of nature by 2030. The Chilterns National Landscape is centrally located within the Big Chalk area and is a member of the Big Chalk Partnership Board.

The partnership aims to build ecological resilience to climate change by improving:

- the area, quality and connectivity of nature-rich habitats across chalk and limestone landscapes
- quality and function of England's chalk streams; and
- the abundance and range of priority species.

Sustainably managed species-rich grassland areas within an extensively grazed complex habitat mosaic are a critical component of the vision.

Map 6 Buglife B-lines and Grassland Bottleneck analysis



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Species-rich grassland, a key characteristic of the chalk landscape, is of particular importance to pollinating insects (including bees, butterflies and hoverflies), which are essential to food production. However, widespread habitat destruction and fragmentation mean that pollinating insects are in major decline. Pollinators have become restricted to small, scattered fragments of suitable habitat, unable to colonise new sites and respond to threats such as climate change.

In response, Buglife and other conservation organisations have developed the B-Lines project, which has identified a network of 3 km-wide insect pathways across the UK connecting the best remaining wildflower-rich habitats from north to south and east to west. If 10% of the length of the network is filled with pollinator habitat then essential connectivity will enable pollinators to thrive (BugLife, 2025).

A critical B-Line runs along the Chilterns escarpment, joining habitat in North Wessex Downs National Landscape in the South via the Thames River corridor to the very north of the Chilterns and beyond to Cambridge. There are also two B-lines running in a SE-NW direction across the Chilterns; one along the River Wye valley, through Bradenham and Bledlow Ridge to Princes Risborough and Thame; and the other through the River Chess valley, to the north of Chesham and on to Tring.

In 2024 the Condatis model was used to was used to identify regional-scale 'bottlenecks' in connectivity across the Chilterns National Landscape to help identify the most impactful opportunities for targeted improvements to enable species migration from south to north in response to climate change. For our purposes bottlenecks are areas between mapped priority habitats where species mobility is restricted. The analysis considered generalist species capable of moving through the landscape at both a low (1 km) and moderate (3.4 km) dispersal distance per generation. The shorter dispersal distance of 1 km is appropriate for many insect pollinators.

Along the B-Lines corridors through the Chilterns, severe bottlenecks to species movement across priority grassland habitats (mapped in Natural England's priority habitat inventory) can be found around Pirton (1 km dispersal distance), Wendover (1 km and 3.4 km dispersal distance), Chinnor (1 km dispersal distance) and South of Wallingford (3.4 km dispersal distance). Species-rich grassland habitat creation and restoration should be prioritised in these areas to enable pollinator movement.

5. River catchments and their plans



The four catchment partnerships have complementary visions and priorities



Working with partner organisations at Chesham Moor (February 2025)

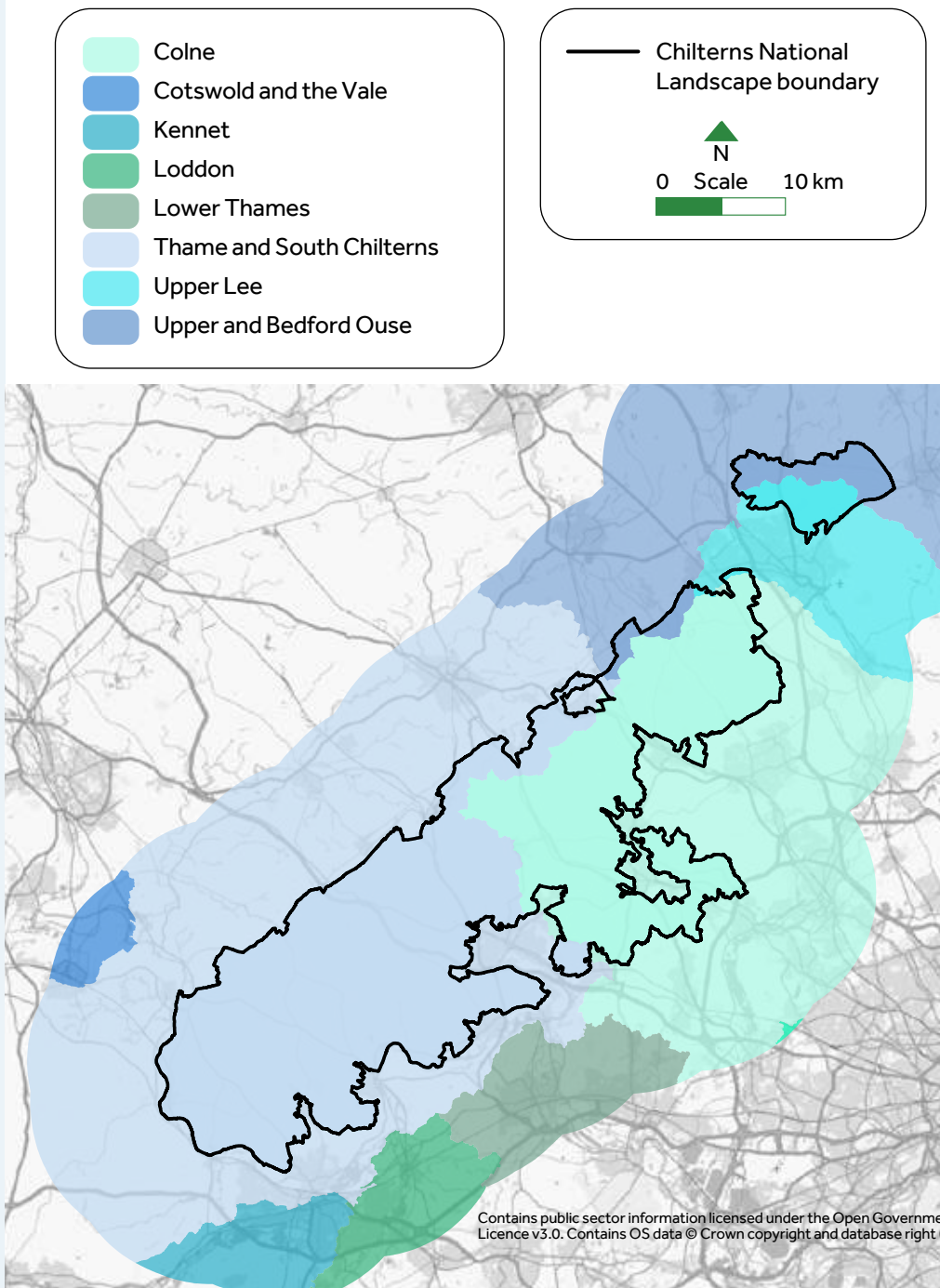
5. The link to river catchments and their plans

The Environment Agency's River Basin Management Plans (RBMPs) set the legally binding specific environmental objectives that underpin water regulation and are a key foundation for delivery of the Government's 25 Year Environment Plan. They were last updated in 2022, and the current RBMPs will run until 2028. The Thames River Basin Management Plan covers most of the Chilterns National Landscape, but the North Chilterns area is also covered by the Anglian River Basin Management Plan.
Each River Basin Management Plan is sub-divided by catchment.

The Chilterns National Landscape is spread across four different river catchment management areas for the purposes of the Water Framework Directive. Most of the landscape is in the Thames and South Chilterns catchment (ID3098, 57%), with the Colne catchment (ID 3017, 35%) the second largest management area and Upper Lee (ID 3105) and Upper Bedford Ouse (ID3104) covering 3% and 5% on an areal basis respectively

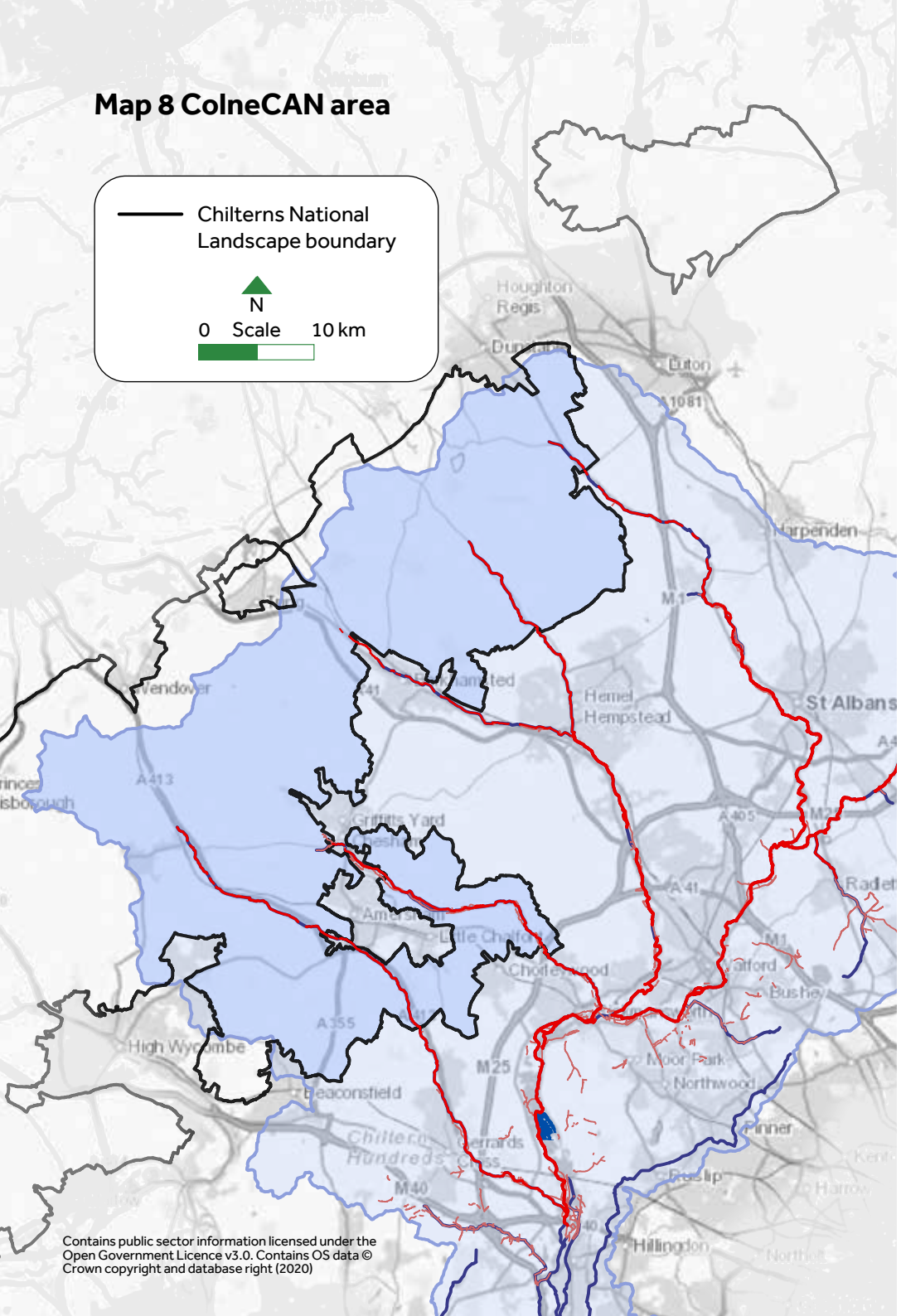
Catchment partnerships are groups that bring together non-government organisations, community groups, government agencies, local authorities, water companies, landowners, farmers, business, academia – all of which have an interest in managing local rivers. They aim to ensure management is collaborative and planned on a catchment scale. The Chilterns National Landscape area is home to three catchment partnerships: The Colne Catchment Action Network (ColneCAN), the South Chilterns Catchment Partnership, and the Upper and Bedford Ouse Catchment Partnership.
Also, portions of the North-West extent fall within the Thame catchment and its Partnership (including the high-conservation headwaters of several River Thame tributaries).

Map 7 Water Framework Directive catchments



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Map 8 ColneCAN area




River Gade near Gt. Gaddesden

Colne Catchment
River water bodies
Lake water bodies

Chalk Streams
High certainty*
Low certainty*
* According to Natural England data

5.1 ColneCAN

ColneCAN ties together the work of the Colne Valley Regional Park with the Chilterns Chalk Streams Project. The aims of the group are focused around control of invasive non-native species (INNS), involving people with their local rivers, improving wildlife corridors, water quality and flows and working in partnership. More information can be found on the ColneCAN website.

Whilst much of the area covered by ColneCAN is outside the Chilterns National Landscape boundaries, because rivers act as wildlife corridors there is a two-way movement of species both up and downstream. Obstructions that prevent the movement of animals and fish, such as weirs and impoundments, in the river network downstream of the Chilterns National Landscape can negatively impact river ecological health and prevent nature recovery in chalk stream headwaters. Conversely polluting and water abstraction activities in the headwaters of the chalk streams of the Colne catchment will affect downstream water quality and river flows and contribute to poor river health in the River Colne, and ultimately the River Thames. It has long been established how important maintaining the health of headwaters is to overall river ecological status, so activities taking place in the catchment of chalk streams within the Chilterns National Landscape can have profound effects on downstream river health.

Relevant ColneCAN priorities include:

- Avoiding severance of ecological connectivity between the Thames and the Chilterns in the event of Heathrow expansion or other large infrastructure projects.
- A catchment-scale focus and action across county boundaries and across landscape partnership boundaries including linking the work of the National Landscape with that of the Colne Valley Regional Park.
- A catchment-scale programme of work to tackle INNS.
- Mapping and monitoring of polluting outfalls to create evidence-led water quality improvement projects.

5.2 South Chilterns Catchment Partnership

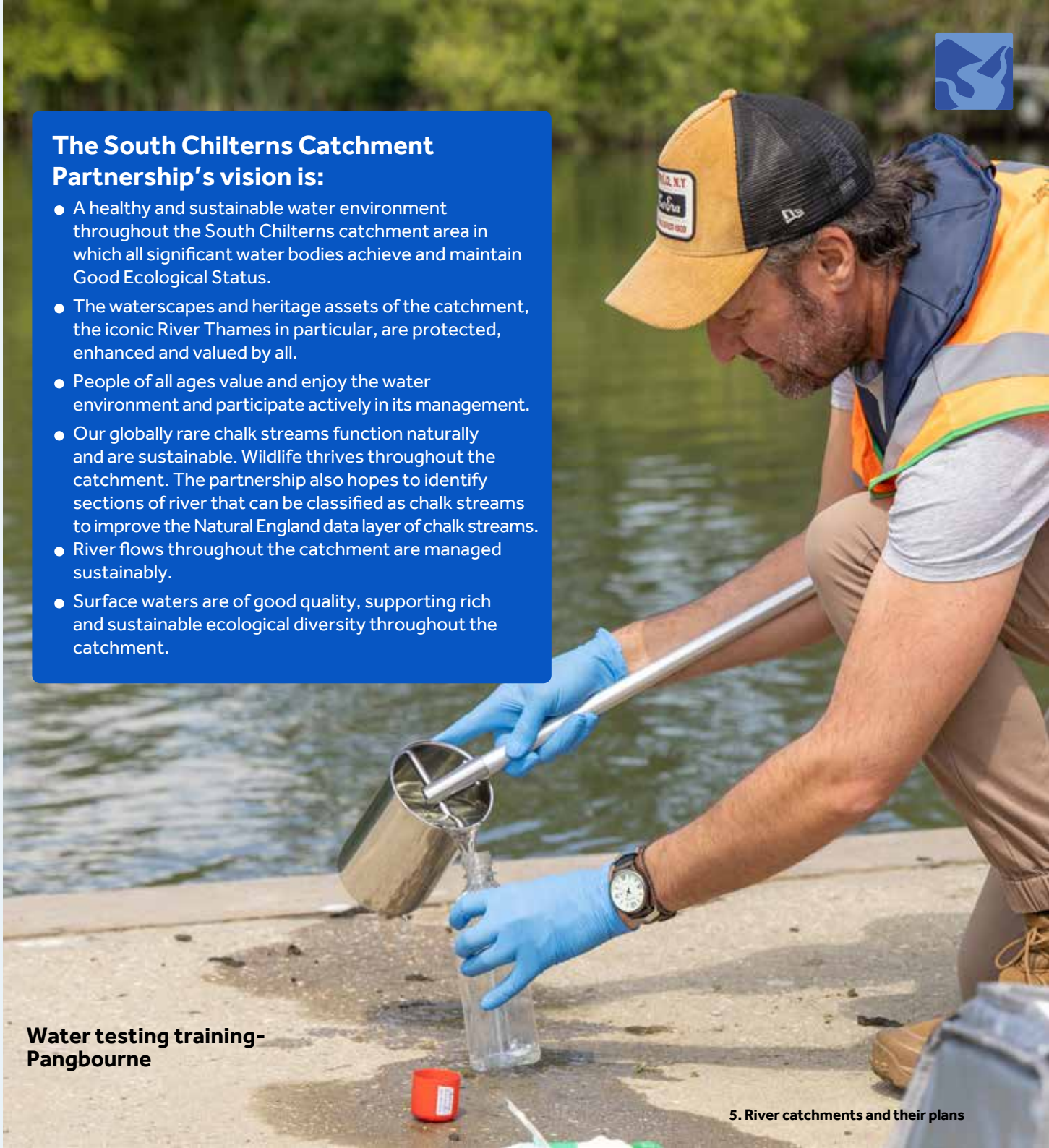
The South Chilterns Catchment Partnership area includes parts of both the Chilterns National Landscape and North Wessex Downs National Landscape.
The partnership is co-hosted by Thames21, Chilterns Chalk Streams and Action for the River Kennet (ARK).

Each co-host has published a catchment plan outlining key issues and challenges for:

- the River Thames
- tributaries to the East (Ewelme Brook with River Wye to follow)
- to the West (River Pang and Sulham Brook) of the Thames

The South Chilterns Catchment Partnership's vision is:

- A healthy and sustainable water environment throughout the South Chilterns catchment area in which all significant water bodies achieve and maintain Good Ecological Status.
- The waterscapes and heritage assets of the catchment, the iconic River Thames in particular, are protected, enhanced and valued by all.
- People of all ages value and enjoy the water environment and participate actively in its management.
- Our globally rare chalk streams function naturally and are sustainable. Wildlife thrives throughout the catchment. The partnership also hopes to identify sections of river that can be classified as chalk streams to improve the Natural England data layer of chalk streams.
- River flows throughout the catchment are managed sustainably.
- Surface waters are of good quality, supporting rich and sustainable ecological diversity throughout the catchment.



Water testing training- Pangbourne

5.3 Upper & Bedford Ouse Catchment Partnership

The Upper & Bedford Ouse Catchment Partnership (UBOCP) is located in the Anglian River Basin District and covers an area from the headwaters of the River Great Ouse (west of Buckingham and Brackley) to east of Huntingdon and St Ives. It contains the Ivel catchment with the Rivers Ivel and Flit rising from springs in the Chiltern chalk. UBOCPs vision is for their rivers and their catchment to be healthier, richer in wildlife and valued by all.

To achieve this vision the work and objectives of the Partnership are organised under seven themes supported by working groups:

- **Data & Evidence:** Understanding and using available data and evidence, and targeting citizen science activity to maximise value
- **River Restoration:** Developing a strategy for river restoration and reducing the impacts of physical modification
- **Volunteering & Citizen Science:** Support, enhance and direct citizen science activity
- **Agriculture:** Engaging and connecting with farmers and advisors, reducing the impacts of rural diffuse pollution
- **Natural Flood Management:** Supporting the development of targeted and effective NFM projects
- **Chalk Streams:** Raising awareness of chalk streams and their importance, and restoring degraded chalk streams
- **INNS:** Targeting activity to reduce INNS and their impacts

5.4 Upper Lea Catchment Partnership

The Upper Lea Catchment Partnership (River Lea Catchment Partnership – Home) covers a significant part of National Landscape outlier between Luton and Hitchin (River Mimram) and a small area to the south west of Luton.

The River Mimram Catchment Partnership (River Lea Catchment Partnership – River Mimram home) has four main themes:

- Flow – getting more water back into the river;
- Improving the water quality, habitats and wildlife;
- Helping people appreciate and get the most out of the river;
- Measuring the river's ecological status and monitoring its health.

The Luton Lea Catchment (River Lea Catchment Partnership – Luton Lea home) has three themes:

- Community engagement and participation;
- Promoting appropriate and sympathetic land management;
- Improving water quality and water quantity.

It is clear that many of the different partnerships have complementary visions and priorities which are appropriate within the Chilterns National Landscape. For example, addressing water quantity issues (e.g. low flows and flooding), improving water quality and habitat, and tackling non-native invasive species are all key themes that are essential to improving the health of our nationally-important chalk streams, and for river management in general. Encouraging and supporting community engagement and participation, alongside adequate monitoring of river health, are also critical activities in catchment management.



Collecting spring water samples from the River Chess catchment

6. Heritage considerations with nature recovery



Understanding our past to help deliver a sustainable nature recovery today

6. Heritage considerations with nature recovery

The Historic Environment is defined by the National Planning Policy Framework as being *'all aspects of the environment resulting from the interaction between people and places through time, including surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.'*

This can be more usefully thought of as three distinct but interrelated aspects:

- Archaeological assets (known and unknown)
- Built environment (buildings and historic properties)
- Social history /traditions (these include oral histories, storytelling, folklore, traditional crafting and contemporary arts)

Archaeology is a finite resource. Once removed from its context (whether by intentional excavation and recording or through inadvertent destruction), it can neither be replaced nor restored. It can be reconstructed, but this is a different thing entirely from preservation and protection. Buildings and historic properties can offer unique opportunities to seek mutually beneficial heritage and nature recovery outcomes. Social history and traditions are deeply intertwined in the landscape and in human interactions with nature.

Whilst Scheduled Monuments are protected by statute and legislation, and known archaeological features, even in the unscheduled state, are given some protection through planning, unknown archaeological features and those on undeveloped but farmed land are extremely vulnerable. Further regulation including scheduling of features is not always a desirable or sensible way forward. Rather, a bottom-up approach to management and protection from farmers and land managers is preferred. However, these agents can only lead on best practice if they are

- advised/educated on what best practice options are available to them and, crucially,
- if they are engaged with the significance of the heritage of which they are the stewards.



Windmill at Lacey Green

Within the National Landscape there are nine monuments on the Historic England Heritage at Risk register, as well as three listed buildings and two Registered Parks and Gardens (RPGs). A short-term (2-5 year) plan would be to rehabilitate these sites to the point where they are no longer considered to be at risk. Another short-term aim would be to establish a baseline monitoring of condition for all known significant archaeological features.

There are many opportunities for integrated approaches, which may include the preparation or updating of a Conservation Management Plans, Parkland Management Plans, or equivalent for RPGs where this is not present, prioritising those on the Heritage at Risk Register. Equally, green space and infrastructure as part of conservation areas should be considered, along with the role that historic buildings have in being wildlife havens and habitats in their own right. Other opportunities include the restoration of historic hedgerows, re-planting of lost woodland and orchards, restoration of historic ponds, water-meadows, water-cress beds and other projects where information about the historic landscape can **inform restoration or rehabilitation**.

Longer-term ambitions would be to begin to regularly feature archaeology as a factor in land and whole farm management plans. We have the data from both LiDAR and the National Mapping Programme as well as Historic Environment Record information enabling us to make good contributions to landscape management.



Mature hedge, Bradenham Valley

Case study: Desborough Castle, High Wycombe



Within Desborough Castle Park, a public amenity owned by the Buckinghamshire Unitary Authority (formerly Wycombe District Council), the medieval remains of a defensive enclosure (known as Roundabout Wood) and about 40% of an Iron Age hillfort, which exists as a slight ditch and bank, are still present. Internal to this may be a large amount of buried archaeology (some identified by a 2019 geophysical survey) including pits of undetermined date. The park, apart from the tree covered medieval earthworks, is unimproved chalk grassland currently managed by an annual cut and collect regime by the council. The site is a regular location for heavy domestic and occasional industrial fly tipping and the Chiltern Rangers (tenants of the site) regularly remove tonnes of litter.

A series of relatively simple actions might solve this problem – it is hard to convince a community to value a space if there is no community recognition of its importance. Fly-tipping and other anti-social behaviours such as illegal motorbiking are less likely to be carried out if the surrounding community is engaged in the preservation and protection of the site. Two project proposals seek to enthuse local people about the wealth of history and natural heritage on their doorstep: firstly, a community archaeological excavation involving the Castlefield community and local schools; and secondly, a new cutting regime allowing areas of chalk grassland to revert to wildflower-rich meadow.

7. Climate change and nature recovery



Climate change demands urgent, resilient action for nature recovery

7. Climate change and nature recovery

Climate change, alongside nature decline, is one of the biggest challenges of our generation. Average surface temperature in the UK has already risen by 1.5 °C since pre-industrial times (as of 2024) and we may see between +2 and +4 °C warming by 2100 depending on our global climate change mitigation action. +2 and +4 °C refers to changes in global mean temperature (°C) compared to pre-industrial levels related to a specific point in time, e.g. by 2100. The future extent and impacts of climate change depends on our success in controlling global emissions over the next few decades.

Defra 25YEP contained a commitment to ensure that Governments policies, programmes and investment decisions consider the possible extent of climate change this century. The subsequent EIP2023 indicated that organisations must be prepared for global warming levels up to +4 °C, and Climate Change Committee advice is to plan for +2 °C of global warming and assess risk for 4 °C of global warming by 2100.



Misbourne, Old Amersham dead sticklebacks

Figure 5 Global surface temperature change relative to 1850-1900, from IPCC (2021)

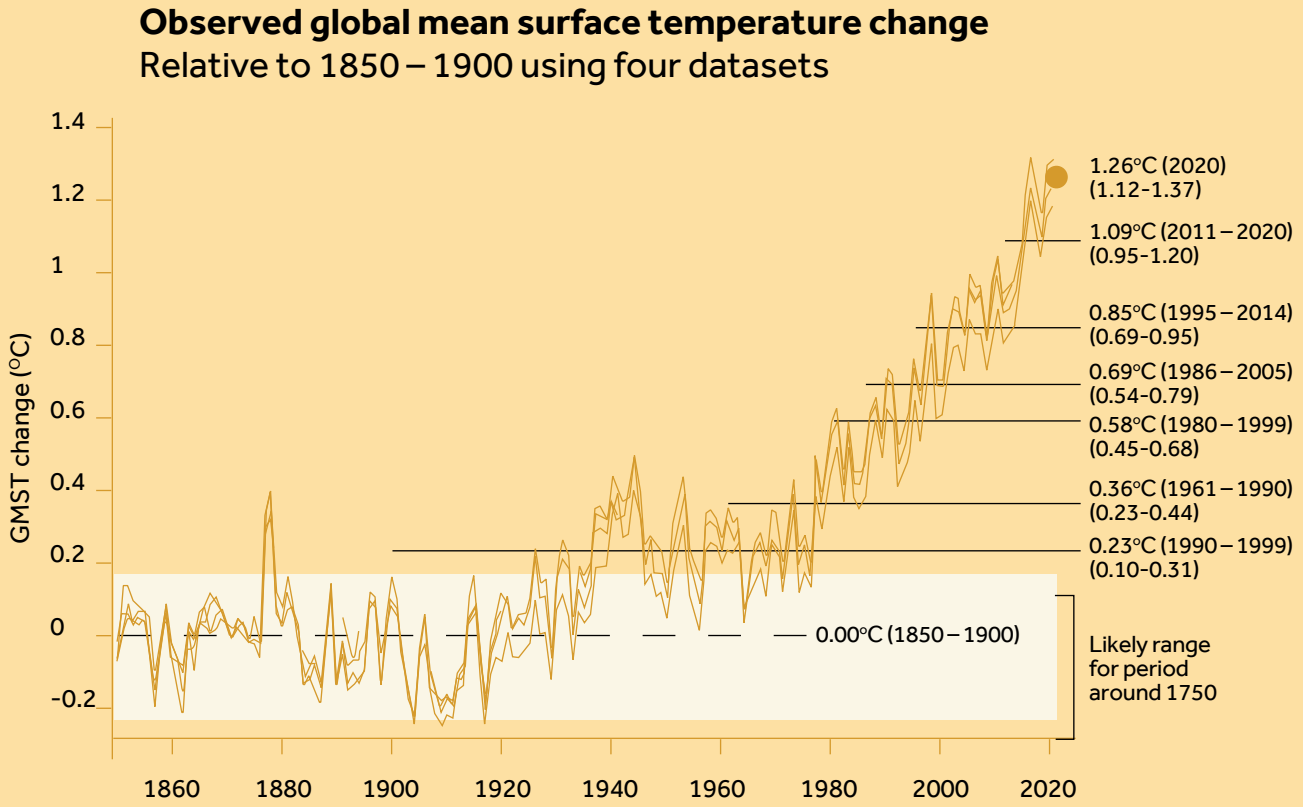


Figure 1.12 in IPCC, 2021: Chapter 1. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Chen, D., M. Rojas, B.H. Samset, K. Cobb, A. Diongue Niang, P. Edwards, S. Emori, S.H. Faria, E. Hawkins, P. Hope, P. Huybrechts, M. Meinshausen, S.K. Mustafa, G.-K. Plattner, and A.-M. Tréguier, 2021: Framing, Context, and Methods. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 147–286, doi: 10.1017/9781009157896.003 .]

Critical primary impacts of climate change to consider in relation to nature recovery are:



Storms: potential increase in frequency and severity of storms with implications for our woodland and ancient and veteran trees. However, we don't yet have good scientific consensus on trends in this area or details.

Drought: brought about by lack of rain (not necessarily high temperatures). Woodland situated on free-draining soils with high hydraulic conductivity may be particularly vulnerable, and drought will make native broadleaf trees more prone to other pressures such as pests and diseases.

Extreme cold: whilst average winter temperatures are increasing we may see extreme cold events that could impact wildlife.





Heatwaves and increasing seasonal temperatures: hot spells become more frequent, with heatwaves almost 100 times more likely by the end of the century than at present.

July 2022 heatwave saw air temperatures over 40 °C with consequences for nature such as:

- direct effects of heat stress on plants, birds, animals and livestock, deaths of insects such as caterpillars and bumblebees and dehydration as water supplies dry up (far beyond the normal wet and dry cycles of ephemeral ponds and winterbourne sections of chalk streams which provide important habitats in their own right); heat-stress also increases susceptibility to pests and diseases
- wild fruit dropping from plants to help them preserve water with longer term implications for food supply in autumn
- leaves being shed from trees early
- warmer water temperatures in ponds and rivers (particularly shallow, clear chalk streams)



Wildfires: due to increasing frequency and severity of heatwaves and summer drought, wildfires are projected to increase with associated damage to wildlife and habitats.

In the UK Climate Change Risk Assessment 2022 report, the Government outlines several priority risk areas that are of relevance to nature recovery.

These are:

- risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards;
- risks to soil health from increased flooding and drought;
- risks to crops, livestock and commercial trees from multiple climate hazards;
- and an associated risk to natural carbon stores and carbon sequestration in habitats leading to increased emissions.



The Government's commitment to establishing a Nature Recovery Network (NRN) designed to expand, improve and connect wildlife-rich habitat across England is a biodiversity initiative that should support climate adaptation.

It is hoped that by establishing the network, landscapes will become more resilient to climate change through enhanced ecosystem function; species will be able to migrate northwards and westwards to colonise new cooler areas (such as north-facing valley sides); by ensuring populations are not fragmented and stay connected, natural genetic diversity within species will be strengthened and populations will be better able to tolerate changing weather conditions and extreme events.

However, our climate is changing faster than many of our habitats and species can adapt and become more resilient to climate change. The climate over the next 70 years will require species not just to move a few miles but the full length of England. Species will also need to move to fill the vacuum left behind. As the geology of the Chilterns makes it particularly vulnerable, climate adaptation will be key to nature recovery.

In this Nature Recovery Plan, because we recognise that climate change will have an impact on nature recovery in the Chilterns, we highlight the sensitivity of our special characteristics and priority habitats to climate change in Section 9 using the Natural England Climate Adaptation Manual (NE751) as our key source of information.
We recognise that this is only a starting point to think about climate adaptation and we will be considering the effects of climate change in more detail in the Climate Change Adaptation Plan that will be produced as part of the next cycle of our Management Plan.

Figure 6 Rebuilding nature – the 'Lawton Principles'



8. Connecting people and nature



Nature recovery succeeds when communities connect, learn, and act

8. Connecting people and nature

A key outcome of the Nature Recovery Plan is for people to be better connected with nature. It is now widely recognised that people and communities can play a vital role in nature recovery and need to be part of the vision. Nature recovery needs to be a collaborative approach, with the support and engagement of local communities helping to deliver change and bringing benefits to all. The Chilterns is a home and workplace for over 80,000 people and some 1.6 million live within 8 km of the National Landscape. We are also one of the most visited protected landscapes in the country with the large towns of Reading, High Wycombe, Aylesbury, Luton and Dunstable on our doorstep and accessible transport links from London, including the London Underground and Chiltern Railways. The Chilterns Conservation Board and partners are working with communities across the Chilterns and beyond to connect more people with nature.

8.1 Volunteering for all

With the climate crisis becoming more acute, as well as a growing public interest in issues such as the state of our chalk streams and species decline, there is a greater urgency and desire by people to take action for the environment. There are many ways people can contribute to nature recovery in the Chilterns:

- Volunteering for nature-based organisations. This could be anything from practical conservation tasks outdoors to office-based activities, offering a wide range of opportunities. There are many organisations in the Chilterns offering conservation volunteering including the Chiltern Society, Chiltern Rangers, National Trust, Wildlife Trusts, Natural England as well as local community wildlife groups.
- Citizen science and wildlife monitoring programmes such as the RSPB Big Bird Count have become more popular, and this is a growing area of volunteering in the Chilterns with programmes such as Tracking the Impact and a variety of ecology surveys and water quality monitoring programmes on the Chilterns chalk streams.
- There are many locally based nature, environment and climate action groups. They encourage people to take action locally, for example planting trees or hedgerows, rewilding community greenspaces, litter picking or encouraging nature friendly gardening.

However, volunteering still attracts a narrow demographic. There is great potential to make volunteering more inclusive and attract new volunteers, reflecting the diversity of communities within and close to the Chilterns.



Chalk Streams Project and Ver Valley Society volunteers working together to carry out riverfly monitoring on the River Ver to help track and protect river health.

This will require a partnership approach, to design, and coordinate relevant and accessible volunteer opportunities. There need to be pathways to engagement including entry level and youth volunteering, with opportunities for training and skills development so that people can progress.

Case study: St Albans Wilderhood Watch – enabling local community action

"By combining our individual actions we are creating positive changes and improving the nature network around us".

Wilderhood Watch was set up by a group of St Albans residents wanting to take action to make their neighbourhoods more friendly for wildlife and people, one street at a time. Those living in a Wilderhood Watch Street are encouraged to become involved and help take action for nature. This could be through wildlife friendly gardening, swapping pollinator-friendly plants, greening or rewilding their local community spaces, or joining a local conservation project. The project provides resources and support for starting a group.

This has created a community of residents who care about nature, collaborating with their neighbours, encouraging and supporting change and creating a 'corridor' of plants from which bees and other pollinators can forage. The Wilderhood Watch website maps projects and activity in each neighbourhood. People can find out what's going on in their area and add new projects or events to the map, so you can see how and where activity is happening.



There are lots of options for people to get involved, from small-scale individual actions to joining one of the conservation projects developed through Wilderhood. Some examples are listed below:

- **Rewilding** gardens, creating ponds, installing bird feeders or a bug hotel, creating access holes for hedgehogs
- **Street weeding project** – replacing glyphosate spraying with manual weeding carried out by residents on six Wilderhood Watch streets (collaborating with the Hertfordshire Wildlife Trust, Hertfordshire Highways and the District Council)
- **Joining** one of the many events organised by Wilderhood Watch

Information, resources, and inspiration on making your garden and lifestyle more sustainable for the environment are available at [wilderhoodwatch.org.](wilderhoodwatch.org)



Cycling in the Chilterns

8.2. Boosting health and well-being

It is now widely recognised that a lack of physical activity and time spent in scenic, nature-rich greenspaces has major impacts on people's physical and mental well-being. The Chilterns offers a vital resource for recreation and leisure which is enjoyed by millions of visitors every year. It is a landscape ideal for walking and a wide array of outdoor activities. With an increasing and more urbanised population, the Chilterns countryside has become more important than ever for recreation and nature connection.

However, many people face barriers to accessing and enjoying nature. A study by the University of Bedfordshire on how diverse communities engage with greenspaces and the countryside, found that only around 33% of participants in the Luton/Dunstable area visited greenspaces weekly, with older individuals, those facing various challenges, and people from minority ethnic backgrounds being the least frequent users. Nature is for everyone. Addressing this inequality of access and working to make the countryside more welcoming and inclusive is an overriding priority for the Chilterns.

Priorities for supporting more equitable access:

- Improve the accessibility of greenspaces. Communities need high quality and accessible green spaces close to home.
- Well maintained accessible routes with good signage.
- A collaborative approach will be required, working with many different partners.

Figure 7 Chilterns celebration of food and drink

Raising awareness of nature-friendly farming, local food and drink, heritage and crafts.











Case study: Chilterns Walking Festival – increasing understanding and connection with the Chilterns



The Chilterns Walking Festival is an initiative of the Chilterns Conservation Board, established in 2017 to showcase the landscapes, wildlife, heritage, people and places of the Chilterns. Taking place over two weeks each May, it features over 60 walks and outdoor events encouraging more people to walk and experience the Chilterns. The Festivals attract around 600 participants, mostly within an hour's travel-time of the Chilterns and many from nearby towns.

The walk are designed to combine walking with exploring a new area, visiting interesting sights, learning something new, stopping off at a café or pub, tasting local produce, meeting local people- and having fun!

Walk leaders are from a wide range of nature organisations and community groups with each of the many volunteers keen to share their love and knowledge of the Chilterns. Around 20% of Walking Festival participants are not regular walkers, so for many people it is as much about the wider experience as the walking itself.

The Walking Festivals achieve multiple objectives:

- Increasing understanding and enjoyment of the Chilterns. This promotes a stronger sense of place.
- Promoting local produce – 63% of participants use at least one local business during their visit. Many of the walks take in a café or pub stop, and some include a tour, tasting, talk or demonstration by a local food, drink or craft producer. Farm walks show how food can be produced in a nature-friendly way.
- Encouraging greater connection with the Chilterns. Participants have gone on to join walking groups, conservation activities or to volunteer with us.
- More people spending time outdoors in nature, benefitting their health and well-being.
- Attracting a greater diversity of participants by offering more easy access walks, linking in with themes such as Mental Health Awareness Week and involving walk leaders from diverse backgrounds such as the Salaam Seekers women's walking group, the Disabled Ramblers, Dadima's Walks and Dudes & Dogs.

8.3 Education and awareness

An increasingly urbanised population means people are becoming more disconnected from the countryside and nature. Education and engagement is vital for raising awareness of the specialness of the Chilterns landscape, sparking an interest, encouraging people to discover and learn more about the area's nature and that it needs managing and protecting. By experiencing nature, people are more likely take an interest and to help care for it.

This could include activities such as guided farm or river walks, art classes in nature, foraging events, mindfulness sessions, and toddler groups that encourage play and exploration outdoors. Festivals such as the Chilterns Walking Festival provide many opportunities for people to experience the landscape.

There are many organisations in the Chilterns offering activities that engage people with nature, from public events (guided walks and nature-based activities) to outdoor learning such as forest schools and educational programmes (e.g. the Chilterns Chalk Streams Project Trout in the Classroom). Education and awareness raising is also important to encourage people to explore the landscape in a responsible way. People are often not aware of the impacts that visitor pressure can have on the countryside, and especially in sensitive habitats. As visitor numbers grow it is more important than ever to educate people by promoting the Countryside Code, through signage, interpretation and media campaigns.

8.4 Visitor management

Visitor numbers to the Chilterns countryside sites are increasing, and some of the most sensitive habitats are under great pressure and being adversely impacted. Accommodating this increased use will require increased levels of resources and management to avoid damage to habitats and disturbance to wildlife. Investment in visitor management is crucial – diverting people away from the most sensitive habitats, zoning, creating greenspace buffers. Alongside this there is a need for more information and education. (See 'Desborough Castle' case study in Section 6).

8.5 Businesses

It is important that nature recovery is embedded in the local economy and supports livelihoods. Visitors and local people can help by supporting the businesses that deliver nature recovery. Examples include buying local meat produced from livestock which graze and help maintain important habitats, local honey, apple juice from Chilterns orchards and other locally grown produce. The wild deer population in the Chilterns has increased rapidly over the years and this is causing damage; managing deer numbers is essential for habitat maintenance, regeneration and biodiversity but also provides a business opportunity selling venison products and featuring it as a Chilterns speciality on local menus. Businesses have an important role to play in communicating messages about the special qualities of the Chilterns, as well as environmental messages relating to their approach to farming and food production. There are inspiring examples of businesses leading the way in communicating these messages to their customers, and giving back to nature.



Village Farm, farm walk and talk

Case study: Local businesses promoting wildlife

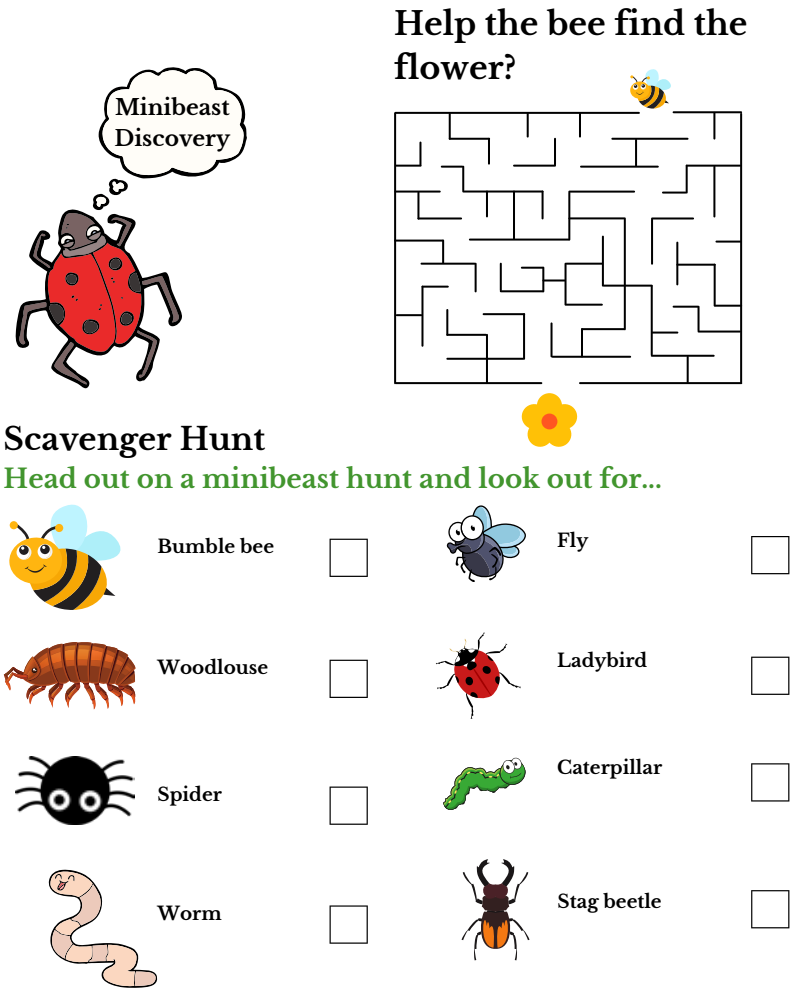


Puddingstone Distillery has been partnering with Herts and Middlesex Wildlife Trust with their launch of the world's first Himalayan balsam gin – raising awareness of the conservation work needed to address this invasive, non-native species (INNS). See video They have also used local botanicals and juniper in their gins, with a percentage of profits going to support local conservation groups.

Nettlebed Creamery makes award-winning cheeses with milk from their organic dairy herd on the Nettlebed Estate. They have a café 'The Cheese Shed' selling their speciality cheese toasties and a shop stocking local produce. It is popular with walkers, cyclists and families, with its rustic countryside setting. There are mini-beast hunt and wildlife spotting activity sheets available to encourage kids to be more nature aware. And they communicate their ethos of organic farming and sustainability.

The Barn Café at Turville Heath is also known as the 'No car café'. Customers having to walk, cycle or ride to get there. They serve venison dishes at the Barn and use and promote local produce from local suppliers. (see video).

Figure 8 Nettlebed Creamery quiz



8.6 Priority outcomes for nature recovery



Community hedgelaying event

Table 7 Priority outcomes for people and nature in the Chilterns National Landscape

Themes	Priority outcomes codes
Volunteering opportunities are developed and promoted, and barriers to participation reduced. Volunteering is made more inclusive to reach new and diverse audiences.	PeN 1
Local communities are encouraged and supported to take local action for nature by providing resources, information and a communications platform, to encourage wider participation.	PeN 2
Funding opportunities are sought for supporting education, health and well-being initiatives that complement nature recovery activities. A collaborative, partnership approach will be essential.	PeN 3
Opportunities to improve access to greenspaces and countryside close to home are identified. Strategic access links and connectivity between rural and urban areas are improved.	PeN 4
Awareness and understanding of the Chilterns as a protected, farmed and managed landscape is increased. Messages about caring for the countryside are widely adopted and promoted.	PeN 5
Visitor management initiatives are invested in and developed, car-free visits increase and positive behaviour change is encouraged.	PeN 6
Nature recovery is embedded in the local economy, and initiatives which promote local produce are supported and promoted.	PeN 7

9. Special qualities of the Chilterns National Landscape



Protecting Chilterns' chalk hills, valleys, streams, woods and heritage

Special qualities

The Chilterns National Landscape was designated as an AONB in 1965 to protect its special qualities, which include the steep chalk escarpment with flower-rich downland, woodlands, commons, tranquil valleys, ancient routes, villages with brick and flint houses, chalk streams, and a rich historic environment of hillforts and chalk figures. While there are thirteen special qualities in total, this page highlights those most directly relevant to nature recovery.

Significant ancient hedgerows, hedgerow and field trees, orchards and parkland

Weaving across farmland that covers approximately 60% of the Chilterns.



Nine precious chalk streams

A globally scarce habitat and home to some of the UK's most endangered species, including UK Biodiversity Action Plan priority species such as otter, water vole, reed bunting and brown trout, as well as numerous chalk springs that occur along the base of the escarpment.



Nationally important concentrations of chalk grassland extremely diverse in flora and fauna

Home to some scarce and threatened species. Once extensive, the chalk grassland now only covers 1.5% of the National Landscape mostly in small fragments. Species for which the National Landscape is particularly important include Chiltern gentian, wild candytuft, pasque flower, silver-spotted skipper and glow-worm.



Over 2,300 ha of common land, heaths and greens

Rich in wildlife and cultural heritage, forming a significant part of the Chilterns' 3,700 ha of Open Access land.



One of the most wooded landscapes in England

With 24% woodland cover concentrated in the central and southern areas. 56% of the woodland is Ancient, a particularly rich, distinctive and prominent feature, including the Chilterns Beech Wood Special Area of Conservation. It also includes significant box, juniper and beech yew woods, as well as many veteran trees and relict wood pasture.



9.1 Woodland and trees

Special qualities of the Chilterns National Landscape



Shardeloes lake and wood

9.1 Woodland and trees

9.1.1 Statement of woodland and tree habitats

The Chilterns is one of the most wooded landscapes in England with woods covering almost 24% (19,775 ha) of the National Landscape. Woodland, ancient hedgerows, hedgerow and field trees, traditional orchards and parkland are all important elements of the Special Qualities on which the AONB designation is based. The latest analysis for Natural England (Forest Research, 2023) identifies the extent of tree cover outside woodland (excluding orchards) in the Chilterns National Landscape as 3,973 ha (c. 5% of the area), and the area with orchards included as 4,043 ha.

Ancient Woodland is of particular importance in the landscape, with 56% of woodland cover designated as ancient (13% of the AONB area compared to only 2% of England overall), and 71% (14,586 ha) of all the woodland cover classified as deciduous woodland; a priority habitat designated by Natural England.

Ancient hedgerows containing field trees are valuable habitat and ecological corridors to support species movement, and it is estimated that approximately 44,000 mature standard trees grow in over c. 3,000 km of hedgerows extending over the Chilterns (PLTOF, 2022). (Hedgerows and hedgerow tress are covered in section 9.3.2.1).

Because woodland is such an important component of the area, the condition of this woodland is important to understand. Threats arise from pests and diseases and unfavourable management decisions. According to Forestry Commissions records, 65% of the woodland in the Chilterns National Landscape is in active management, compared to 59% across the UK (FC Managed Woodland Headline Performance Indicator). While active management is essential to achieve good woodland condition, active management does not mean that the woodland has achieved this from a biodiversity perspective.

Case study: Treescapes – research benefitting tree planting and management

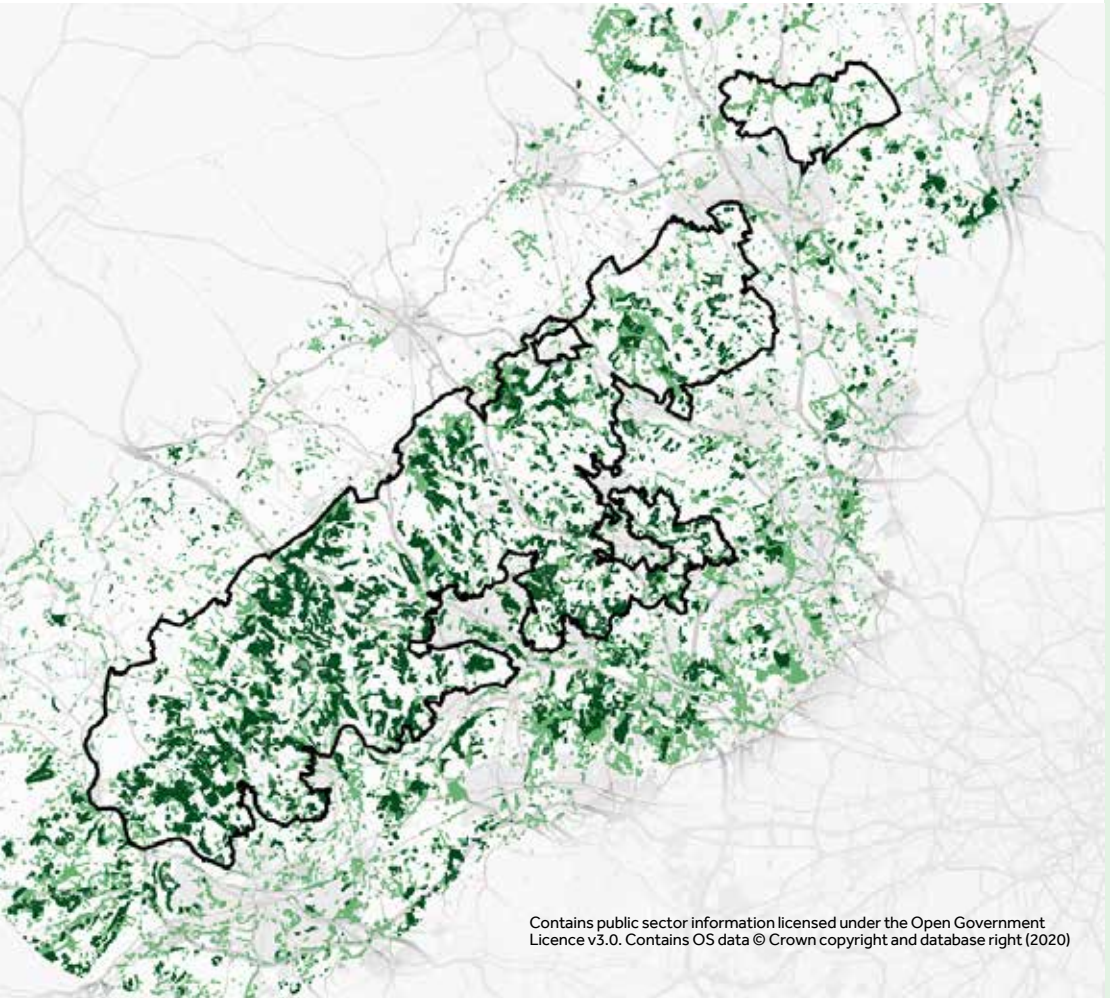


Figure 9 Infographic from Treescapes workshop

During 2024, the Chilterns National Landscape partnered with Reading University in a UKRI Treescapes Knowledge Exchange project.
This enabled us to explore various tools created by researchers at Reading University aimed at connecting farmers, estate managers and conservationists with the most up-to-date research on treescapes via a new online Guidance Hub – a readily available directory of current information for practitioners and those in education, which is hosted by the Tree Council. During the first workshop (March 2024), different aspects were captured through a series of infographics.

9.1 Woodland and trees

Map 9 Deciduous and ancient woodland



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Woodland lacking understorey and regeneration due to deer pressure

9.1.2 Description of woodland habitats

The different types of woodland habitat in the Chilterns National Landscape are described in the sections below.

9.1.2.1 Deciduous woodland

Deciduous woodland covers 17.5% of the total area spread across 9,347 different sites. These woodlands grow on a full range of soils and are often semi-natural.
Those that existed before the 1600s, and are still here today, are considered to be 'ancient'. The Chilterns are famous for beech woodland but many other trees are present including oak, lime, hornbeam, ash, whitebeam, yew, cherry and field maple. Mature woodlands are often carpeted with native bluebells in spring and a large variety of fungi in autumn, and support a range of mammals, woodland birds and invertebrates.

Unfortunately, deciduous woodland in the Chilterns National Landscape is under pressure from deer, grey squirrel and edible dormouse (*Glis glis*). Expanding deer populations and high grey squirrel numbers are detrimental to all woodland ecology. They browse natural regeneration and planted trees alike, preventing forest renewal, and damage mature trees, making them susceptible to climatic stresses, pests and disease. This impact on regeneration and planted trees limits the potential genetic diversity of woodlands, restricting their ability to adapt to climatic changes. At even moderate levels of deer browsing, ground flora will be harmed and species composition disturbed.

9.1 Woodland and trees

An increasing occurrence of novel pests and diseases impacts the health and balance of the woodland ecosystems. For example, ash dominated woodland is increasingly being impacted by ash dieback.

While current advice is to retain ash as long as possible (to identify potentially resistant individuals, retain deadwood and an ash element of the woodland as ong as possible), safety concerns are paramount, and significant areas of ash woodland are being felled to reduce risk to landowners and the public. In many cases, large scale felling and sale of timber or firewood must be considered to make such operations economically viable.

The oak processionary moth (OPM), the range of which is expanding from London and through Hertfordshire, is one of the latest pests that might affect Chilterns woodlands. Though OPM has limited impact on the health of affected oak trees, shed caterpillar hairs are an irritant to those who come in contact so management of open spaces and rights of way, warning notices and other public awareness measures, are likely to be required.

A full description of lowland mixed deciduous woodland can be found here:
Lowland mixed deciduous woodland (UK BAP priority habitat description) (jncc.gov.uk).
Two particular deciduous woodland types are associated with the Chilterns and described below:
(i) lowland beech and yew; and
(ii) box woodland.

9.1.2.1.1 Lowland beech and yew woodland
There are 19 sites and only 10.8 ha of this priority habitat in the Chilterns. This might be surprising to those familiar with the Chilterns and its special qualities, however, lowland beech and yew woodland refers to a specific definition of priority habitat, and many areas of beech woodland fall outside this category.

The Chilterns Beechwoods SAC (see Section 9.1.2.1.2) covers a far greater area. Whilst small in mapped extent, this type of woodland is ecologically and culturally important. Growing on both acidic and calcareous soils, these woodlands span a range of vegetation types, but have been historically managed as coppice and wood-pasture. Trees include beech, ash, sycamore, yew, whitebeam and, less commonly, oak. Rare plants, such as red helleborine, box and bird's-nest orchids, adorn the forest floor, and carpets of bluebells appear in spring. Woodland birds include woodpeckers, bullfinches, owls, nuthatches and warblers. In the Chilterns, these woods are often found on the dip slope clay soils, and thinner chalk soils at the tops of valley sides and steeper chalk escarpment slopes.

Beech woodlands are a key cultural feature of the Chilterns as they were historically managed and harvested for use in the furniture industry. A lack of management following the decline of this industry has resulted in many beechwoods losing condition, becoming over-mature, even aged and structurally poor. Both new planting and natural regeneration of beech is severely affected by deer and squirrel damage and these species will need to be controlled to improve regeneration and planting success. The Chilterns beech woodlands should be brought back into sustainable management, with decisions focusing on increasing structural and genetic diversity.


Bluebells in Adams Wood


Ground flora in deciduous woodland


Oak processionary moth

9.1 Woodland and trees

9.1.2.1.2 Chilterns Beechwoods Special Area of Conservation (SAC)

Special Areas of Conservation are high-quality conservation sites that make a significant contribution to conserving habitats and species identified in the Habitats Directive. These habitats and species are considered to be most in need of conservation at a European level.

This Special Area of Conservation incorporates nine separate woodlands (15 individual woodland blocks), all of which are within the National Landscape boundary; apart from Bisham Woods which overlooks the Thames, south of Marlow. The SAC protects beech forests (88%) where the rare coralroot (*Cardamine bulbifera*) can be found, alongside semi-natural dry grasslands (8%) containing some areas rich with orchids, and heath and scrub mosaics (4%). The SAC is noted for its population of stag beetles.

9.1.2.2 Box woodland

The Chilterns Box Woodland Project (2013-2015) recorded over 90 sites (across > 70 ha) of box woodland though in many of these locations, box forms an important component of the understorey. Whilst areas of box can be extensive, unfortunately, accurate mapping of these areas is not available. The largest individual site is the Ellesborough and Kimble Warren SSSI which, at 69 ha, represents the largest area of native box woodland within the UK. Box blight and the box moth have had major impacts on cultivated box topiary and natural box woodlands in mainland Europe. Both have the potential to spread to the Chilterns' box woodlands. Biosecurity measures should be taken to reduce the risk of introducing box blight and box moth and monitoring for their presence should be introduced in box woodlands.

9.1.2.3 Juniper

Juniper is one of the key species associated with Chilterns woodland, chalk grassland and scrub mosaics. Various propagation and reintroduction measures have been attempted over recent decades with varying results.

Measures that help maintain healthy juniper include:
(i) careful grazing management,
(ii) specific succession planning (creating bare ground for germination and selecting any new planting for genetic diversity/developing resistance),
(iii) and managing biosecurity as juniper are vulnerable to *Phytophthora austrocedri*, a pathogen that infects and kills juniper trees.

A useful guide to managing juniper can be found here.

9.1.2.4 Traditional orchards

Traditional orchards are characterised by open grown fruit or nut trees in a permanent grazed grassland setting. They often support a wide range of Nationally Rare and Nationally Scarce Species including invertebrates and fungi. Mature and gnarly trees, with split bark and hollows, make perfect nesting sites and shelter invertebrates. Fungi are abundant on both the trees and in the grasses below, while berries and fallen fruit attract birds such as redstarts and fieldfares.

Chilterns traditional orchards include cherry, the Aylesbury Prune, and apple. Once known nationally as a region for cherries, visitors would come out from London in the spring to see the cherry blossom with a further influx of seasonal workers for the cherry harvest. As farm economics changed, cherry growing declined and many accepted government grants to remove trees. Very few cherry trees now remain apart from wild cherry in woodland and hedgerows; however, community orchards have increased in popularity, and small apple juicing and bottling businesses have encouraged interest in local fruit.

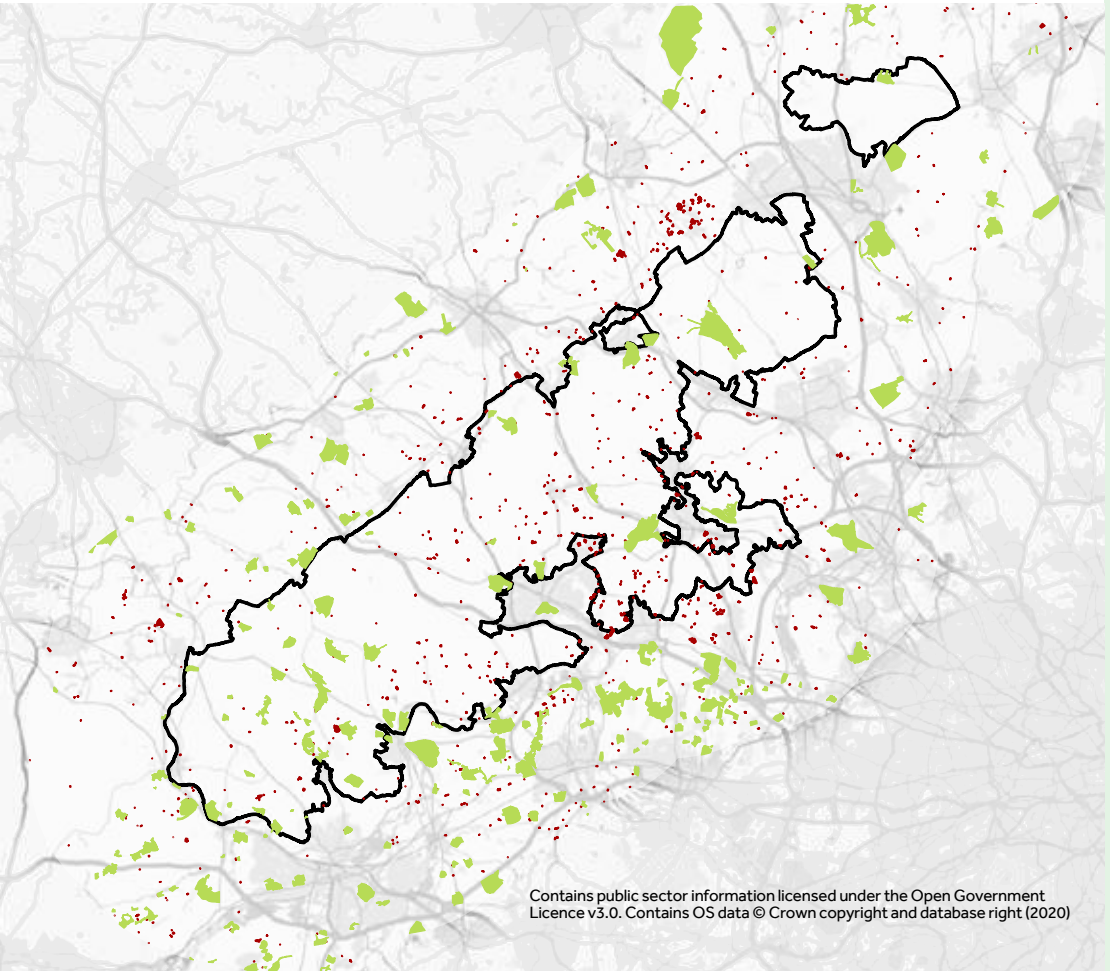






9.1 Woodland and trees

Map 10 Parkland and traditional orchards in the Chilterns National Landscape



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Cows resting in wood pasture

9.1.2.5 Wood pasture and parkland

Wood pasture and parkland are managed through grazing. They may be of ancient or more recent origin, perhaps starting life as a medieval hunting forest, wooded common or a landscaped estate. Trees are often pollarded (the crowns taken off) and stock may graze the grassland beneath.

There is currently approximately 300 ha of wood pasture and 2,412 ha (across 19 sites) of registered parkland in the Chilterns National Landscape.These mosaic habitats are valued for their trees, especially veteran and ancient trees, and the plants and animals that they support. Grazing animals are fundamental to the continued existence of this habitat. Specialised and varied habitats within wood pasture and parkland provide a home for a wide range of species, many of which occur only in these habitats, particularly insects, lichens and fungi which depend on dead and decaying wood. Individual trees, some of which may be of great size and age, are key elements of the habitat and many sites are also important historic landscapes.

The extensive grazing (a low input, low output system) vital for this habitat, has been seen as uneconomic and largely lost favour over recent decades. Traditional breeds suited to low intensity grazing and browsing have been replaced by modern, heavier breeds that require more productive grassland to maintain condition and put on weight. Heavier stock are also more likely to damage stems, roots and soils around veteran trees by rubbing, poaching and compaction. This shift in farming has left this priority habitat particularly vulnerable. However, the growing interest in regenerative farming techniques and agro-forestry and the benefits of shade for grazing animals may increase interest in this habitat as a part of a wider grazing farm system.

Case study: Bailey Hill Farm – recreating a traditional orchard



Bailey Hill Farm (Chalfont St Giles) created 6.5 hectares of traditional heritage orchard with support from the Farming in Protected Landscapes (FiPL) programme. As well as there being records of orchards in the same valley in the 1870s, a small number of fruit trees had already been planted at the farm prior to the FiPL funding and were used to produce apple juice for sale alongside the main products in the farm shop (pasture fed lamb and beef). Both the farmer and the FiPL officer were very much aware of the benefits that the orchard would also bring in terms of increasing rainfall interception and reducing sediment run off to the Misbourne chalk stream (an important habitat for the Chilterns National Landscape).

The project was undertaken in three phases, which ensured the planting was achievable each year. The specification was taken from the Higher Tier Countryside Stewardship option TE3, with trees grown on M25 rootstock for longevity. Trees were spaced at 10m and protected by cactus guards so that the orchard can also be grazed by sheep. The heritage varieties were chosen to reflect those found in Buckinghamshire historically as well as ensuring the right combination of flowering periods to ensure cross pollination.

Funding this via FiPL meant a quick turnaround from project inception to implementation as well as the flexibility to incorporate newer approaches such as cactus guards to protect the fruit trees from livestock.



9.1 Woodland and trees

9.1.2.6 Veteran and ancient trees

The Woodland Trust's Ancient Tree Inventory, identifies over 1,000 ancient trees within the Chilterns National Landscape and this may well be an under-estimate of the true numbers. These ancient trees are defined by their age and characterised by dead and decaying wood both in the crown and lying on the ground nearby, hollowing limbs or trunks and holes that may contain water.

Veteran trees, which have the physical characteristics of an ancient tree but not the age, may also support a wide range of rare fauna and fungi. While veteran and ancient trees are important components of wood pasture and parkland, they can also often be found in open areas of woodland and as historic boundary features, often contained within hedgerows. Ancient trees are recognised as some of the oldest living organisms in the UK.

Common threats to ancient and veteran trees include:

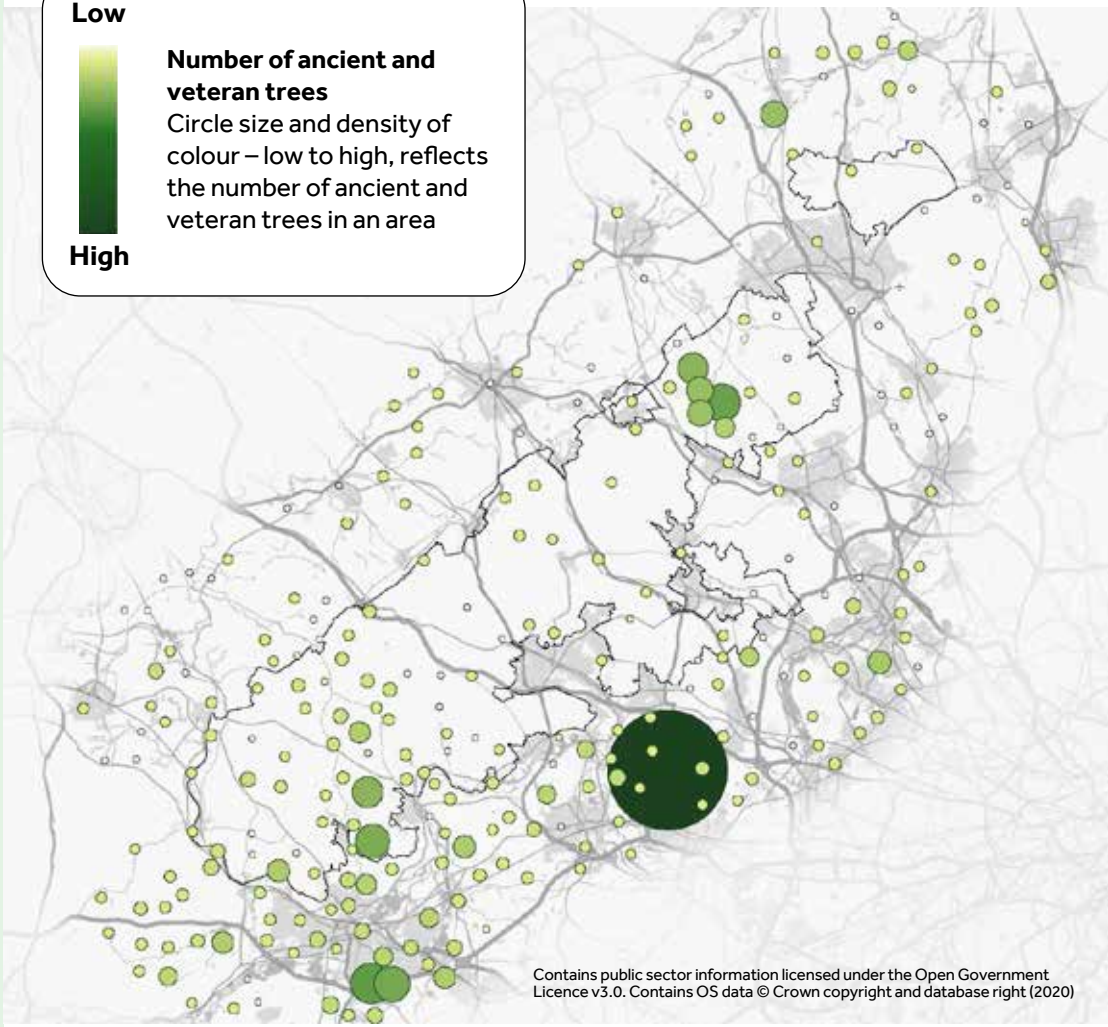
- Increased shade from newly planted trees;
- Soil compaction;
- Over-zealous tree safety;
- Loss due to development.

A wide range of species are associated with the dead and decaying wood found in veteran and ancient trees. Often, these species are not 'mobile', i.e. they cannot easily move from suitable habitat to habitat. This highlights the importance of maintaining fallen and standing dead wood and some might even consider 'veteranising' younger trees; a process of deliberately creating dead or broken tree limbs (perhaps by ring barking or physical damage).



Coppiced beech at Warburg Nature Reserve

Map 11 Ancient and veteran trees within 10 km of boundary



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9.1 Woodland and trees

Pollarding has helped oak and beech trees survive to many hundreds of years. While not as long lived, pollarded willows can also exhibit ancient tree characteristics. For such trees, continued pollarding management is crucial for long term survival. Recognising their importance, Natural England's Chiltern's Natural Character Assessment (NCA Profile:110 Chilterns – NE406) recommends ancient and veteran trees be given Tree Preservation Orders where possible.

9.1.3 Heritage of woodland habitats

9.1.3.1 Description

The importance of woodland to natural heritage and character of the Chilterns landscape is unquestionable, yet it is inextricably linked in recent millennia to the cultural heritage of human communities. From the use of woodland for activities such as charcoal making, timber extraction, pannage for medieval pig farming (allowing pigs to forage, primarily for beech nuts and oak acorns or 'mast'), or for the post medieval 'bodging' industry (bodgers crafted chair parts and other products in makeshift woodland camps), these woodlands hold centuries of evidence beneath their roots and their canopies.

The 2019 Beacons of the Past LiDAR survey revealed over 10,000 new features in woodland across all periods. Woodland, therefore, can protect historic features that might otherwise be at risk from agricultural cultivation or development and woodland archaeology can contribute micro-niches which host particular species, e.g. wood banks, ponds, or extractive pits permitting different ground flora, lichens, or fungi to thrive. However, roots, windblow (lifting root plates) and planting in sensitive locations may also damage archaeological features. It is important to consider these factors when planning new woodland or managing existing woodland.

9.1.3.2 Threats

The greatest threat to woodland archaeology is the use of large machinery during felling, harvesting, and plantation activities, particularly in wet conditions (risks can be reduced if operations are carried out in dry conditions using low ground pressure vehicles, and by sensitively planning extraction routes to avoid archaeological features); a close second is damage caused by root plate upheaval during end-of-life incidents for shallow-rooted trees.

For example, as mature beeches (a favourite for Victorian/Edwardian plantation on ancient earthworks) draw to the ends of their lives, they are highly vulnerable to the more intense wind events that are occurring, driven by climate change. It should be noted though that windthrow risk is highest for young un-thinned woodlands where trees have grown tall and not developed strong individual root systems.

9.1.3.3 Opportunities

Working in collaboration, where appropriate, with Natural England, Forestry England, the Forestry Commission, the Woodland Trust, and Historic England, there are opportunities to incorporate knowledge-enhancement activities, such as surveys and targeted excavation. These may be useful in engaging communities during the responsible management and creation of woodland in heritage-dense locations.

In addition, well-designed woodland management plans and woodland creation schemes could help to restore valued historic landscapes, especially in designed landscapes. Such schemes would provide suitable management and settings for heritage assets within those landscapes, but also be a route for effective community engagement. However, great care needs to be taken to avoid inappropriate planting that could be harmful to both archaeological remains and designed landscapes.



Tree management activities



Bodgers crafted chair parts



LiDAR image of Totternhoe Castle, Totternhoe Quarry SSSI, and Maiden Bower hillfort

9.1.4 Nature Recovery Plan (NRP) priority species in woodland habitats

The lack of fungi species in this section is acknowledged: those included are mentioned in the National Character Area document for the Chilterns. Noble chafer is included as it is associated with traditional orchard rather than broad-leaved woodland. Similarly, some species (e.g. military orchid, striped lychnis, grizzled skipper) are included because of their association with more open habitats within woodland settings rather than mature broad-leaved woodland. Successional stages of woodland ecology are important in supporting species such as adder although these are aspirational species for nature recovery at this stage.

Table 8 NRP Priority species in woodland habitats

Group	Common name	Latin name
Lichens	Eagle's claw	*Anaptychia ciliaris*
Fungi	Devil's bolete Old man of the woods	*Boletus satanus* *Strobilomyces strobilaceus*
Plants	Red helleborine Military orchid Lesser butterfly orchid Narrow leaved helleborine	*Cephalanthera rubra* *Orchis militaris* *Platanthera bifolia* *Cephalanthera longifolia*
Invertebrates	Stag beetle Noble chafer Glow worm Striped Lychnis Grizzled skipper Dingy skipper	*Lucanus cervus* *Gnorimus nobilis (traditional orchards)* *Lampyris noctiluca* *Limenitis camilla* *Pyrgus malvae* *Erynnis tages*
Reptiles and amphibians	Adder	*Vipera berus*
Birds	Willow tit Marsh tit Lesser-spotted woodpecker Hawfinch	*Poecile montanus* *Poecile palustris* *Dendrocopos minor* *Coccothraustes coccothraustes*
Mammals	Hazel dormouse Barbastelle bat Bechstein`s bat	*Muscardinus avellanarius* *Barbastella barbastellus* *Myotis bechsteinii*

Table 9 Invasive non-native or other problematic species in woodland

Group	Common name	Latin name
Disease	Ramorum disease	e.g. *Phytophthora ramorum*
Plants	Cherry laurel Rhododendron Spanish bluebell Variegated yellow archangel	*Prunus laurocerasus* *Rhododendron ponticum* *Hyacinthoides hispanica* *Lamiastrum galeobdolon argentatum*
Invertebrates	Oak processionary moth	*Thaumetopoea processionea*
Birds	Ring-necked parakeet	*Psittacula krameria*
Mammals	Edible dormouse Fallow deer, Grey squirrel, Muntjac deer Roe deer	*Glis glis* *Dama dama* *Sciurus carolinensis* *Muntiacus reevesi* *Capreolus capreolus* (although native, increasing numbers are likely to have significant impacts on woodland habitats).

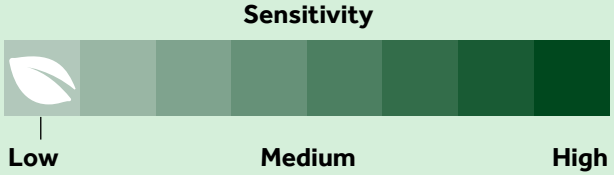
9.1 Woodland and trees





9.1.5 Climate adaptation

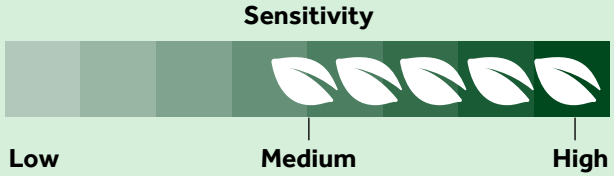
9.1.5.1 Deciduous woodland (low sensitivity)



Based on the Natural England Climate Adaption manual, general deciduous woodland is considered at low risk to climate change. However, the first paragraph of the manual states that such woodland on thin soils over limestone in the south-east of England are at very high risk .The sensitivity of Chilterns deciduous woodland growing on chalk and clay-with-flint to climate change should be assessed.

Increases in the frequency and severity of summer drought may well impact drought-sensitive tree species on shallow-free draining soils such as those underlain by chalk, whereas changes in winter rainfall might be important in wetter, boggy areas that retain moisture. Increased temperatures may enable insect pests to increase in activity and support over-wintering, making their impact more marked over time. Without management deer populations are also likely to increase and represent a greater threat to woodland regeneration and condition. Overall, climate change may lead to a transition of lowland broadleaf woodland to scrub on hill tops and brashy soils, where drought impacts are likely to be higher, with mature woodland retreating to sheltered valley sides and valleys.

9.1.5.2 Beech and yew woodland and veteran trees (medium – high sensitivity)



Beech and yew woodlands are considered at medium risk from climate change. It is likely that these woodlands in the Chilterns will decline and retreat northwards to deeper soils and north-facing slopes. Ancient and veteran trees, particularly open grown, might be vulnerable to extreme weather conditions such as drought, floods and gales.



Thermal image of fallow herd in woodland

9.1.5.3 Climate change adaptation for woodland and veteran trees

Current advice to improve woodland resilience to climate change recommends active management to create species diversity and greater structural variation within woodlands. Natural regeneration should be supported through reduction in grazing pressure from deer and thinning to create canopy gaps (NE751 Climate Change Adaptation Manual).

Where pollarding and coppicing have been carried out in the past, they should be continued, or re-introduction considered if these management activities are no longer practised. There is currently a debate as to whether trees originating from more southerly latitudes should be introduced to help woodlands adapt to warmer conditions (see Forest Research guidance).

In any case re-stocking, by planting with suitable drought resistant species or fostering natural regeneration, is important to increase structural and genetic diversity. Care should be taken when sourcing replacement trees, with good biosecurity measures being followed to avoid the risk of introducing pathogens or pest species. Climate change is thought to be a factor in the rapidly increasing spread of pests, diseases and invasive, non-native species (INNS). All planting should avoid the use of peat-based products.

9.1 Woodland and trees

9.1.6 Data and knowledge gaps

- Understanding and improving woodland condition in the Chilterns National Landscape is acknowledged as an important goal but there is little data currently available to assess woodland condition at a landscape scale (but see '**Bunce Woodland Survey, 2024**' for an overview).
- The impact of deer on woodland is significant, preventing natural regeneration. Deer density needs to be assessed alongside impacts of deer on woodland condition so that a deer management strategy can be created that works for landowners, and supports the local economy.
- The effects of ash dieback are increasingly visible in the landscape, and the prevalence of other pests and diseases may increase due to the impacts of climate change. There are opportunities here to support natural regeneration of woodland to improve biodiversity and hence resilience, but a better holistic understanding of the **impacts of climate change** on Chilterns woodland is needed to determine the best mix of climate adaptation measures.
- Further data are needed on the extent and impact of INNS on Chilterns woodland including grey squirrel, edible dormouse (*Glis glis*) and invasive flora such as *Rhododendron ponticum*.



Ash dieback

Case study: Captains Wood – a woodland condition assessment



The Chiltern Society commissioned Sundew Ecology to carry out a woodland condition assessment of Captains Wood using the **assessment toolkit** developed by Forest Research and the England Woodland Biodiversity Group.

The condition assessment includes a desk-based study, a qualitative assessment of ten 10m plots throughout the wood, and a final walkover survey. The rapid assessment scores 15 indicators including tree age, distribution and health as

1. poor
2. moderate
3. good

to give an overall score out of 45

The Captain's Wood score of 27 indicates moderate ecological condition. Recommended actions and management recommendations to enhance woodland ecology are automatically generated by the toolkit.

Sundew Ecology also carried out a more detailed ecological survey alongside the Woodland Condition Assessment. This highlighted that the Condition Assessment is a useful tool to support, guide and monitor the Management Plan and other surveys. Use of the assessment toolkit provides a good quick general assessment which might help to identify and focus on more specific areas in more detail.



9.1 Woodland and trees

9.1.7. Priority outcomes for nature recovery

Table 10 describes our recommendations for priority outcomes in relation to woodland and planting of trees outside woodland that we believe are required for nature to thrive in the Chilterns.

Table 10 Priority outcomes for woodland habitat and trees outside woodland in the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Woodland creation and trees outside woodland	WdLnd 1	Woodland and tree canopy cover increases by 286 ha by 2030 and 1,000 ha by 2050 with an emphasis on increasing tree canopy cover outside woodland and improving connectivity between existing woodland habitats.	8
Woodland creation and trees outside woodland	WdLnd 2	The choice of species for new woodland and tree planting is Chilterns-appropriate, suited to specific locations, soils, aspects and climate, and the provenance supports climate adaptation ambitions.	
Trees outside woodland	WdLnd 3	The number of native hedgerow trees are increased across the Chilterns National Landscape to increase tree canopy cover and enhance biodiversity.	8
Trees outside woodland	WdLnd 4	Traditional orchards are maintained, expanded, enhanced and valued by local communities to increase tree canopy cover and enhance biodiversity.	8
Woodland condition	WdLnd 5	There is no loss of ancient woodland and ancient / veteran trees across the landscape.	
	WdLnd 5	Woodland owners are encouraged to adopt management that increases woodland species and structural diversity and benefits woodland biodiversity.	
Woodland condition	WdLnd 5	Planted Ancient Woodlands (PAWS) are restored to predominantly broadleaved species appropriate to each site and under sensitive, long-term management to enhance biodiversity and increase resilience to climate change.	
Woodland condition	WdLnd 5	Woodlands contain a greater diversity of tree species (and genetic diversity within species) with varied age structure for economic sustainability, enhanced biodiversity and increased resilience to disease and climate change.	
Woodland condition	WdLnd 5	Glades, open areas and woodland edges provide a varied habitat for woodland birds, butterflies and plants to enhance biodiversity and increase resilience to climate change.	

Continued on page 69

Table 10 Priority outcomes for woodland habitat and trees outside woodland in the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Woodland condition	WdLnd 5	More nationally significant woodland (where 4+ woodland bird species occur) is managed through Countryside Stewardship to enhance biodiversity and increase resilience to climate change.	
Woodland condition	WdLnd 5	Deer numbers are monitored and managed to reduce deer impacts, protect against further loss of biodiversity and increase resilience to climate change.	
Woodland condition	WdLnd 5	Strategies are developed for the management and control of grey squirrel and edible dormouse (*Glis glis).*	
Woodland condition	WdLnd 5	The ecological condition of woodland in the Chilterns National Landscape is baselined using woodland condition assessment to help direct investment in measures to enhance biodiversity and increase resilience to climate change.	
Support for local business associated with woodland and trees	WdLnd 6	Local produce from woodland and trees – such as venison, fruit juice and wood products – are supported. It is recognised that there is a shortage of tree nurseries growing certified native provenance stock to meet both national and local tree planting ambitions. The Chilterns National Landscape is, in principle, supportive of Forestry Commission and other initiatives to expand and create nurseries in appropriate locations and scale, growing native provenance stock suited to the Chilterns region.	



9.2 Rivers, streams and wetlands

Special qualities of the Chilterns National Landscape



9.2 Rivers, streams and wetlands

9.2.1 Statement of surface water and water-dependent habitats

Chalk streams are not only a characteristic feature of the Chilterns landscape, but also a globally rare habitat. There are 283 recognised chalk streams in the UK (see Section 9.2.7 regarding recent efforts to map all our chalk streams) and England accounts for 85% of the global total. Important habitats for wildlife, they are home to some of our most threatened plants and animals, such as the water vole and brown trout.

They also have a fascinating history and supported many thriving industries in the past such as mills and watercress beds. There are 150 km of chalk stream within the protected landscape. Five of the nine longest chalk streams with their source in the Chilterns National Landscape flow into the River Colne and then the Thames, whilst the Ewelme Brook, Hamble Brook and River Wye (the Hughenden Stream forming a tributary) flow directly into the River Thames.

There are also multiple headwaters sourced from the scarp slope of the Chilterns that flow north into the River Thame (also a tributary of the Thames). To the north of Luton, water from chalk springs on the scarp slope flow north into the Anglian River Basin District; to the River Hit, onto the Rivers Ivel and Flit, and eventually the Great Ouse.

The River Thames flows along the western edge of the Chilterns National Landscape, through the Goring Gap, forming a boundary with the neighbouring North Wessex Downs National Landscape. In this area the low elevation of the Thames floodplain provides the location for a mosaic of wetland habitat such as floodplain fen, grazing marsh and rush pasture. In the past wetland habitat including wet woodland would have been a common site along the chalk streams of the Chilterns, but there is very little wetland priority habitat recorded now in these areas due to draining of floodplains for housing and agriculture.

Much of the soil in the Chilterns is very permeable allowing water to rapidly drain away, but the clay remains of thick, marine deposits on hilltops is less permeable, and here water can naturally collect in ponds, many of which are seasonal and dry out during periods of low rainfall. Some of the ponds in the Chilterns (such as Mobwell Pond near Great Missenden) are spring-fed from groundwater and are linked to the chalk streams, and others are human-made features lined with clay.

9.2.2 Description of surface water and water-dependent habitats

The different types of surface water and water-dependent habitat in the Chilterns National Landscape are described in the sections that follow.



River Chess at Latimer Park

9.2.1.1 Chalk streams

Chalk streams are groundwater-fed rivers deriving their flow from the chalk aquifers which underly chalk landscapes such as the Chilterns. Most of the water flowing in these rivers has percolated through chalk. This dampens the speed of response to rainfall, so that chalk streams are known for stable flows and constant temperatures. The water in these rivers pick up calcium and magnesium carbonate as it travels through the chalk, giving it a crystal-clear appearance and high alkalinity.

Together these characteristics encourage the verdant growth of submerged and emergent aquatic plants, which in turn provides abundant habitat for invertebrates (e.g. blackfly, mayfly and stoneflies), fish (e.g. brown trout and bullhead) and mammals such as otter, water vole and water shrew. Overall, chalk streams are particularly valued for their high ecological richness and biodiversity.

9.2 Rivers, streams and wetlands



Upstream of Hughenden Manor

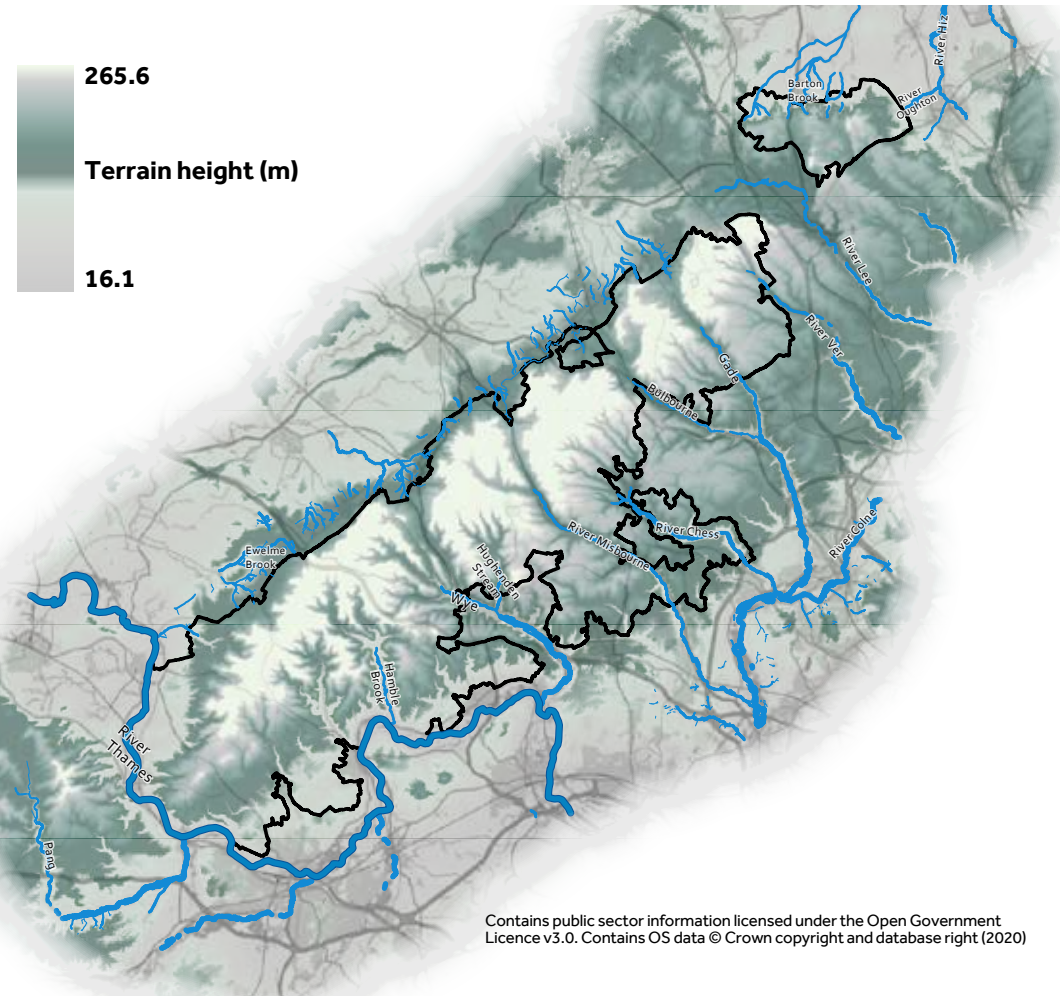
The [CaBA National Chalk Stream Restoration Strategy (2021)] groups chalk streams into four types, and we can find three of these types (Groups A, C and D) in the Chilterns:

Group A
Classic dip-slope chalk streams rising from, and flowing over the chalk such as the Rivers Wye, Chess, Misbourne, Ver, Gade, Bulbourne and Hughenden Stream.
The River Alderbourne, which rises outside the National Landscape boundary, also falls in this category.

Group C
Scarp-face chalk streams rising at the base of the chalk (such as Ewelme Brook) and then in some cases running over gault clay and greensand beds (e.g. Horsenden Stream).

Group D
Pleistocene ice-impacted chalk streams rising from chalk that was directly impacted by major glacial action during the Pleistocene period. In the case of the north Chilterns these flow into older (pre-glacial) river deposits of the Great Ouse (e.g. such as headwaters of the Hiz which are categorised as C/D in CaBA's Chalk Stream Restoration Strategy).

Map 12 Chalk streams of the Chilterns



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9.2 Rivers, streams and wetlands

The headwaters of many chalk streams are winterbournes meaning that the upper stretches dry up for parts of the year or sometimes for several years in a row as groundwater levels fluctuate, as in the case of the Hambleden Brook. Winterbournes are important habitats valued for their specialist rare and scarce species such as the Scarce Purple Dun (*Paraleptophlebia werneri*), a genus of mayfly. Over the last few decades, many chalk streams in the Chilterns have been impacted by over-abstraction so that winterbourne drying cycles may be more frequent or for longer than might naturally occur.

Good chalk stream health is achieved through a combination of natural flows, clean water and excellent habitat. Over the years, many Chilterns chalk streams have been over-widened, straightened and impounded due to man's activities (e.g. milling and watercress production). Whilst the heritage associated with these activities is valued, there has been a negative effect on ecological health so many restoration activities focus on narrowing and re-wiggling channels, re-setting perched channels in valley bottoms to re-connect with groundwater and removing dams and barriers to flows. This has the added benefit of allowing rivers to naturally flush through fine sediments, which otherwise clogs the gravel riverbed. Fish species including brown trout, bullhead and brook lamprey need clean, oxygenated gravels for successful spawning. The gravels are also home to multiple riverine invertebrates – 'riverfly' counts provide an important measure of water quality.

An additional challenge facing Chilterns chalk streams is that there are multiple connections between roads and the rivers, so that when it rains water moves from road surfaces directly to the chalk streams. This introduces fine sediment and a range of contaminants from vehicle and tyre wear and tear which can be harmful to wildlife. The road network also connects sites of soil erosion (e.g. from agricultural land) to the river.

Finally, these precious rivers also receive storm tank discharges from sewage treatment works during and following heavy rainfall and, in some locations, when groundwater levels are high, the groundwater infiltrates the sewer network causing the capacity of sewage treatment works to be overwhelmed.

Chalk streams are invaluable wildlife corridors that can support nature recovery and movement of species in response to climate change, if their bankside and adjoining floodplain areas are managed for biodiversity and as buffers against harmful activities. In the past calcareous fen and wet woodland habitat (see Section 9.2.2.2.4) would have been abundant around the chalk streams of the Chilterns but there is little left now. Wild sections of headwaters with springs and natural fen habitat, such as found in the North Chilterns at Hexton are a rare and valuable habitat supporting biodiversity, and some remnants of wet meadow systems remain adjacent to the River Chess.


A pool on the Hamble brook


Male *Paraleptophlebia werneri*


Bullhead

Case study: Local Riverine Wildlife Site Approach – from the River Mimram, Hertfordshire



In 2023, Herts and Middlesex Wildlife Trust completed a pilot project, funded by Affinity Water, to identify new riverine Hertfordshire Local Wildlife Sites (LWS) in the Mimram Valley, incorporating the River Corridor Assessment (RCA) methodology. Local Wildlife Sites (LWS) are sites of substantive nature conservation value and although they do not have any statutory status, many are equal in quality to statutory Sites of Special Scientific Interest (SSSI). Most LWSs are privately owned.

The project's goal was to assess the health of the entire river and provide evidence to inform restoration efforts. Ecologists from Herts and Middlesex Wildlife Trust obtained landholder permissions to survey approximately three-quarters of the river's length.

The survey was based on two key criteria:

- identifying sections with a minimum number of indicator plants and mapping vegetation to assess species presence and associations;
- using the RCA method to evaluate physical habitat and hydromorphological features within the river.

As a result of the survey, 13 new riverine LWSs were proposed and designated through the LWS Partnership Ratification process, and included in the relevant local authority plans, with protection provided through relevant planning policies. Individual reports were produced for all 21 landholdings surveyed, detailing the survey findings and restoration recommendations for that particular section of the river. This brought the total number of Local Wildlife Sites in the Mimram Catchment to 191.

In 2024, additional funding from the Environment Agency allowed Herts and Middlesex Wildlife Trust to appoint a Chalk Rivers and Farm Advisory Officer for the Mimram catchment until 2027. Building on the pilot project, the officer is providing tailored support to these landholders, as well as others in the catchment, to help enhance the river. They are collaborating with landholders through the development and implementation of action plans, alongside ongoing monitoring to assess the impacts of management and restoration on hydromorphology and priority habitats and species identified in the Hertfordshire Local Nature Recovery Strategy.

During their first six months in the role, they have contacted 18 of the 21 landholders involved in the Riverine Wildlife Site pilot. To date, 12 have committed to collaborating to develop restoration and habitat management plans for their areas.

9.2.2.2 Wetlands

Today the Chilterns National Landscape contains many dry valley systems, and wetlands are not such an abundant or characteristic feature as they will have once been. Priority wetland and wet grassland habitats (floodplain fen, floodplain grazing marsh and rush pasture together) comprise only a small proportion (0.3%) of the Chilterns National Landscape priority habitats by area.

Many of these wetland priority habitats lie adjacent to the River Thames, with only 10% (approximately) adjacent to the chalk streams of the Chilterns. Much of the floodplain grazing marsh that would have existed adjacent to chalk streams, for example, has been replaced with improved pasture and arable crops and only 6 ha of this priority habitat remains adjacent to the River Gade north of Hemel Hempstead.

9.2.2.2 1 Lowland fen including purple-moor grass and rush pasture

There is 17.5 ha of priority habitat lowland fen in the Chilterns, the largest single area being beside the Thames at Whitchurch. Lowland fen wetlands occur on both peat and mineral soils, and receive water from groundwater, surface runoff and/or river flooding in the case of floodplain fens. The vegetation in a fen will be heavily influenced by the hydrological regime (which describes the annual pattern of water, level and water movement through the site), in conjunction with the water, and soil quality (including pH and nutrient status).

Their position in the landscape, in low lying, flat areas with poor drainage such as at the edge of the Chilterns scarp slope and/or close to water, such as on the Thames floodplain, means that they are found in association with a mosaic of wet woodland, lowland heathland and meadow. Historical and current management of networks of ditches and sluices will also heavily influence the fen characteristics.

Calcareous fen is a subset of lowland fen included in the Annex 1 of European Habitats Directive and UK Biodiversity Action Plan due to its scarcity, and because it supports a very high diversity of specialised plants and insects. Two small areas (0.5 ha in total) of nationally and internationally rare groundwater-fed calcareous fen are recorded on the priority habitat inventory just off the north scarp slope of the Chilterns National Landscape near Great Kimble.

Purple moor-grass and rush pasture is a type of wet grassland present on farmland in lowland areas which, in the past, were rough grazing areas often cut for hay. Conservation grazing or mowing is important to maintain plant species richness. Only 3.9 ha remain of this priority habitat in the Chilterns, along the banks of the Thames near Henley.

Map 13 Example distribution of wetland habitats



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9.2 Rivers, streams and wetlands

9.2.2.2 2 Floodplain grazing marsh

Floodplain grazing marsh (covering 48.6 ha over four sites in the Chilterns) is pasture or meadow adjacent to rivers which is periodically inundated by water, often with ditches dug to maintain water levels.

The land has generally been embanked, drained and agriculturally improved to enable grazing by cattle, and some are cut for hay or silage. Many of these marshy areas are now drained throughout the year and either farmed intensively or developed, resulting in the loss of much of this habitat in the twentieth century. Heavy grazing, conversion to arable agriculture and early cutting of vegetation has also contributed to species decline in these locations.

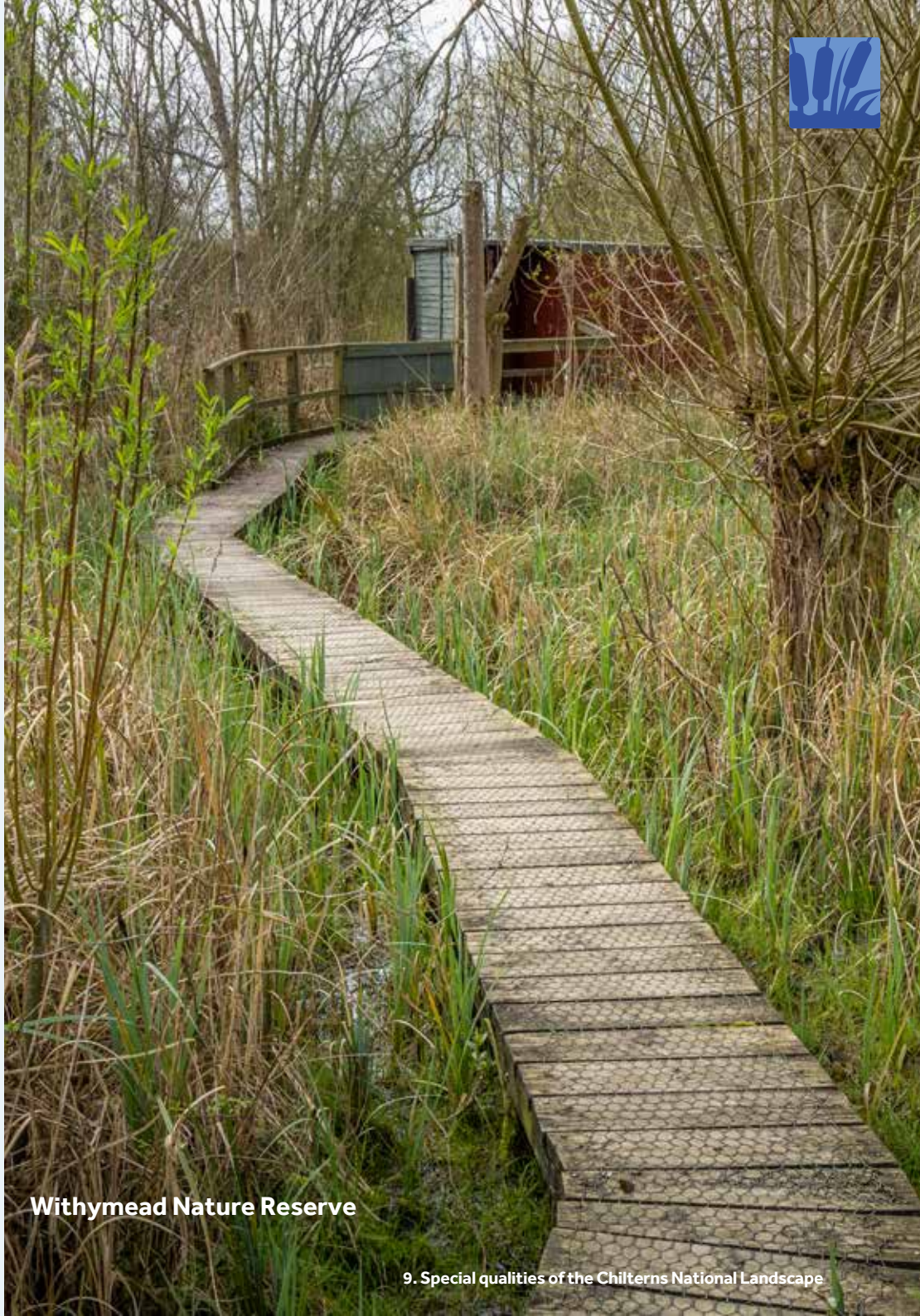
Periods of shallow, winter flooding can attract wetland birds of high conservation value such as curlew, lapwing, snipe and little egret. The proximity of water means that dragonflies and damselflies frequent these sites. Remaining areas of unimproved grassland support a high diversity of native plant species including meadowsweet, greater birds foot trefoil, ragged robin and meadow rue, but most sites have low botanical grassland interest. The ditch networks, which remain damp through the summer, support aquatic-loving plants and invertebrates, but eutrophication (nutrient enrichment) from fertiliser runoff and over-bank inundation from river water can cause loss of biodiversity.

9.2.2.2 3 Reedbeds

Reedbeds are wetland areas dominated by reeds such as *Phragmites australis* which host characteristic species such as the Cetti's warbler. No reedbed priority habitat is recorded in the Chilterns National Landscape, however, reedbeds do survive along the Thames corridor such as at Withymead.

9.2.2.2 4 Wet woodland

Wet woodlands occur on poorly drained or seasonally wet soils and typically arise through succession from open wetland habitats. They can support rich assemblages of bryophytes and invertebrates. Small areas of this priority habitat exist (including a small woodland on the Thames floodplain between Whitchurch and Reading which contains a healthy Loddon lily population). Wet woodland can help to intercept pollution, provide cooling and additional habitat for associated species and could, therefore, in the right location, help buffer and protect our chalk streams. Options for the creation of wet woodland could therefore be considered.



Withymead Nature Reserve

Case study: Improving rivers and wetland – Mend the Gap project working with BBOWT



Mend the Gap is a £3.75million programme of projects in the Thames Valley between Didcot and Reading and partners with North Wessex Downs National Landscape and the Railway Action Group. This provides multiple opportunities to enhance rivers and wetlands in this area.

The programme works closely with South Oxfordshire and West Berkshire Biodiversity Opportunity Areas in five sub-catchments including chalk rivers (such as Pang and Sulham) and priority habitats of lowland fen and floodplain grazing marsh, such as those seen at Cholsey Marshes, South Stoke Lower Meadows and Withymead nature reserve. Delivery of enhancements started in 2022 and will run until 2028. Mend the Gap is funding an officer at BBOWT that is working with Mend the Gap Staff, Thames 21 and landowners along the river Thames.

Find out more about Mend the Gap.

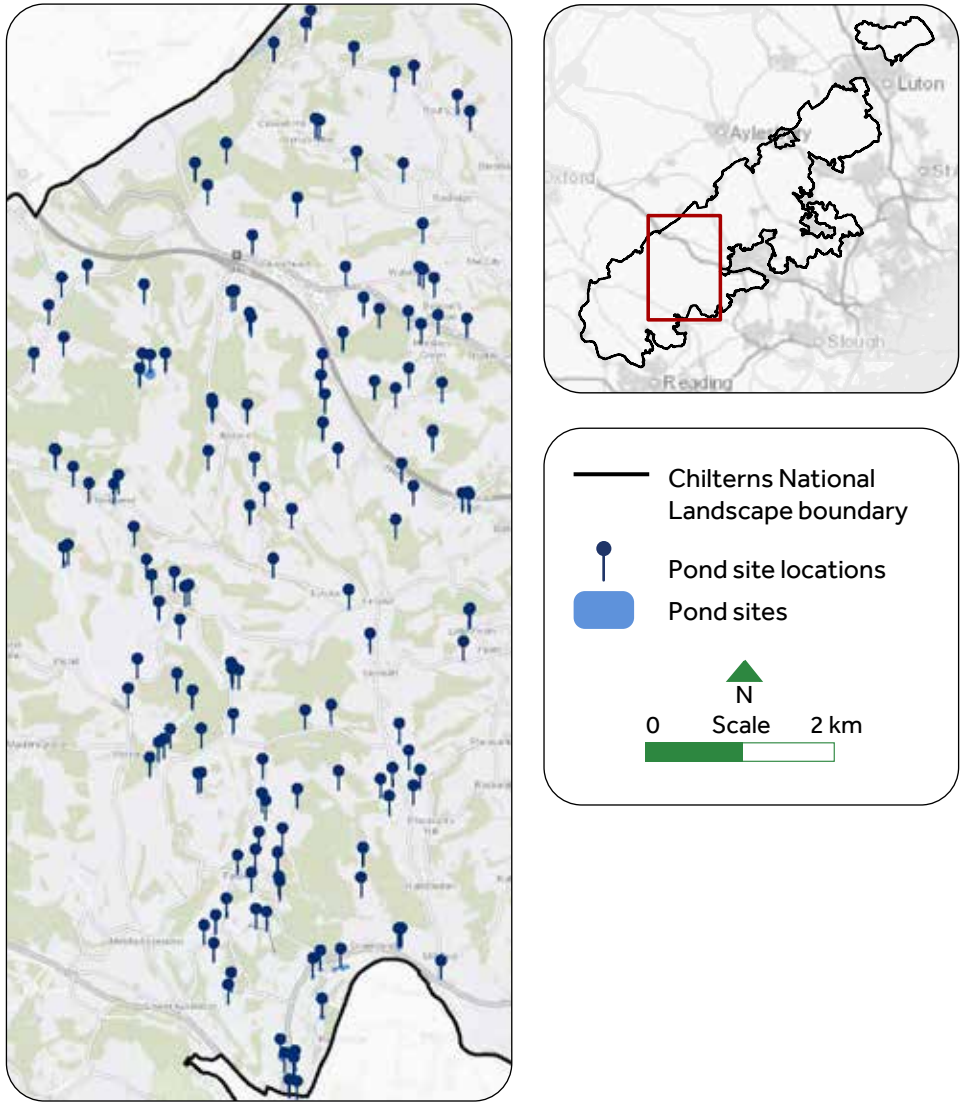
MEND the GAP

Chilterns National Landscape

North Wessex Downs National Landscape

9.2 Rivers, streams and wetlands

Map 14 Ponds and potential ponds in the Christmas Common area identified using 2019 Beacons of the Past LiDAR data (not ground-truthed).



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Pond at Frogmore on the Ver

9.2.2.3 Ponds

Ponds are critical water habitats, supporting two-thirds of UK freshwater species. At landscape scale they support a greater range of species than larger waterbodies, including rivers and lakes, due to their greater collective heterogeneity. In addition, due to their smaller drainage catchments they are more likely to hold clean, unpolluted, water; they are fundamental for rich and diverse wetland plant and animal communities; and they act as vital refuges for some of our rarest and most sensitive freshwater species.

There are currently 25 ponds identified as priority habitat in the Chilterns National Landscape. Priority ponds are permanent or seasonal waterbodies with a particularly high conservation value, because they support rare species or communities such as great crested newts, common toad and lesser spearwort. They can act as a last refuge as species decline, and a valuable reserve from which freshwater flora and fauna can spread once landscape improvements are made. They are also a stepping stone for species in the context of climate change. Across the landscape it is estimated that 90% of priority ponds are yet to be identified. Once identified, site walkovers can help to develop a suitable management plan to protect these precious freshwater habitats.

High-resolution topographical data obtained through a previous National Lottery Heritage Fund-funded project (Beacons of the Past) has also provided the Chilterns National Landscape with data to identify historic or 'ghost' ponds in the landscape that no longer exist but could be suitable sites for pond restoration.

Case study: 'Ponds in the Chess Catchment' – Freshwater Habitats Trust

The Wildlife Corridor Theme in the Chess Smarter Water Catchment initiative has aimed to:

- Increase the extent of priority pond habitat (e.g. by creating new ponds in close proximity to the River Chess, and creating areas where water quality is improved).
- Restore areas of existing priority pond habitat (e.g. by restoring ponds which are no longer functioning/require de-silting).

To ensure these goals can be met, a baseline of the existing pond network is required. Ponds are often overlooked and undervalued with little scientific investigation. The project 'Ponds in the Chess Catchment' aims to develop our understanding of these unique honeypots of biodiversity.

How? 22 citizen scientists were trained in a survey method, developed by the Freshwater Habitats Trust, designed to assess the water quality of the ponds (nitrate and phosphate concentrations) and assess the ability of the surrounding habitat to support pond life (using a metric-based approach).

Method development: The Priority Pond Assessment (PASS) method hopes to bridge the gap between expert and informed citizen scientist knowledge. The citizen scientists create a provisional priority pond list which is then examined and checked by expert level botanists and invertebrate professionals. Surveys must be completed between early summer and early autumn when most wetland plants are visible in ponds.

Main findings: From an initial list of 205 ponds, 63 ponds were surveyed by volunteers. 13 ponds were identified as potential Priority Ponds based on PASS indicators, aligning with national trends, which estimate that only 20% of UK ponds meet Priority Pond criteria.

Water quality testing revealed that 27 of the 42 ponds tested contained clean water – an increasingly rare feature in the UK's freshwater landscape. Professional surveys are still underway, but early findings confirmed the presence of water violet (*Hottonia palustris*), a nationally scarce plant.



However, initial results indicate that only a very small number of ponds meet Priority Pond criteria. Most were found to be degraded, poorly maintained, and lacking the key freshwater species indicative of Priority Ponds.

This project has established an excellent new baseline, providing crucial data to guide and co-ordinate future catchment restoration efforts.

Next steps: The Chess catchment's ponds, while generally degraded and species-poor, reflect the broader decline in freshwater biodiversity across the UK. However, the project has identified critical opportunities for restoration and new habitat creation.

Through the project, Freshwater Habitats Trust is creating a series of proposals outlining large-scale pond and wetland creation across the Chess catchment to address habitat loss and fragmentation. Clean water ponds are especially vital, as research shows they can increase plant diversity by up to 25% across a catchment and significantly benefit species reliant on high water quality.

By expanding the freshwater network, these initiatives will contribute to reversing biodiversity loss and creating resilient landscapes for wildlife and people.

9.2 Rivers, streams and wetlands

9.2.3 Heritage of surface water and water-dependent habitats

9.2.3.1 Description

The narrative of humans in the Chilterns and the biography of our chalk streams are as inter-braided as a prehistoric river channel. Chalk streams have not only been desirable locations for settlement for their supply of drinking water and food resources, but also for their motive power. Industries of all types have thrived over the millennia along the banks of the rivers. Iron smelting in the later prehistoric and Roman periods occurred at places like Cow Roast on the Bulbourne, and a part of the Ver downstream of St Albans (Roman Verulamium), which were navigable by barge, at least in Roman times.

Between that period through to modern times there have been abundant mills (more than 90) which both written records and archaeological remains attest to, processing a range of materials, from turning grain into flour, rags into paper, and even a brief flirtation with milling silk and, in the 18th century, polishing diamonds.

Another major stream-reliant industry was watercress 'farming', which benefitted from the stable chalk stream temperatures and led to the creation of numerous watercress beds along chalk streams throughout the Chilterns. Sadly, these are nearly all out of operation. Floated water meadows have also been identified on the River Chess while natural flooding and wet water meadows were a part of grazing management in other locations.

Beyond the pragmatic, waterside locations have been used for spiritual and religious activity since prehistoric times. From the Bronze Age burnt mounds on the Chess, to Roman shrines and temples on the Ver and Hamble Brook, and the subsequent relationships between Saxon and Medieval churches at 'holy wells' and near the rivers, we can see people are drawn to ritual behaviour near water – even today, we ourselves follow suit. People of many different faiths are still placing items of personal and religious significance in chalk streams.

9.2.3.2 Threats

Although most of our Chilterns waterways and bodies are archaeological in their own right, at least from a philosophical point of view (i.e., they have been modified and shaped for human purposes), the two greatest threats to heritage are unobserved physical modifications and over abstraction. Physical modification of riverbeds and/or riparian margins, or creation of wetland scrapes and ponds, without qualified observation can lead to the loss of knowledge about earlier phases of activity, as well as changing the degree of saturation of soils through changes in drainage. Paired with over abstraction, this loss of saturation can destroy buried waterlogged deposits of both environmental ecofacts and biodegradable organic artefacts.



Case study: Not Bourne Yesterday - chalk stream communities of the Chilterns

Through a suite of 12 projects, an apprenticeship scheme, and a substantial small grants programme, Not Bourne Yesterday (NBY) aims to deliver lasting change for the Chilterns chalk streams. The programme will combine major capital works at several sites with community engagement activity designed to inspire local people and foster future generations of champions for rivers and wetlands.

The development phase began in October 2024 and runs for 18 months, culminating in the submission of a delivery phase application for nearly £3 million. If successful, this would support delivery from 2026 to 2031.

9.2 Rivers, streams and wetlands

9.2.3.3 Opportunities

Using existing knowledge of historic ponds and extraction pits, new freshwater habitats can be created with minimal risk to archaeological features and evidence.

River modification work, properly resourced to include heritage observation, can increase our knowledge of the past phases of our waterways without inhibiting the intended practical works.



Redbournbury Watermill on the River Ver

9.2 Rivers, streams and wetlands

9.2.4 NRP priority species in surface water and water-dependent habitats

Table 11 NRP Priority species in surface water and water-dependent habitats

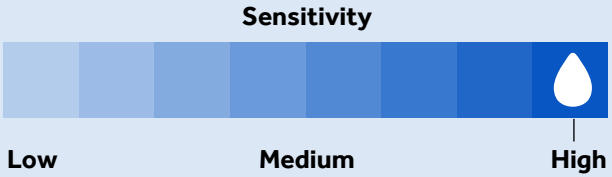
Group	Common name	Latin name
Plants	Star fruit Greater water-parsnip Grass poly Brown galingale	*Damasonium alisma* *Sium latifolium* *Lythrum hyssopifolia* *Cyperus fuscus*
Invertebrates	Desmoulins whorl snail Fairy shrimp Marsh fritillary	*Vertigo moulinsiana* *Chirocephalus diaphanous* *Euphydryas aurinia*
Reptiles and amphibians	Common toad Great crested newt Palmate newt	*Bufo bufo* *Triturus cristatus* *Lissotriton helveticus*
Fish	Brown trout European eel Bullhead	*Salmo trutta* *Anguilla anguilla* *Cottus gobio*
Birds	Cuckoo Curlew Lapwing Lesser spotted woodpecker Willow tit	*Cuculus canorus* *Numenius arquata* *Vanellus vanellus* *Dendrocopos minor* *Poecile montanus*
Mammals	Otter Water vole	*Lutra lutra* *Arvicola amphibius*

Table 12 Invasive non-native or other problematic species considerations for streams and wetland habitats

Group	Common name	Latin name
Plants	Japanese knotweed Himalayan balsam Giant hogweed Curly waterweed Few flowered garlic Least duckweed Monkey flower Montbretia New Zealand pigmyweed Orange balsam Water fern American skunk cabbage Cherry laurel Snowberry	*Reynoutria japonica* *Impatiens glandulifera* *Heracleum mantegazzianum* *Lagarosiphon major* *Allium paradoxum* *Lemna minuta* *Erythranthe guttata* *Crocosmia çrocosmiiflora* *Crassula helmsii* *Impatiens capensis* *Azolla filiculoides* *Lysichiton americanus* *Prunus laurocerasus (shading)* *Symphoricarpos albus (shading)*
Invertebrates	Signal crayfish Quagga mussel Zebra mussel Killer shrimp Caspian mud shrimp Bloody-red mysid shrimp	*Pacifastacus leniusculus* *Dreissena bugensis* *Dreissena polymorpha* *Dikerogammarus villosus* *Chelicorophium curvispinum* *Hemimysis anomala*
Fish	Rainbow trout	*Onchyrinchus mykiss*
Birds	Canada goose Egyptian goose	*Branta canadensis* *Alopochen aegyptiaca*
Mammals	American mink Brown rat	*Neovison vison* *Rattus norvegicus*

9.2.5 Climate adaptation

9.2.5. 1 Rivers including chalk streams (high sensitivity)



Changing rainfall patterns and warmer temperatures are likely to affect water temperature, flows and water quality (notably elevated sediment levels) of rivers in the Chilterns National Landscape. Overall predictions arising from climate change projection suggest that they will be highly sensitive to the effects of climate change. Chilterns chalk streams are headwaters, and as such their health is critical to the wider River Thames network.

Warmer air temperatures will lead to higher summer and winter water temperatures, and, despite constant groundwater temperatures, shallow chalk streams in the Chilterns are likely to be amongst the most affected in the country. For example, temperature rises will threaten reproduction of salmonids such as trout and will change the range, and therefore spread, of invasive non-native species (INNS). Such effects may be compounded by changes in flow in chalk streams with changes to the extent and timing of wet and dry phases of ephemeral and winterbourne reaches.

Prolonged drying of these reaches impacts specialist invertebrate and plant communities with increased encroachment of terrestrial vegetation.

Water level in chalk streams is controlled by groundwater levels. Borehole records in the Chilterns suggest that groundwater levels are already being affected by climate change – less water is reaching the aquifer due to variation of winter rainfall and increases in summer evapotranspiration. Wetter winters and increased frequency of storms may also mobilise more fine sediment from surrounding land into chalk streams in the Chilterns causing siltation of gravels (important habits for spawning salmonids and invertebrates).

The potential effects of climate change on eutrophication of chalk streams are not well understood though reduced summer flows and increased temperatures can lead to reduced oxygen levels and increased pollutant concentrations including ammonia and phosphates.


Riverfly monitoring

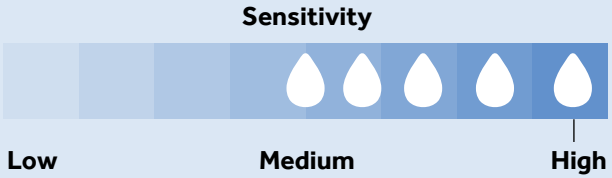

Wooden footbridge over the dry River Gade at Bradden Lane

9.2.5.1.1 Climate change adaptation for chalk streams

- River restoration can improve resilience to changes in flow (e.g. through providing flow refuges) and help with over-heating of water (e.g. by providing a balance of light and shade).
- Prioritising chalk streams for sustainable abstraction and measures to address storm tank overflows will help with resilience to changing flows and water quality (FBA, 2024)
- Natural flood management measures within the catchment that promote infiltration (and thus aquifer recharge) and water retention (to prevent soil erosion) should be encouraged.

9.2.5 Climate adaptation

9.2.5.2 Wetlands (high-medium sensitivity)



Lowland fen is considered to be of high sensitivity to climate change, whilst floodplain grazing marsh, purple moor grass and rush pasture, reed beds are all considered to be of medium sensitivity.
All wetland types will be sensitive to the changes in eco-hydrological regime that will arise from climate change, such as changes in the seasonal availability of water and in water levels (including timing and duration of water inundation) throughout the year.

Lowland fens are thought to be particularly sensitive to the effects of climate change. Groundwater-fed calcareous fens in the Chilterns may be susceptible to changing patterns in the supply of groundwater, whereas floodplain fens in the Thames corridor area may be subject to flooding by nutrient-rich river water and runoff under extreme rainfall events, and subject to drying out during hotter summers. Such changes may lead to a loss of wetland specialists with their narrow hydrological requirements.

Floodplain grazing marsh and rush pasture are landscape types defined by hydrological and topographical features with grazing or cutting for hay and silage as key land management activities.

As is the case for other wetlands, changes in hydrology may lead to changes in plant communities especially where wetland species are out competed by more generalist species.

9.2.5.2.1 Climate change adaptation for wetlands

- Restoring natural hydrological processes on and around wetland sites (including floodplain function where appropriate) will improve resilience of these highly fragmented habitats and the species that rely on them
- Removing pressure on groundwater-fed wetlands due to groundwater abstraction
- For floodplain grazing marsh and rush pasture, flexible grazing regimes should be supported (e.g. timing of grazing regimes in response to variations in seasonality)



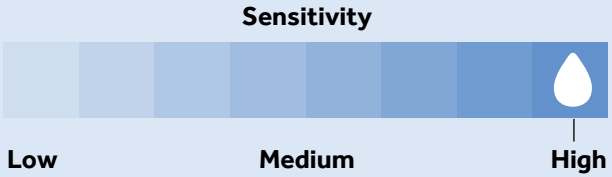
Quarrendon Wetland, River Misbourne



Riverfly monitoring

9.2.5 Climate adaptation

9.2.5.3 Ponds (high sensitivity)



As for other water-based ecosystems, increases in air temperature will warm water temperature and threaten species that are at the southern edge of their range, whilst other species will move northwards. In standing water such as ponds, warmer water temperatures may have significant effects on oxygen levels so that species that require well-oxygenated water may see declines in habitat.

Changes in wetting and drying cycles may lead to ponds drying out more frequently in summer and an increased loading of fine sediments and nutrients associated with winter storms and heavy rainfall, so that the effects of eutrophication – such as algal growth and low night-time oxygen levels – become more marked.

9.2.5.3.1 Climate change adaptation for ponds

- Pond restoration measures will increase resilience to the effects of climate change
- Establishing an ecological network of Priority Ponds will help ponds act as stepping stones for species to migrate in response to climate change
- Increase the number of ponds in the landscape and ensure a range of different stages of succession and permanence of water are found. This will enable mobile species to move around and find suitable habitat
- Buffer ponds from road networks and agricultural runoff with semi-natural vegetation
- Restore pond margins to provide a mix of light and shade to help with over-heating


Pond management leaving a proportion of shading habitat


Nettlebed Common

9.2 Rivers, streams and wetlands

9.2.6 Data and knowledge gaps

- Identification and recording of the location of chalk streams and springs within and affected by the Chilterns National Landscape, that are not currently included on the Natural England map of Chalk Rivers (England), together with refinement of streams that are currently classed as uncertain.
- Recent citizen science activity in the Chilterns has identified nationally rare species of mayfly and stonefly in a winterbourne chalk stream. This highlights the knowledge gap in animal and plant species that live in our temporary streams and wetlands, which needs to be addressed if we are to provide the appropriate protection management techniques to our landscapes.
- Chilterns Important Freshwater Analysis to identify critical areas to focus action on water-dependent habitats in the Chilterns National Landscape.
- Identification and recording of the location of wet woodlands, wet meadow, grazing marsh, calcareous and floodplain fen, temporary and permanent perched watercourses on clay cap within the Chilterns.
- Ongoing surveying to monitor future distribution/potential expansion of INNS across surface water and water-dependent habitats
- Assessment of all Chilterns chalk streams to enable designation of Local Wildlife Sites.



River Misbourne

9.2 Rivers, streams and wetlands

9.2.7 Priority outcomes for nature recovery

The following sections describe our recommendations for priority outcomes in relation to streams, wetlands and ponds that we believe are required for nature to thrive in the Chilterns.

Table 13 Chalk stream priority outcomes for the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Chalk stream identification	CStr 1	The entire length of all chalk streams flowing through the Chilterns National Landscape are identified on the Natural England Chalk Stream map at high certainty.	
Chalk stream condition monitoring	CStr 3	There is improved understanding of the condition of chalk streams in the Chilterns National Landscape that fills any gaps in, rather than duplicating, Water Framework Directive analysis.	
Chalk stream restoration – habitat	CStr 3	Chalk steams, winterbournes and associated riparian habitats (including wetland and wet woodland) are restored as wildlife corridors.	1
Chalk stream restoration – flows	CStr 4	Abstraction is reduced and maintained at environmentally sustainable levels.	
Chalk stream restoration – flows	CStr 5	Landowners adopt farming practises that promote soil infiltration and groundwater recharge, help store water and slow down the rate at which it enters river systems.	
Chalk stream restoration – water quality	CStr 6	Sewage treatment works infrastructure operates effectively under changing rainfall patterns and high groundwater levels with sufficient treatment capacity for extreme events.	
Chalk stream restoration – water quality	CStr 7	The impacts of urban runoff on chalk stream water quality have been reduced through working with Highways Agency and local authorities to introduce sustainable drainage systems (SuDS).	4
Chalk stream restoration – water quality	CStr 8	The impacts of agricultural runoff on chalk streams have been minimised through working with farmers and landowners to introduce nature-based solutions (NbS) and improve soil health.	4
Chalk stream restoration – water quality	CStr 9	The infiltration of contaminants into aquifers has been minimised through working with farmers and landowners to reduce over-application of fertiliser and pesticides, and to improve soil health.	
Chalk stream restoration for characteristic species	CStr 10	Chalk stream habitats have been created and restored to support specialist, rare winterbourne species.	
Control of INNS	CStr 11	Priority INNS in chalk streams are eradicated or controlled.	

9.2 Rivers, streams and wetlands

9.2.7.1 Chalk Streams
Not all the chalk streams in the Chilterns are on the Natural England chalk stream map. For example, the headwaters of the River Hit do not appear on the map, and others on the scarp slope only appear as 'low certainty' chalk streams. So, there is an opportunity to raise awareness about these chalk streams, and to map them.

All chalk streams are classified as priority habitat, but they are not described by Natural England as 'irreplaceable habitat' under Biodiversity Net Gain despite their global rarity. Irreplaceable habitats are those which are very difficult (or take a very significant time) to restore, recreate or replace once destroyed due to their age, uniqueness, species diversity and rarity. Furthermore, not a single chalk stream in the Chilterns is designated as a SSSI or SAC. This means that despite their special characteristics, protection of these Chiltern chalk streams is not as strong as it could – and arguably should – be. The 2021 CaBA Chalk Stream Restoration Strategy Report called for a statutory driver to support investment decisions in all chalk streams, and calling for such a designation remains an objective today.

9.2.7.2. Wetlands
The River Thames floodplain is the site of many fragments of priority wetland habitat. This creates an opportunity to work collaboratively with local authorities and North Wessex Downs National Landscape to create nature-rich, joined up wetland habitat enhancements in the South Chilterns Catchment from Wallingford to Caversham. A key priority is to identify further potential to connect patches of wetland with wildlife-friendly habitat along the Thames Corridor and to re-instate wetland areas to create a riparian corridor along which wetland species can migrate.

Table 14 Wetland priority outcomes for the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Wetland creation for better connectivity	WtLnd 1	New opportunities for wetland creation have been identified by focusing on those areas that offer connection to a mosaic of fen, meadow, marsh and wet woodland in the Thames floodplain area, and chalk stream floodplains.	1
Wetland restoration	WtLnd 2	Where appropriate, suitable hydrological regimes have been restored in floodplain wetland habitats.	4
Wetland restoration	WtLnd 3	Existing and potential wetland areas have been mapped in detail, and management plans outlined, to enable the provision of appropriate advice to site managers and adjacent farmers.	
Wetland restoration	WtLnd 4	Habitat has been created and restored to support black poplar, Desmoulin's whorl snail and Loddon lily in the Thames corridor.	1,4

9.2.7.3. Ponds

The Chess catchment has benefitted from Freshwater Habitats Trust PASS project to identify priority ponds within the catchment. The findings and methodology developed for this project could be rolled out across the Chilterns National Landscape so that an updated list of priority ponds needing action can be added to the Natural England priority ponds map, and a management plan is developed for each priority pond.

Table 15 Pond priority outcomes for the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Pond identification	Pnd 1	Priority ponds needing action have been identified on the Natural England Priority Ponds map	
Pond creation for better connection	Pnd 2	New opportunities have been identified for pond creation in key locations to increase connectivity of pond habitat and ability of species to move between ponds.	1
Pond restoration	Pnd 3	Condition of existing ponds (both priority and others) has been improved to ensure diversity of water levels and pond habitat types across the Chilterns National Landscape, and with considering the longer-term impacts of climate change.	4
Pond creation and restoration	Pnd 4	Species resilience has been improved through provision of pond habitat connectivity and facilitating the movement of key species between ponds.	

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

Special qualities of the Chilterns National Landscape



9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

9.3.1 Statement of farmed land

Farmland is the main land use in the Chilterns, covering approximately 60% of the National Landscape and providing a wide array of habitats. The mixture of acidic and calcareous soils on variable geology (chalk, clay and gravel in river valleys) enables mixed farming activities.

Table 16 Farmed land use (2021 and Natural England priority habitat analysis)

Farmed land use	Area (ha)	% of CNL area[a]
Arable[b]	27,144	33
Grassland (all) [b]	18,067	22
Calcareous grassland[c]	1,309	1.5

[a] Total area of 83,380 ha – includes all urban and all other land cover types
[b] Defra Agricultural Census Data, 2021
[c] Natural England priority habitat analysis

The mosaic of arable and grassland habitats is overlaid with a network of interconnecting hedgerows and interspersed with woodland and common land. Species-rich hedgerows and hedgerow trees provide important wildlife habitat and connecting wildlife corridors for many different species. There are five grades of agricultural land as classified by the Agricultural Land Classification system, with 1 being most productive to 5 being of very poor quality for agricultural production. The majority of the Chilterns National Landscape farmland is categorised as Grade 3 – land with moderate limitations on cropping.

Unfortunately, the post war push to increase food production, has negatively impacted biodiversity, soil health and freshwater quality in the Chilterns National Landscape. For example, the Chilterns was once a strong-hold for rare arable plants (such as pheasant's eye and ground pine) and farmland birds including nationally important populations of corn bunting and linnet, and the once common lapwing, yellowhammer and skylark. A move to larger fields and more intensive agriculture has led to a decline in biodiversity. In recent years, livestock farming (sheep, beef and dairy) has declined markedly due to lower profitability while arable farming has increased.



Manor Farm, Bradenham

This is directly relevant to our important grassland habitats, including highly biodiverse chalk grassland, which are dependent on grazing to survive. However, many believe we might see an increase in mixed farming (livestock and arable together) as farm support mechanisms evolve post Brexit. As of 2022, 16,200 ha (19.4% of total Chilterns National Landscape area, 30% of total farmed land) had been entered into agri-environment scheme agreements (Countryside Stewardship, Environmental Stewardship and Sustainable Farming Incentive). This has grown from 2020 when only 6,198 ha of land was covered by agri-environment schemes.

The shallow lime-rich and free draining lightly acid loamy soils that together cover c. 35% of the Chilterns are vulnerable to soil erosion. Erosion of thin chalk soil not only leads to a loss of productive land but can also expose chalk rock. Soil erosion can lead to sediment runoff into standing water and streams and strips away the buffering capability of soils to protect groundwater from contaminants like nitrates and pesticides.

Case study: Supporting farmers and rural communities – Farming in Protected Landscapes (FiPL)

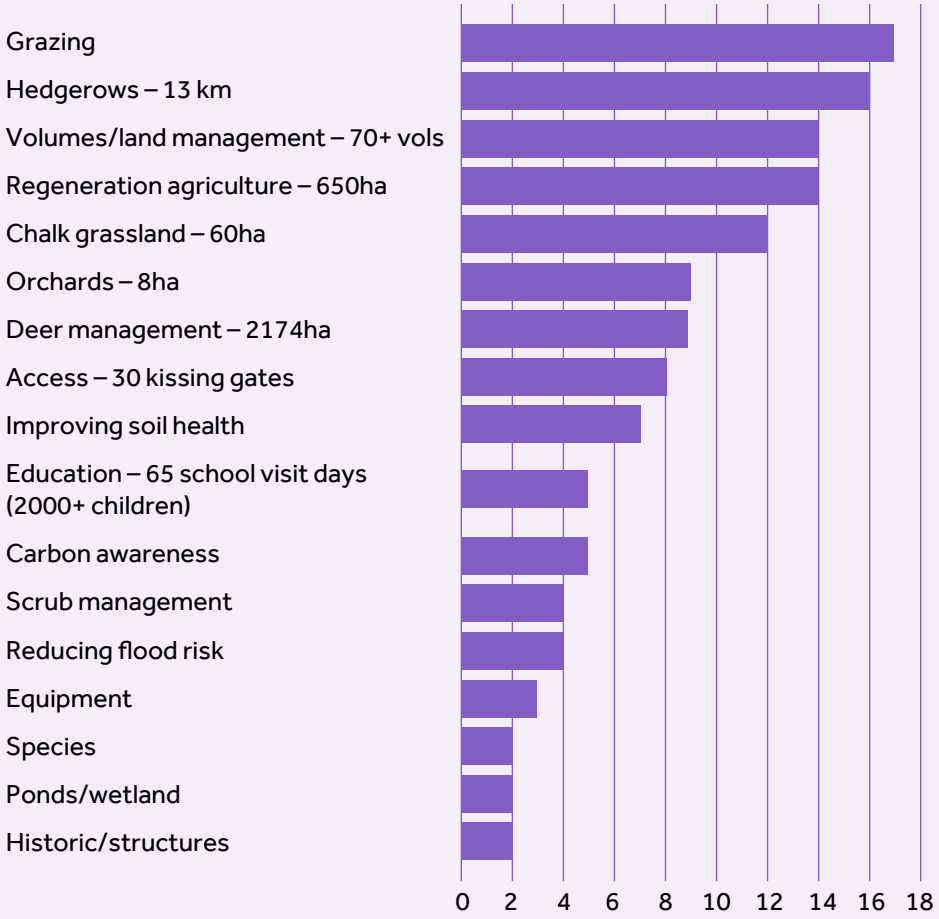
Introduced in July 2021 and extended until March 2026 as part of Defra's Agricultural Transition Plan, Farming in Protected Landscapes (FiPL) helps farmers and land managers to carry out projects that support nature's recovery, mitigate the impacts of climate change, provide opportunities for people (to discover, enjoy and understand the landscape) and support/restore cultural heritage. During the first four years of the programme, 164 projects were approved and £2.3m spent in total.

The programme has supported existing farm clusters (such as the Central Chilterns farm cluster) and also helped get new clusters off the ground (South Chilterns and North Chilterns farm clusters). Over a two year period, the North Chilterns farm cluster has planted 10.5 km of hedge and restored a further 6.4 km. The farm cluster projects have also provided supplementary feeding for farmland birds such as yellowhammer and corn bunting as well as helped farmers in understanding the wildlife and carbon value of their land. The FiPL funding has created even more impact by working with funding from the commercial sector (e.g. Affinity Water and Thames Water).

As well as working with farm clusters, there have been many individual applications which have resulted in new habitats being created (e.g. traditional orchards, wood pasture), restoration of existing habitats (chalk stream wetlands, species-rich chalk grassland, ponds). Applications have in some cases focused on particular species, including some of those listed in this document (military orchid, juniper, Duke of Burgundy and fritillary butterfly). Such projects have been farmer led, or supported by farmers but with management by trusted partners such as Plantlife or Chiltern Rangers. Chiltern Rangers have made volunteer involvement a key part of projects they have been involved with.

An increasing number of projects have supported land managers with the management of the deer populations on their land. This has sometimes been indirectly via funding for stalkers (e.g. chillers, high seats) and venison processing units. In addition, funding has enabled the deer population in the southern Chilterns area to be surveyed. This has shown the scale of the issue in terms of density of deer per square kilometre, with results indicating that negative impacts are highly likely to be happening in such areas.

Figure 10 Main project themes funded by FiPL in the first four years of the programme.



FiPL has clearly demonstrated the benefit of providing bespoke and flexible funding, supported by expert 1:1 advice. It will be of great benefit to the Chilterns if this model continues into the future.

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

The loamy and clay soils that cover almost 50% of the area are prone to capping and easily compacted by machinery or livestock when wet, impeding infiltration of water into the subsoil, and encouraging surface runoff; an increasing challenge under future climate change scenarios of more intense and extreme rainfall events. In recent years there has been an increased interest in farming techniques to improve soil health and pollinator numbers ('Min-till', 'Controlled Traffic', 'Regenerative Farming', cover cropping etc.) and, while organic and agro-ecology farming systems argue against pesticide use, there are moves even within conventional farming to reduce the need for pesticides using techniques such as Integrated Pest Management.

In the past, hedgerows defined ownership and were maintained for stock management. Where livestock farming continues, farmers rely on fencing rather than hedges.

Remaining hedgerows are flailed annually to keep growth in check, but this leads to a decline in not only the quantity, but also the quality of habitat. Hedges and hedgerow trees can represent a significant management burden and cost for arable farmers, but they also provide multiple benefits which include intercepting runoff and reducing soil erosion; capturing carbon and hosting insects that pollinate crops and predate on crop pests as well as supporting numerous threatened species. In fact, hedgerows and field margins both produce the most nectar for pollinators compared to other farmland habitats.

Pollinators not only support much of the world's plant diversity, but they are also critical to agricultural systems. In England many of our crops (such as oilseed rape, orchard fruit and field beans) rely to some extent on insect pollinators comprising bees (wild solitary bees, bumblebees and domesticated honeybees), flies, butterflies, beetles, wasps and moths. 80% of wildflower species in Europe also rely on insect pollinators. A combination of changes in agricultural land use (such as loss of wildflower meadows, hedgerows and field margins), chronic exposure to pesticides and climate change have led to marked declines in insect populations.

Deer numbers (fallow, roe, muntjac and Chinese water deer) across the Chilterns are not known, but they are thought to be increasing, and currently at record high numbers due to a lack of predators, mild winters and a lack of coordinated control between neighbouring land holdings. Browsing of crops by deer is a recognised problem, with deer moving across the landscape between woodland and farmland when searching for food. Some deer management activities are providing a limited supply of Chilterns venison, but more needs to be done to support **deer management** and the venison supply and marketing chain.



The Chilterns National Landscape is one of the most visited designated areas in the country. Many people enjoy the countryside, most of which is managed by farmers. However, high visitor numbers can impact farm management and farm wildlife. Dogs running off-lead can disturb ground nesting birds and visitors may see field margins as unofficial footpaths. Such visitor pressure can act as a disincentive for farmers adopting measures such as bird plots for skylarks and wildflower rich field margins.

The Chilterns Conservation Board and our partners can support farmers through communications (newsletters, social media etc.) reinforcing the need for visitors to respect farmers and their land by keeping to public and permissive rights of way.

Clearly, the main function for farming is food production and we need a viable farming sector and sustainable farming systems to produce both the food we need and manage land in ways that contribute to nature recovery. Supported by agri-environment schemes and using modern technology to reduce agrochemical inputs, many farmers are now incorporating conservation measures into their day-to-day activities. In the future, all farmers need to be supported with advice and evidence to adopt farming techniques that have positive environmental outcomes whilst maintaining profitability.

At a time of significant pressure on public spending, it is important that agri-environment schemes, supporting farmers to adopt nature friendly farming techniques, are maintained and, where possible, expanded.

Case study: The role of farmer clusters in nature recovery



The farmer cluster model has been shown on a national and local scale to drive tangible and scalable impact on the ground and clusters are critical to successful long-term delivery of the Chilterns National Landscape nature recovery plan. The model was first tested in the Chilterns in 2019 and at the time of writing, the Chilterns Conservation Board is actively supporting five farmer-led clusters covering c. 30% of the farmed land across the Chilterns. Between them the South Chilterns, Christmas Common, Central Chilterns, Chess Valley and North Chilterns Farmer Clusters have a combined membership of over 80 farmers and land managers who are farming over 20,000 hectares of land and offer a wide-reaching network through which to engage and deliver.

Farmers within these groups are enthusiastic to identify their own priorities for nature while, at the same time, maintaining viable businesses. Arable and livestock farming and food production work hand in glove with the provision and management of networks of hedgerows, field margins, grassland, woodland, chalk stream, pond and arable marginal habitats that support the unique blend of species that call the Chilterns home. Working with clusters and supporting them to help identify options and funding that fit individual circumstances, has already seen significant lengths of hedgerow rejuvenated and planted, areas of grassland restored (including SSSIs), supplementary feeding to support overwintering farmland birds and measures to improve soil health adopted. Further developing the network of Farmer Clusters through dynamic facilitation and allowing farmers to take the lead and create plans for nature recovery is critical to creating a sense of ownership, collaboration and partnership at landscape scale.

Barriers to action are removed by creating a focused, connected and supportive community of facilitators, funders, advisers including ecologists, contractors and volunteers. To do this, large scale and long-term investment from a combination of public, private and charitable sectors is needed.

Farmer clusters are proven to deliver more, better, bigger and better-connected habitat. Whether its large scale hedgerow planting, flower rich grassland creation, chalk grassland SSSI restoration, species specific conservation (e.g. barn owl/grey partridge), collective projects (e.g. winter supplementary bird feeding), knowledge sharing (up-to-date training and peer support), providing an evidence base (e.g. wildlife surveying) or collective themed projects (e.g. insects or cover cropping) the network of farmer clusters across the Chilterns is proven to deliver long term impact at landscape scale.

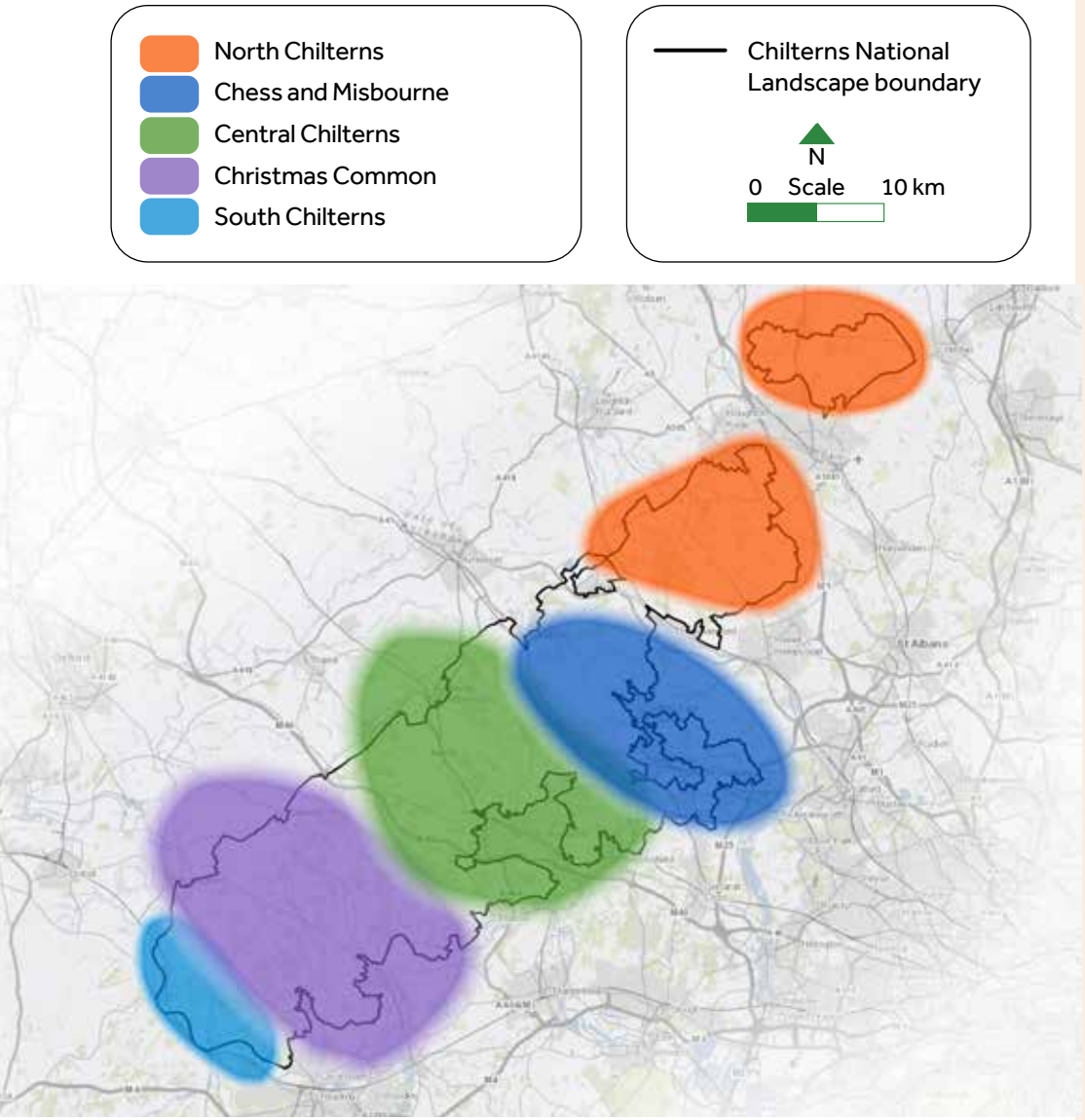
The ambition in the Chilterns is for support to farmer clusters to follow the five-stage end-to-end package of support developed originally for the Central Chilterns as part of the National Lottery Heritage Fund project, 'Chalk, Cherries and Chairs':

- **Inspire and engage:** help farmers better connect with the wildlife on their farms
- **Advise:** enable high quality advice helping farmers understand what's possible and to make plans
- **Invest:** open up opportunities for direct investment to support farmers deliver at scale
- **Deliver:** help farmers plan and deliver projects on the ground
- **Monitor:** help farmers track the impact of their work on a site at farm and landscape scale

See Section 10 for further details about how farmer clusters are helping to deliver landscape-scale nature recovery across the Chilterns.

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

Map 15 Farm Clusters in the Chilterns National Landscape



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Mature, well-managed hedgerows on Manor Farm (Bradenham)

9.3.2 Description of farmed land habitats

The different types of farmed land habitat in the Chilterns National Landscape are described in the sections below.

9.3 2.1. Hedgerows

Hedgerows are historic field boundaries consisting of tree and shrub species, sometimes with a diverse mix of herbaceous plants in the hedge bottom and adjacent margin. They provide valuable food, shelter and breeding habitats for many birds, reptiles, amphibians, bats, ground-dwelling mammals and invertebrates. They also provide corridors for movement through the landscape and natural recolonisation of areas. They provide a carbon sink both through the biomass that makes up the plants and roots, but also due to their impact on the soil below them, which is typically very rich in carbon. Chiltern hedgerows are also renowned for the number of mature hedgerow trees (estimated as 44,000 in 2008). However, most of these are over mature and, with the added threat of increasing tree disease, if numbers are to be maintained, focussed effort to plant new hedgerow trees is required.

Latest estimates for the total length of hedgerow within the Chilterns National Landscape vary between 2,087 km (UKCEH, 2016-2021) and 3,300 km (PL TOF, 2022). The last bespoke Chilterns hedgerow survey was carried out in 2008 (limited to 330 hedges with results extrapolated). This survey concluded that only 38% were thought to be in good condition, so c. 62% are thought to need active management. An average Chilterns hedge may need laying or coppicing every 40 years so across the Chilterns, c. 80 km needs rejuvenating every year.

Taller and wider hedges can support more wildlife while healthy field margins adjacent to hedgerows (the 'hedge and edge') are vital if the full benefits of hedgerows, both for biodiversity and farming, are to be realised. We should therefore be aiming for a range of hedge types in a constant cycle of rejuvenation. In some areas hedges have been

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

removed to allow large arable farming machinery to be easily used. They have also been lost due to development of agricultural land for housing, infrastructure projects and neglect. The condition of some hedges has been diminished through lack of periodic management and excessive browsing by herbivores. Protecting hedges with fencing and planting new hedges requires land to be taken out of agricultural production, but can increase production on neighbouring land by providing refuges for predatory invertebrates that reduce crop pests, increasing infiltration of rainwater, preventing erosion of soil and providing shade and shelter for livestock.

Planting new hedges requires a supply of native saplings of good quality and a trained workforce. Establishment of new hedges can be a challenge in very dry weather. Better protection from weed growth (weed mats) and browsing deer are in development, but currently tree guards and deer fencing are expensive and/or difficult to remove. Good management of hedges requires knowledge and skill, both to understand when coppicing or hedge-laying is appropriate, how to do it, and the best management plan for long-term hedge health.

9.3 2.2. Arable field margins

Farmers and landowners can release less productive land at field edges to create field margins. Field margins can be managed in different ways depending on the landholding and on the intended outcome for nature recovery. Grassland, wildflower and cultivated arable margins can all be introduced to farmed land for different purposes.

Cultivated arable margins can help support rare arable plants. Grassland margins are important in areas of arable farmland to (i) provide buffers to adjoining habitats (streams, woodland etc.), (ii) barriers to soil erosion, (iii) corridors for wildlife between woodland and species-rich grassland; and (iv) wildflower margins that provide a source of pollen and nectar for pollinating insects. Bare ground is also important for many rare and notable species (including both plants and invertebrates) though care has to be taken to avoid erosion and run off risks.

All these types of margin support invertebrates that feed on crop pests and are a protein-rich source of food for farmland birds. These areas also act as refugia for small mammals which, in turn, support birds of prey. Field margins act as links to hedgerows, ditches and ponds enabling movement of different species around the landscape.

9.3 2.3. Scrub habitat

Scrub is a vital, but often overlooked and undervalued habitat that many of our breeding bird species love (e.g. lesser and common whitethroat, willow warbler, chiffchaff and blackcap), small mammals can use to move about the countryside, and bats can use to glean insects. It is frequently described as the ideal marginal habitat,

Case study: Focussed effort achieved by the Chalk Cherries and Chairs and North Chilterns Hedgerow projects



As part of the Chalk, Cherries and Chairs National Lottery Heritage Fund project the Chilterns National Landscape held a workshop for farmers in the Central Chilterns Farm Cluster centred on the benefits of hedge planting, rejuvenation and good management. As a result of this, farmers were willing to embark on a two-year project funded in part by Farming in Protected Landscapes, part-funded by the landowners and in some cases also by the HS2 'Additional Projects' budget and in one case part-funded by SUSTRANS. Hedge surveys throughout the Central Chilterns were undertaken by a specialist to provide guidance on optimum locations for new hedges, priorities for gapping up and management of old hedges. Working at such a large scale allowed a focus on forming habitat corridors and providing links at a landscape scale. The Chilterns National Landscape was able to arrange procurement of contractors, project management, delivery and aftercare.

Using the same focussed model of 'start to finish' support, the North Chilterns Hedgerow Project also engaged with a number of land managers to secure significant hedgerow restoration.The total length of new hedgerow planted during the combined projects totalled 16.5 km, and in addition 7.4 km of coppicing and
335 m of hedge-laying was completed between 2021–23.

Case study: Central Chilterns Farmer Cluster Hedgerow Project | Chilterns National Landscape

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

softening the edges of woods and buffering the margins of arable fields to create a rich mosaic of habitat, breaking up field and woodland boundaries. Often made up of thorny species such as blackthorn and hawthorn, as well as bramble and early succession woodland species such as birch and willow, the best scrub offers a rich mix of ages and stage, adding a real sense of heterogeneity to the Chilterns landscape. As with mature mixed species hedgerows, scrub is also a great source of carbon sequestration, pollen and nectar for butterflies and other invertebrates and a source of berries for over wintering birds.

Farming doesn't offer many opportunities for marginal areas to be left to scrub over, and public perception of scrub of being unsightly and reflecting on poor farming, as opposed to a habitat to be celebrated, is often scrubs worst enemy. It can, however, be a favourite for unproductive field corners, or as a buffer to woodland edges, finding a niche where farming is least economic. It can attract more favourable payment rates in agri-environment schemes and a feature in long term land management plans and offers a great addition to hedge and woodland planting projects.

Scrub is a dynamic habitat and is best managed by rotational clearance, and by conservation cattle grazing, to keep the balance of age and stage. Planned and managed well, scrub provides an ideal opportunity to connect areas of woodland to hedgerow to grassland to arable land and is the perfect buffer to support many of our declining Chiltern's species. On chalk grassland some scrub is a welcome addition for specific species such as the green hairstreak and Duke of Burgundy butterfly. However, it requires careful management to ensure it does not dominate and turn into early succession woodland, choking our chalk grassland species.

9.3 2.4. Drainage ditches and ponds

Whilst the Chilterns are often seen as a dry landscape, ditches and ponds still provide an important farmland habitat for a rich variety of wildlife including aquatic plants, water vole, grass snake, dragonflies and bats feeding on insects. They are, however, vulnerable to sediment runoff and pollution. At one time, livestock farming was far more prevalent and field sizes would have been smaller. Every grazed field would have needed access to water so ponds would have been a very common sight. It is estimated that 50% of UK ponds have been lost in the 20th century and 80% of those left are in poor condition. Change in land use, but also a switch to potable water to reduce disease risk for stock, has contributed to this massive decline. There is an increasing base of knowledge on how we can better manage these habitats and keep the water healthy, whilst managing them to increase flood storage and reduce flooding downstream. Section 9.2 provides more details on ponds in the Chilterns landscape.

Case study: Positive management of rare arable plants – Manor Farm, Bradenham



At Manor Farm in Bradenham a botanical survey undertaken as part of the Chalk, Cherries and Chairs National Lottery Heritage Fund project revealed a total of 284 vascular plant species on the 220 ha farm. As a result of these findings the whole farm was designated as a Local Wildlife Site.

Support for entry into Countryside Stewardship was also provided through this project, and as a result the whole farm was entered into a five-year Countryside Stewardship scheme, including an agreement for 2.9 ha of the farm to be supported for AB11 'Cultivated Areas for Arable Plants'. There were nine arable plants of note found on this farm, including rye brome (*Bromus secalinus*), field woundwort (*Stachys arvensis*), venus's-looking glass (*Legousia hybrida*) and dwarf spurge (*Euphorbia exigua*).

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

9.3 2.5 Arable land

Recent data suggests that about 59% of our farmed land is under arable cultivation (Defra Agricultural Statistics, 2021). The free draining soils give farmers more months of access for machinery compared to heavier soils and low-lying areas that are increasingly prone to flooding and water logging with more frequent extreme weather events. These soils are also suitable for more valuable cereal crops including malting barley. Increasing input costs (fuel, fertiliser, pesticides) alongside reduced support payments, have encouraged farmers to consider changes to their farming systems. Many farming commentators suggest that, given the loss of European farm support mechanisms, there may be a return to mixed farming as whole farm systems providing diversification and stability in an era of fluctuating global markets.

Technological innovation such as precision farming techniques, GPS guided machinery, soil mapping and real time on-board harvest analysis can help farmers plan accurate use of seed, fertiliser and pesticides. Cover cropping (sowing crops in between yearly cash crops) is also gaining popularity as a means to reduce erosion, nutrient loss and increase soil carbon. Such techniques can both boost profitability and reduce the risk of excess nutrients and chemicals entering and polluting the wider environment.

9.3 2.6 Grazed land

Nationally important areas of species-rich chalk grassland form one of the special qualities for which the Chilterns were designated as an AONB in 1965, therefore a separate section within this Nature Recovery Plan covers the various grassland habitats within the Chilterns. However, it is important to note that the range of farmed grassland – from downland, semi-improved grassland, permanent and even short-term leys – can provide important habitats supporting a range of species (plants, invertebrates, birds etc.) as well as valuable carbon sequestration.

9.3.3 Heritage of farmed land habitats

9.3 3.1 Description

The Chilterns landscape has been farmed for nearly 6000 years; the fields are themselves, in one sense, archaeological features, as are the ancient hedgerows and boundary ditches that demarcate them, and many of the routeways and trackways that connect them.

Many of these influence historic landscape character. More than this, of the 113 scheduled monuments in the Chilterns National Landscape, 30% are on arable and 31% are on grassland. An even greater number of undesignated archaeological assets are known to exist on farmed land through topographical survey (LiDAR), and still more likely under the surface but unconfirmed by non-invasive geophysical survey.

These survey techniques may enable us to identify areas where medieval field patterns survive and help us identify opportunities to protect and restore such field patterns through replacement of lost hedges. Historic farmsteads often stand at the centre of arable fields, and may preserve evidential, historic, aesthetic and communal heritage value through their buildings, layout, or artefactual evidence in abandoned outbuildings.

Field names (often only known by local farmers) often evidence communal/social histories of the landscape and should be recorded where possible. In addition to all this, there are listed buildings linked to ancient and historic farming, to say nothing of traditional farming practices and skills which form intangible social heritage. In short, heritage assets are inextricably linked with farming across the entire protected landscape.

9.3 3.2 Threats

The greatest threat to buried assets and undesignated earthworks is a lack of awareness and understanding. Knowing what exists and being aware that farming practices or changes to regimes can affect the preservation of heritage assets is key. The past cannot and should not be preserved in aspic; farming must and should continue to thrive, but without having all the information available and explained, farmers and land managers cannot take the best decisions for nature and heritage holistically.

9.3 3.3 Opportunities

The Chilterns LiDAR survey of 2019 provided a dataset that offers the opportunity to engage with and inform farmers about the heritage assets they own or manage. This data allows us to identify extinct historic ponds to suggest reinstatement, to identify old boundaries and hedgerows, and indeed in some instances, even ancient field systems.

Encouraging farmers to see themselves as the current link in a long chain of farmers stretching back over millennia can open up dialogues about how to best steward the land. Engaging with farmers about the designated and undesignated heritage in their care may help them access government schemes to support best practice with monetary incentives.

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

9.3.4 NRP priority species in farmed land habitats

Note that the emphasis is on arable flora for this section. There are many more arable plant species which could have been included here, but scored lower in terms of conservation assessment. For other plant species, see the "Grassland" section of this document. The invertebrate species listed are associated with scrub habitat which has been included in this farmland section of this plan. Adder is also a species associated with (young) scrub.

9.3.5 Climate adaptation

Many farmers are already adopting mitigation measures to reduce their own impacts on climate change. These include improving soil carbon sequestration and adopting techniques to reduce fuel use to work towards net zero (the National Farmers Union ambition for UK agriculture to reach net zero by 2040). However, a greater number of farmers will also need to adapt their farming systems to cope with our changing climate.

Whilst from year to year there are winners and losers for landowners arising from an increase in climate variability (e.g. wet weather can provide greater grass yields for stock farmers, but make management operations difficult for arable farmers), such climate extremes provide real challenges to farming.

Here we focus on sensitivity of hedgerows and arable field margins to climate change, given their importance for nature recovery, alongside a brief overview of potential adaptation measures ahead of the publication of the Chilterns Climate Change Adaptation Plan.

9.3 5.1 Hedgerows (low sensitivity)
Potential climate change impacts on hedgerows include longer growing season due to elevated temperatures, increased mortality of some species due to drought (e.g. beech in the south-east of its range), wet soil conditions increasing dieback of hedgerow trees and loss of mature and veteran hedgerow trees due to increase in storm intensity and frequency.

9.3 5.2 Arable field margins (low sensitivity)
Higher average temperatures and drier summers could lead to changes in plant community composition. Key changes are likely to occur due to a combination of new crops with associated changes to management.

Table 17 NRP priority species in farmed land habitats (including scrub)

Group	Common name	Latin name
Plants (Arable flora emphasis. For other plant species, see the Grassland section)	Broad leaved cudweed Ground pine Pheasant's eye Wild candytuft Broad fruited cornsalad Small-flowered catchfly Shepherds needle Corn buttercup	*Filago pyramidata* *Ajuga chamaepitys* *Adonis annua* *Iberis amara* *Valerianella rimosa* *Silene gallica* *Scandix pecten-veneris* *Ranunculus arvensis*
Invertebrates	Duke of Burgundy Glow worm Liquorice piercer Green hairstreak	*Hamearis lucina* *Lampyris noctiluca* *Grapholita pallifrontana* *Callophrys rubi*
Reptiles	Adder	*Vipera berus*
Birds	Corn bunting Grey partridge Lapwing Stone curlew Turtle dove Yellowhammer Linnet Skylark	*Emberiza calandra* *Perdix perdix* *Vanellus vanellus* *Burhinus oedicnemus* *Streptopelia turtur* *Emberiza citronella* *Linaria cannabina* *Alauda arvensis*
Mammals	Hazel dormouse Harvest mouse	*Muscardinus avellanarius* *Micromys minutus*

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

9.3 5.3 Climate change adaptation for farmed land
Adaption measures such as 'min-till' and cover cropping can improve soil structure and health which increase water infiltration, reduce soil erosion and allow farming operations to continue when otherwise the ground would be too wet to farm. We may also see changes in crops grown and crop rotations. Maintaining and improving resilience and connectivity of farm habitats will also be essential for the wildlife our farms support.

Changes in composition and structure of hedges should be considered to ensure species are chosen that are adapted to a wide range of climate conditions to ensure resilience, and that a greater range of age classes is encouraged. Links to existing hedgerow networks and patches of semi-natural habitat should be made to enable species movement.

Using field margins to buffer wildlife from the effects of chemical inputs from adjacent cropped areas will remain key to ensuring resilience to climate change. Within planted margins the diversity of flowering species should be tailored to ensure provision of pollen and nectar, and those species that can tolerate hotter, drier summers should be included in the mix.

9.3.6 Data and knowledge gaps

- An assessment of hedgerow condition (including 2m edges alongside hedgerows) across the Chilterns National Landscape that enables comparison with previous datasets
- Ground-truthing of mapping of pond locations and pond condition in farmland across the Chilterns National Landscape
- Identification and recording of rare arable plants with better understanding of their specialist needs, alongside enthusing farmers and landowners to enable these species to thrive
- Analysis of farmed land use change in the Chilterns National Landscape using innovative, remote sensing data to guide our focus on future work and horizon-scan emerging issues


Pasture with scrub margin

Table 19 contains examples of specific actions that farmers and landowners could consider introducing on their farmed land to aid nature recovery. Specialist advice obtained through ecological assessment and whole farm management plans is key and can help farmers and landowners decide which options best suit their circumstances, both from a business perspective and with regards to geographical location.

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

9.3.7 Priority outcomes for nature recovery

The following sections describe our recommendations for priority outcomes in relation to streams, wetlands and ponds that we believe are required for nature to thrive in the Chilterns.

Table 18 Priority outcomes for farmed land in the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Help and advice	Frm 1	All farmers in the Chilterns have access to advice, support and suitable long-term funding for nature-friendly farming practices (including landscape scale advice where possible, connecting habitats on and between farms). Advice and support will inspire, enthuse and engage farmers, helping them to be the driving force for nature-friendly farming that works for them.	
Nature-friendly farming	Frm 2	Existing, newly created and restored priority habitat is entered into agri-environment schemes.	4
Nature-friendly farming	Frm 3	Fully resourced networks of farmer clusters can work together and access end-to-end packages of support for innovation and change.	
Nature-friendly farming	Frm 4	Favourable grazing management supports high biodiversity and condition of chalk grassland.	
Nature-friendly farming	Frm 5	Most land managers have adopted nature-friendly farming on at least 15% of their land with an overall significant increase in land actively and positively managed for wildlife.	5
Nature-friendly farming	Frm 6	Healthy soil ecosystems are created across farmed land in the Chilterns National Landscape to support biodiversity and increase climate resilience.	
Nature-friendly farming	Frm 7	Wildlife-rich habitats, including ponds and streams, are linked and buffered with a network of hedgerows with trees, wildlife-friendly field margins and scrub mosaic.	
Nature-friendly farming	Frm 8	Farmers can easily use accessible wildlife surveying techniques for assemblage of birds, butterflies, and plants and, in time, other wildlife groups, to track the impact of their efforts at site and landscape scale.	
Local economy	Frm 9	Support is given to secure the long-term viability and success of local nature friendly farm businesses and high-quality food production.	

9.3 Farmed land (including hedgerows, arable field margins and scrub mosaic)

Table 19 List of suggested actions to support nature recovery on farmed land

Action	Reason why?
Create field margins in strategically important places	Supports farmland birds and predators, invertebrates, small mammals and wildflowers; linear nature improves connectivity of wildlife-friendly habitat. Kent Wildlife Trust offers some useful advice for managing field margins for wildlife here.
Create herbal leys	Herb rich leys can be introduced within grazed rotations to increase the amount of nectar and invertebrates present in the landscape; native species are preferable.
Introduce mob grazing	A 'regenerative' farming technique which aims to increase soil organic matter, build soil fertility and water-holding capacity, increase insect, bird and plant biodiversity, improve business resilience and cattle health. Other, more traditional, rotational grazing systems can have similar benefits if managed sympathetically.
Introduce cover cropping	Use seed-rich winter cover crops using wild bird seed mixtures to help farmland birds bridge the hunger gap; reduces soil capping, runoff and soil loss and nitrogen loss to the atmosphere.
Reintroduce mixed farming	Either with farm owned stock or contract grazing, such farming systems represent a diversification option but also introduce a greater diversity to farmland habitats.
Improve connectivity by gapping up and planting hedgerows	Thick hedgerows support nesting sites for birds and homes for small mammals; hedges create wildlife corridors for species movement; hedgerows store carbon and provide shelter during heat waves; hedgerow root systems are beneficial to soil organisms. Further advice on hedges can be found at HedgeLink. You can download a healthy hedge management app here.
Reduce reliance on chemical inputs	Minimising use of artificial pesticides and fertilisers improves water quality and biodiversity; cost-saving measures on the farm; leaving areas unsprayed will support rare arable weeds and wildflowers. For some, this could mean adopting 'Pasture Fed' or 'Organic' standards.
Adjust management practices (duration, timing) for specialist species survival	Examples might include: haymaking rather than silage; pasture rather than maize as fodder for dairying; spring cropping in place of winter to allow over-wintered stubbles.
Conversion of arable on steep slopes to extensively grazed wildflower grassland or mosaic habitat	Prevents soil erosion and runoff; and provides areas for nature recovery on difficult-to-farm areas Plantlife offer helpful practical guidance on Managing Meadows.
Overwinter stubble	Provide habitat for insect pollinators.
Supplementary farmland bird feeding	Help feed farmland birds until a suitable wildlife-rich habitat has been developed.
Find a place for scrub habitat	Valuable as a mosaic between grassland and woodland offering benefits for carbon capture and diversity of habitat to support specialist species.

9.4 Grassland

Special qualities of the Chilterns National Landscape




Grassland

9.4 Grassland

9.4.1 Statement of grassland habitats

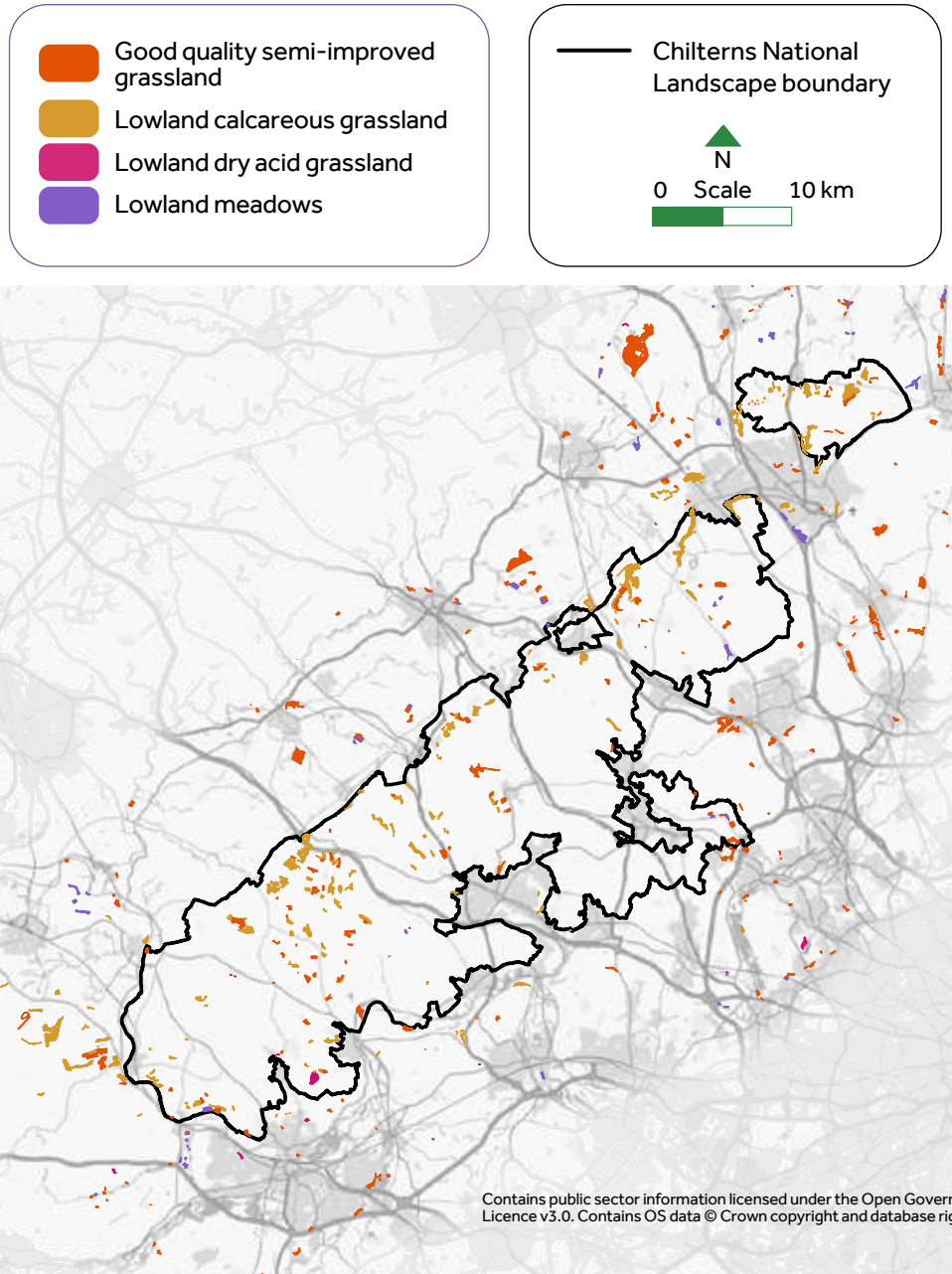
The nationally important concentrations of species-rich chalk grassland are one of the special characteristics for which the Chilterns were designated as an AONB in 1965. Once extensive, the chalk grassland now covers just over 1% of the National Landscape, mostly in small fragments. Despite the Chilterns being a chalk landscape, however, important areas of other priority grassland exist; including floodplain grazing marsh and dry acid grassland. Very often, the fine mix and interconnectivity of different habitat mosaics (including grassland, woodland, hedgerows and even arable land) create special micro-environments that are extremely valuable for wildlife.

All our grassland habitats have one thing in common, they require grazing to prevent succession to scrub and then woodland. Wild herbivores – deer, rabbit and hare – maintain some areas without farming intervention but largely, grass habitats are maintained through livestock farming. Unfortunately, the extensive low input grazing management required for these naturally unfertile, low productive grasslands often is seen an economically unviable and the risk of a lack of management and abandonment is very real.

9.4.2 Description of grassland habitats

The different types of grassland habitat in the Chilterns National Landscape are described in the sections below. Many of these grassland types are managed by Wildlife Trusts; the National Trust, local nature reserve and commoners' groups actively manage their land to benefit nature. In recent years, agri-environment payments for managing existing habitat have increased in recognition of the challenges many grassland sites present. However, while recent agricultural statistics suggest the decline in livestock farming may have levelled off and there may even be

Map 16 Grassland types within 10 km of the Chilterns National Landscape boundary



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Duke of Burgundy


Bell heather


Lowland meadow

an increase in sheep numbers over the last 10 years, the difficulties of finding suitable stock and the pressures high visitor numbers and dogs can present, still make grazing these sites difficult. Horse and pony grazing is often maligned but, when sensitively managed, have assisted successful management of Local Wildlife Sites and Nature Reserves. Concerted efforts to support management of grassland habitats by both farmers and non-farmers alike will need to continue.

As with other habitats bare ground is also important for many rare and notable species (including both plants and invertebrates) though care has to be taken to avoid erosion and run off risks.

9.4.2.1 Lowland calcareous grassland
Just 1,309 ha (1.5% of the national landscape area) of lowland calcareous grassland is identified in the NE priority habitat inventory. This is one of the most species rich habitats found in the UK, often quoted as having up to 40 different species per square metre, frequently characterised by meadow ant hills and supporting numerous butterflies and other invertebrates. Within the Chilterns, chalk grassland is mainly found on steep escarpment and valley side slopes and has evolved over centuries through sheep and cattle grazing. In farming terms, grazing is extensive or a form of low input/low output farming system. Stock farming has seen a decline within the Chilterns, particularly the case for low profitability chalk grassland grazing.

The lack of grazing has led to a decline in quality of much of our chalk grassland areas with scrub becoming dominant. Some scrub is welcome as it supports species such as the green hairstreak and Duke of Burgundy butterfly but all too often is left unmanaged where it then tends to dominate and turn into early succession woodland shading out our chalk grassland species. Juniper is a particularly valued shrub component with numerous projects aimed at halting the decline that has been occurring for many years.

9.4.2.2 Lowland dry acid grassland and heathland
Lowland dry acid grassland covers 37 ha, 0.044% of the national landscape area. It is generally associated with nutrient-poor, free-draining soils with a moderate acidic pH range from 4 to 5.5. Despite the Chilterns being a largely chalk landscape, clay-with-flints, sandy soils and gravel superficial deposits are found, particularly on the dip slope. It often forms part of a lowland heath habitat mosaic and remaining areas are found in remnant areas of common land (see section 9.5). This habitat is particularly noted for supporting a range of bryophytes and lichens, rare plants and specialist ground dwelling and burrowing invertebrates.

Historically, common land was generally allocated to the poorest members of society to eke out a subsistence living. As commons have been lost, originally through the Enclosure Acts but also through abandonment of commoners' rights or agricultural intensification, the area of lowland dry acid grassland has decreased.

9.4.2.3 Lowland meadows
Lowland meadows include a range of unimproved neutral grassland habitats where traditional haymaking or grazing regimes have produced subtle ranges of floristic diversity. Over 98% of lowland meadows present in England and Wales before the Second World War have been lost, largely as a result of agricultural intensification. In the post war push for greater food security, these meadows were easily 'improved' through fertiliser input and reseeding to increase forage productivity for livestock grazing or ploughed to convert to arable production.


Chalk grassland Whitchurch



Case study: Chalk grassland can be managed profitably – Path Hill Farm

Path Hill Farm near Whitchurch-on-Thames, is around 100 hectares at the southern end of the Chilterns, and supports a pasture-fed, Hereford suckler herd and finishers on organic permanent pasture. A third of this is chalk grassland, the rest being floodplain hay meadows and neutral pastures. With no inputs to the land, no supplementary feeding apart from hay in the winter, and using rotational grazing to maximise productivity, the farm achieves an annual stocking rate of 0.8 LSU/ ha, and an average Daily Live Weight Gain on youngstock of 0.85 kg.

Although chalk grassland is only a part of the farm, 25 years of grazing data shows that the chalk grassland fields achieve similar stocking rates to other pastures on the farm.This simple system has reasonable productivity and very low costs, and achieves a gross margin of £338/ ha after all variable costs including: labour, water, vet, straw, haymaking, fencing, machinery, and sale costs. No wormers, vaccines, or routine medications are used, and natural service achieves almost 100% fertility.

The farmer believes that plant species diversity in the diet is key to the health and productivity of the cattle, and that chalk grassland is a valuable part of that diversity, contributing many different grasses and herbs to the other pastures and hay meadows. The rotational grazing with long rest periods allows the plants to flower and seed, providing a rich habitat for other species. This case study shows that grazing on chalk grassland, using rotational grazing with cattle as part of a low-input livestock system, can be a successful enterprise. At the same time the nature conservation value of this precious habitat is maintained and enhanced.



Case study: Working together to reclaim Chalk Grassland – Lodge Hill

Lodge Hill SSSI is an area of 12 ha between Saunderton and Bledlow, designated for its chalk grassland assemblage. In 2020 it was classed as in unfavourable status due to lack of grazing and the resulting increased scrub cover. The fencing had not been repaired for decades and the water supply pipe had broken.

Through a combination of a Higher Tier Countryside Stewardship agreement, project management support through the Chalk, Cherries and Chairs National Lottery Heritage Fund project and a financial contribution from the landowner, a large scrub clearance operation was undertaken, combined with new perimeter fencing, plus fencing off yew trees and laying a new water pipe. Entry into the 10-year Countryside Stewardship agreement was supported through provision of advice as part of the Central Chilterns Farm Cluster package, and provided for the capital investment for the infrastructure and scrub clearance, but will also continue to pay for seasonal, managed grazing.

By 2022 a small herd of native Galloway cattle were purchased by the landowner to keep on site, to thwart the regrowth of scrub and create the right conditions for chalk grassland to regenerate. Through using volunteers to carry out an annual Rapid Habitat Assessment (using a template specifically designed for the site) an increased frequency of positive indicators has been detected just two years after intervention.

9.4 Grassland

9.4.2.4 Good quality semi-improved grassland
Within an agricultural context, improved grassland (also referred to as "Modified Grassland" in UKHAB) is seen as highly productive, often dominated by modern cultivars that respond well to high levels of nutrient input, particularly artificial nitrogen fertilisers. Often reseeded regularly, such short-term leys have limited wildlife value. However, this means that semi-improved grassland, of which there is 493 ha (0.592% of the national landscape area) recorded in the priority habitat inventory, can be overlooked. These areas have a greater level of species diversity and, with minor changes to management, can quickly be recognised as species rich. Meadows that have been uniformly grazed by sheep for years can soon provide displays of orchid and other wildflowers if grazing pressure is reduced in late spring and early summer.

9.4.2.5 Other
Floodplain grazing marsh, lowland fen and purple moor grass are covered in the Rivers, Streams and Wetland Section.

9.4.3 Heritage of grassland habitats

Our priority grassland habitats and the complex ecosystems they support, have developed over centuries. Wild herbivores grazed the post ice age tundra then maintained glades within the spreading woodland. Our hunter gatherer ancestors started to select animals to herd and pastoral farming systems were born. Herding stock continued on our commons and downland long after organised crop growing commenced. As farmed areas were increasingly enclosed and stock were selected for their productivity (wool, meat, milk), so grazing systems developed to manage grassland productivity. However, it was only in the post war 20th century with the push for greater food production, the development of commercial grass cultivars and the inorganic fertilisers required to push these cultivars to their full potential, that the decline in the area of species diverse grassland really gathered pace.



Semi-improved grassland

9.4.4 NRP priority species in grassland habitats

This table focuses largely on species associated with calcareous grassland. Please see Section 9.2 (Rivers, streams and wetlands) for floodplain grazing marsh, lowland fen and purple moor grass and Section 9.5 (Common land) for acid grassland species. A lack of fungi species is acknowledged, and we would recommend referring to individual LNRS documents. Some species are associated with scrubbier grasslands but are included here for completeness and in recognition of the continuum of habitat that exists on the ground.

Table 21 Invasive non-native or other problematic species considerations for grassland

Group	Common name	Latin name
Plants	Cotoneaster	*Cotoneaster spp.*
Mammals	Fallow deer, Muntjac deer	*Dama dama* *Muntiacus reevesi*

9.4.5 Climate adaptation

In general terms, grassland habitats are thought to be at low risk from climate change. However, extreme weather events and seasonal changes are known to affect the inter-relationships between different species groups – invertebrates and their food plants for example. It is therefore important to maintain and ideally increase both species and structural diversity within different grassland habitats to provide the widest possible range of habitat for associated species.

Table 20 NRP Priority species in grassland habitats

Group	Common name	Latin name
Plants	Chalk eyebright Chiltern gentian Deptford pink Fly orchid Juniper Military orchid Monkey orchid Pasque flower Wild candytuft	*Euphrasia pseudokerneri* *Gentianella germanica* *Dianthus armeria* *Ophrys insectifera* *Juniperus communis* *Orchis militaris* *Orchis simia* *Pulsatilla vulgaris* *Iberis amara*
Invertebrates	Dingy skipper Duke of Burgundy Glow worm Grizzled skipper Silver spotted skipper Small blue Striped lychnis Carline thistle leafhopper Liquorice piercer Green hairstreak Downland plume	*Erynnis tages* *Hamearis lucina* *Lampyris noctiluca* *Pyrgus malvae* *Hesperia comma* *Cupido minimus* *Shargacucullia lychnitis* *Euscelis venosus* *Grapholita pallifrontana* *Callophrys rubi* *Oxyptilus pilosellae*
Reptiles	Adder Common lizard	*Vipera berus* *Zootoca vivipara*
Birds	Cuckoo Curlew Lapwing Skylark Yellowhammer Linnet	*Cuculus canorus* *Numenius arquata* *Vanellus vanellus* *Alauda arvensis* *Emberiza citronella* *Linaria cannabina*
Mammals	Harvest mouse	*Micromys minutus*

9.4 Grassland

9.4.6 Data and knowledge gaps

- Remote sensing methods to identify semi-improved and fragmented grassland outside priority habitat areas in order to help prioritise botanical surveys on areas with high potential to become species-rich grassland
- Identify and classify wet meadow outside priority habitat to understand the potential for restoration and enable positive management

9.4.7 Priority outcomes for nature recovery

Table 22 describes our recommendations for priority outcomes in relation to grassland that we believe are required for nature to thrive in the Chilterns.

Table 22 Priority outcomes for grassland in the Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Semi-natural grassland identification and restoration	Grs 1	All areas of species-rich grassland (large or fragmented) have been identified, management plans are in place and supporting actions are underway throughout the National Landscape.	1
Grassland creation for better connectivity	Grs 2	Landowners and farmers are encouraged and motivated to identify suitable areas for species diverse grassland reversion, and implement measures, through sowing or natural regeneration.	
Restore grassland biodiversity	Grs 3	Over-use of artificial pesticides and fertilisers has been reduced across the National Landscape to improve water quality, biodiversity and save farm input costs.	
Restore grassland biodiversity	Grs 4	Conservation grazing opportunities have been explored and implemented. This might involve support for specialist graziers, renewed grazing infrastructure, an increased capacity for cut and remove management options and creating capacity for scrub management to control levels on sensitive sites.	
Ensure connectivity to woodland	Grs 5	The value of scrub mosaic, in its own right, and as connecting habitat is better understood by landowners, farmers and the general public.	
Ensure connectivity to woodland	Grs 6	Opportunities to create new and manage existing areas of scrub have been identified, management plans are in place and measures are underway for sustainable site-specific levels of scrub mosaic (at the same time the total area of semi-natural grassland is increased).	

9.4 Grassland

The following table contains examples of specific actions that farmers and landowners could consider introducing on their land to aid nature recovery. Specialist advice obtained through ecological assessment and whole farm management plans can help farmers decide which options best suit their circumstances though a number of measures might represent relatively minor and cost-effective tweaks to existing management practices.

Table 23 Potential actions for grasslands

Action	Reason why?
Consider conservation grazing. While grazing grassland habitats remains economically marginal: ● seek agri-environment funding support; ● investigate conservation grazing opportunities with specialist graziers; ● investigate partnership working with neighbouring farmers possibly through farmer cluster arrangements; ● seek advice and support from National Landscape teams who will be able to identify sources of project funding.	To restore biodiversity-rich, semi-natural grasslands across the landscape.
Identify suitable areas for grassland reversion. Such reversion may require funding and new partnerships with graziers (as above).	To restore biodiversity-rich, semi-natural grasslands across the landscape.
Introduce mob grazing	This action may improve grassland habitat condition and will help build soil fertility and water-holding capacity, increase insect, bird and plant biodiversity, improve business resilience and cattle health. Other, more traditional, rotational grazing systems can have similar benefits if managed sympathetically.
Adjust management practices (duration, timing) to accommodate a greater number of species. Examples might include: ● haymaking rather than silage; ● leaving a margin uncut on a rotational basis to provide invertebrate habitat; ● adjusting grazing regimes to avoid poaching and compaction.	This action may improve grassland habitat condition, and biodiversity giving a home to a greater number of species in the grassland.
Maintain or manage a percentage of scrub, including juniper, to increase the mosaic edge effect' and habitat for specialist species (such as the Duke of Burgundy butterfly) whilst ensuring the total grassland area is expanded.	Grassland habitat condition will be better-connected to woodland and support movement of species.
Consider introducing herbal leys with native species within arable and grazing rotations	This action should help to increase the amount of nectar and invertebrates present in the landscape; sowing with native species will be more beneficial to native pollinators.

9.5 Common land

Special qualities of the Chilterns National Landscape



Chinnor Hill

9.5 Common land

9.5.1 Statement of common land habitats

Commons, covering 2.8% (2,348 ha) of the National Landscape area, play a valuable role in the natural and cultural heritage of the Chilterns. Although our once extensive common land is now much reduced, 170 Chilterns commons remain, ranging from strips of grass verge and village ponds to rolling hectares of wildflower-rich grassland and woodland.

They are important wildlife habitats, natural playgrounds and contain centuries of local history within them. Some commons have been lost to the Enclosure Acts but also to encroaching development. The ecological condition of remaining common land has changed with the abandonment of commoner's rights or agricultural intensification. In the absence of grazing, important priority habitats such as heathland and acid grassland have in many cases succeeded to secondary woodland with a corresponding loss of species associated with those open habitats. Many of the remaining commons in the Chilterns National Landscape include land designated as SSSI (23 areas comprising 26%, covering 619 ha).

As with other habitats bare ground is also important for many rare and notable species (including both plants and invertebrates), although care has to be taken to avoid erosion and run off risks.

Despite covering a small percentage area of the National Landscape, commons include disproportionally higher percentages of the Chilterns priority habitat areas – notably lowland heathland (see Table 24 on the right).



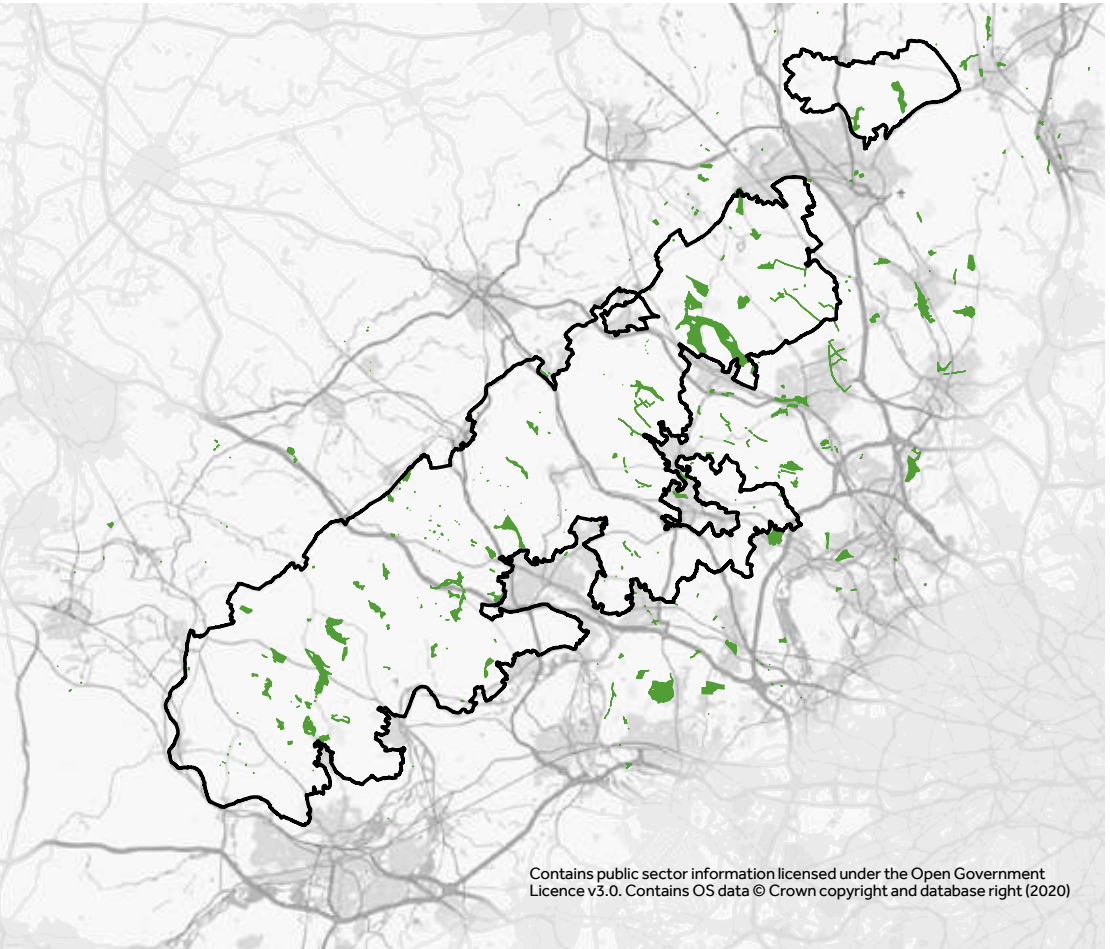
Wildflower meadow, Moorend Common

Table 24 Area of priority habitat within registered commons in the Chilterns

Priority habitat	Area within registered commons (ha)	% of total Chilterns priority habitat area
Deciduous woodland	1092.68	7.7
Good quality semi-improved grassland	27.52	5.6
Lowland calcareous grassland	93.41	7.1
Lowland dry acid grassland	1.35	3.5
Lowland heathland	219.35	75.9
No main habitat	60.86	5.9
Traditional orchards	3.9	9.3

9.5 Common land

Map 17 Common land in the Chilterns National Landscape



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Bluebells in deciduous woodland

9.5.2 Description of common land habitats

Commons are distributed throughout the Chilterns and whilst they now predominantly comprise areas of mixed broadleaved woodland (with ancient, pollarded trees a special feature), many still support heathland, chalk and acid grassland.

9.5.2.1 Lowland dry acid grassland

Lowland dry acid grassland is generally associated with nutrient-poor, free-draining soils with a moderate acidic pH range from 4 to 5.5. Despite the Chilterns being a largely chalk landscape, sandy soils and gravel superficial deposits are found, particularly on the dip slope. It often forms part of a lowland heath habitat mosaic and remaining areas are found in remnant areas of common land.
This habitat is particularly noted for supporting a range of bryophytes and lichens, rare plants and specialist ground dwelling and burrowing invertebrates.

Case study: Lowland dry acid grassland restoration, Berkhamsted Common



Berkhamsted Common is designated as a Local Wildlife Site and is one of the largest remaining areas of acid grassland and lowland heathland in Hertfordshire. It's a rare habitat. As landowner, the Berkhamsted Golf Club Trustee Company has an obligation to maintain the Common for the benefit of the public.

The Common remained as heathland due to animal grazing up to the beginning of the Second World War, so the cattle, six Devon Reds that arrived in May 2024, were the first animals to graze the Common in over 80 years. They successfully grazed the Common until October 2024. A slightly larger herd of eight to ten cattle will return to the Common in April, 2025.

A Grazing Licence covering 150 acres of the land owned by the Trustee Company was agreed with a local National Trust tenant farmer prior to the commencement of grazing. The grazing initiative is designed to future-proof the land management of the Common. Currently diesel powered machinery is used to manage the land but grazing, while not entirely replacing machinery in the short term, is a very attractive option.

And importantly it will also enhance the biodiversity of the Common, increase sustainability by reducing emissions from mechanical equipment, provide access opportunities for the public, education and information and volunteering opportunities.

As permanent fencing isn't permitted on Common land, the project is working with a Norwegian company called Nofence which supplies GPS collars for cattle and the associated software that enables the grazier to create virtual "fenced" areas. The real-time location of the cattle is monitored using a mobile phone-based app.

This system is being used at Epping Forest, Burnham Beeches, Salisbury Plain and other areas of the UK with great success. Under the Farming in Protected Landscapes (FiPL) programme, an 80% grant has been received from the Chilterns National Landscape towards capital costs of the initiative.

www.berkhamstedgolfclub.co.uk

9.5 Common land

9.5.2.2 Lowland heath
Lowland heath represents a particularly rare and threatened habitat with less than 20% of that present in England in the 1800s remaining. However, this represents 20% of all lowland heath in Europe so, although we only have a relatively small area, it is important we protect it.

Our areas of heath support numerous highly specialised plants and animals including reptiles, scarce birds and invertebrates and plants that are only in this habitat. Traditionally managed through grazing, with wood and shrubs being harvested for commoners' fuel, one of the main threats to our remaining heathland is a lack of appropriate management leading to woodland succession.

9.5.2.3 Ponds, woodland, wood pasture and scrub
Ponds and common land are inextricably linked – originally ponds were the only source of drinking water for both villagers and their stock and they can also be evidence of earlier clay extraction for brick making. As with ponds elsewhere, vegetation encroachment and leaf litter can lead to a gradual reduction in size and even loss.

As mentioned in other sections, both mature woodland and scrub mosaics provide important habitats, often supporting a range of other species adapted to sometimes very specific conditions. Our commons may have areas of early successional woodland, perhaps dominated by birch, but in many cases, mature woodland extends over much of the remaining common areas. It is easy to forget that much of our common land was once open and actively managed on a day-to-day basis.

9.5.3 Heritage of common land

Commons have been at the heart of our communities since medieval times. They often formed a key part of village life providing grazing for animals, fuel for heating, baking, brick making and blacksmiths, and, before deep wells were dug, ponds provided drinking water for both residents and their animals.



Snowdrops on Common Moor Medmenham

Use of commons became tightly defined within commoners' rights:

- **Pasture** – the most common right, the right to graze animals which might identify the number and type of animals a specific cottage dweller might be able to turn out onto the common and the times of year they could do this;
- **Piscary** – the right to fish;
- **Turbary** – the right to take sods of earth for fuel;
- **Mast or pannage** – the right to turn out pigs for a period in autumn to eat mast (beech mast, acorns and other nuts).
- **Common in the Soil** – rights to extract minerals such as sands, gravels, clay for bricks, flints for walling, marl (sometimes known as the right to marl) and chalk for use on the land. Many of our commons are noted for their clay, marl and chalk pits.
- **Estovers** – the right to take sufficient wood for the commoner's use; usually limited to smaller trees, bushes (such as gorse) and fallen branches Where these rights still exist, commoners are generally restricted to hand tools, chainsaws are definitely not allowed!

These rights were not only key to village life but often key to survival. When Enclosure Acts were introduced, protesters risked jail sentences in their battle to save their way of life.

It is a mistake to think that commons are not owned. While responsibility may fall to local parishes, trusts, of volunteer commons groups, many commons are in fact owned by local land owners.

9.5 Common land

Table 25 NRP Priority species in common land

Group	Common name	Latin name
Plants	Broad leaved cudweed Lesser butterfly orchid Penny royal Red tipped cudweed	*Filago pyramidata* *Platanthera bifolia* *Mentha pulegium* *Filago lutescens*
Invertebrates	Glow worm Green hairstreak Grizzled skipper Dingy skipper Small heath Stag beetle	*Lampyris noctiluca* *Callophrys rubi* *Pyrgus malvae* *Eyrnnis tages* *Coenonympha pamphilus* *Lucanas cervus*
Reptiles	Adder Common lizard	*Vipera berus* *Zootoca vivipara*
Birds	Cuckoo Hawfinch Linnet Nightingale Skylark	*Cuculus canorus* *Coccothraustes coccothraustes* *Linaria cannabina* *Luscinia megarhynchos* *Alauda arvensis*
Mammals	Barbastelle Bechstein's bat Harvest mouse	*Barbastella barbastellus* *Myotis bechsteinii* *Micromys minutus*

Invasive non-native or other problematic species considerations for common land (particularly heathland and acid grassland) are shown below.

Group	Common name	Latin name
Plants	Cherry laurel Rhododendron Spanish bluebell Shallon	*Prunus laurocerasus* *Rhododendron ponticum* *Hyacinthoides hispanica* *Gaultheria shallon*

9.5.4 NRP priority species in common land

The following species are more associated with habitats found on the neutral to acidic open commons (comprising 16.6% of registered common land).

Although the commons include areas of calcareous grassland (6.2% of registered common land), species associated with that habitat are listed in the grassland section. The cessation of grazing on many commons means that some of these species may no longer be present but could be recovered or reintroduced with suitable management.

9.5.5 Climate adaptation

In general terms, the intimate mix of habitats found on common land are thought to be at medium risk from climate change. It is therefore important to maintain and ideally increase both species and structural diversity across common land habitats to provide the widest possible opportunity for survival of associated species. Wildfire risk may become particularly acute with public use of commons and landowners and commons groups may need to consider practical measures such as fire breaks and accessible fire beaters to reduce this risk.

9.5.6 Data and knowledge gaps

- Condition assessment and improved understanding of current management regimes of commons (including lowland heathland) across the Chilterns to evaluate challenges to nature recovery and mechanisms to improve management
- Assessment of GPS coverage on common land to understand potential for no-fence grazing

9.5 Common land

9.5.7 Priority outcomes for nature recovery

Table 26 describes our recommendations for priority outcomes in relation to common land that we believe are required for nature to thrive in the Chilterns. Owners and managers of common land might like to consider the following actions:



Berkhamsted Common

Table 26 Priority outcomes for common land in Chilterns National Landscape

Themes	Priority outcomes codes	Priority outcomes	Contribution to PLTOF
Maintain and enhance wooded areas	Cmn 1	Woodlands in common land are being managed to achieve a greater diversity of tree species and varied age structure and to ensure economic sustainability, enhance biodiversity and make them more resilient to disease and climate change.	
Maintain rides and open spaces within wooded areas	Cmn 2	Glades and other open areas and woodland edges are being managed to provide a varied habitat for woodland birds, butterflies and plants.	
Maintain habitat mosaics	Cmn 3	Scrub mosaics and coppice are being managed on a rotational basis.	
Maintain and restore heathland and acid grassland	Cmn 4	Heathland and acid grassland is being grazed by livestock (or cut by machine with the arisings removed) to enhance biodiversity and restore the historical character of the landscape.	
Raising public awareness	Cmn 5	Awareness has been raised in local communities of the importance of nature recovery through the positive management of commons.	

9.5 Common land

Table 27 Actions for owners and managers of common land in the Chilterns National Landscape

Action	Reasons why?
Consider expanding and linking open areas. This might be through increasing the area of rotational management of scrub and woodland (as above) or by permanent scrub and woodland removal to favour grass or heath habitats. The value of competing habitats should be carefully assessed.	Link open areas to enable species movement, encourage light, plants and butterflies to increase biodiversity
Consider mowing and collecting options. Limit bramble and bracken encroachment through appropriate means such as cutting, mulching and rolling.	To restore grassland and/or heath habitat biodiversity
Consider Conservation Grazing. Grazing common land is fraught with difficulties as areas are often officially or unofficially open access with restrictions on fencing – both legal and practical. In some circumstances, some of the expanding number of 'fenceless grazing' options might be considered.	To restore grassland and/or heath habitat biodiversity



Naphill Common

10. Landscape-scale opportunities for nature recovery

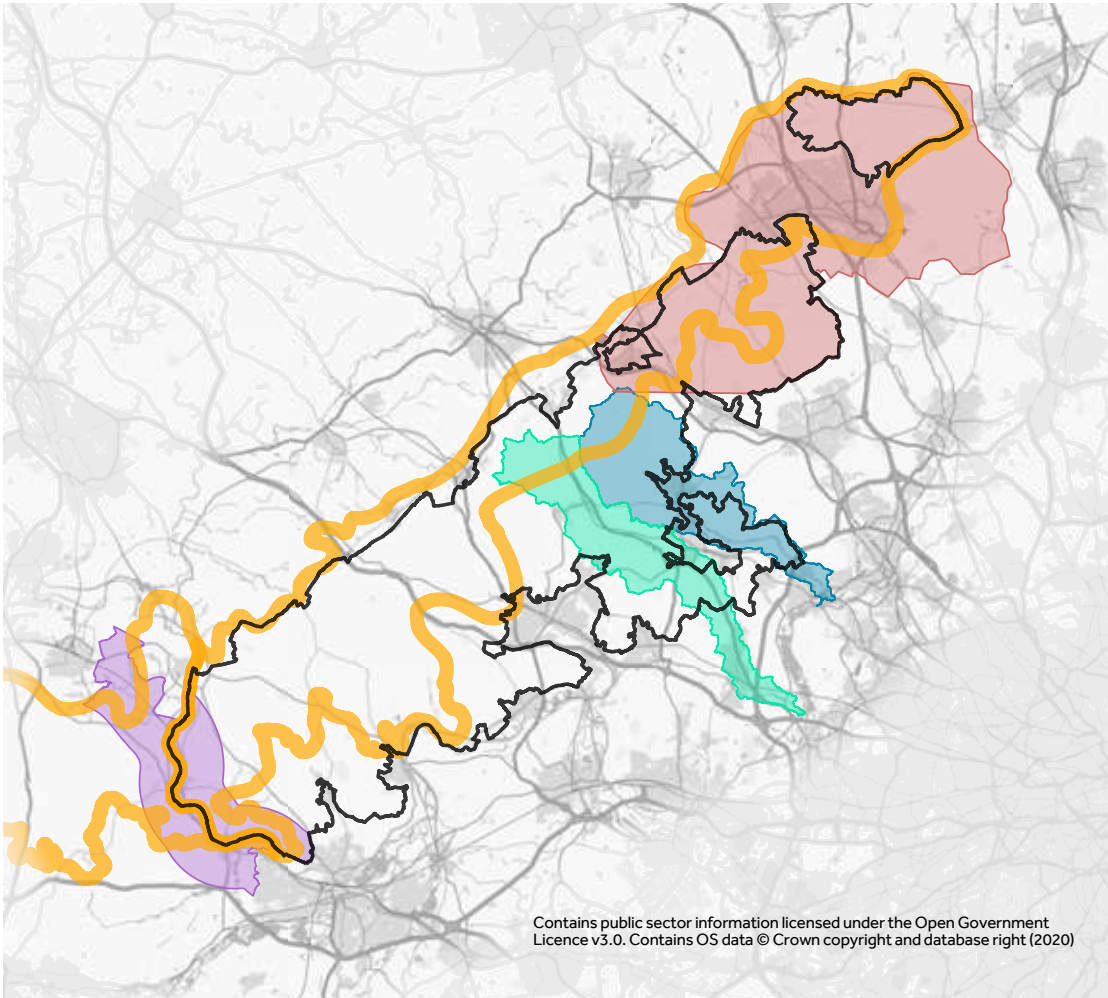


Large blocks of connected, wildlife-rich habitat across the landscape



Contiguous habitat – River Chess

Map 18 Landscape-scale nature recovery opportunities



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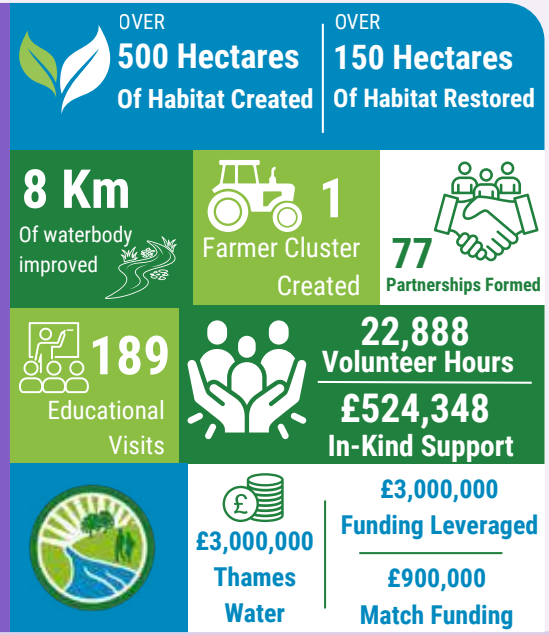
Case study: The Chess Smarter Water Catchment 2021 – 2025

The River Chess was one of three rivers chosen by Thames Water to pilot their new Smarter Water Catchment initiative.This ground-breaking initiative brings together key organisations and community groups to address issues on a catchment scale and aims to restore one of the Chilterns' finest chalk streams to health. The Chilterns Chalk Streams Project is a key partner in this initiative.

Over the last five years, the project has taken a 'systems-based' view of the environment, addressing multiple challenges and delivering landscape-scale solutions that make the most of bigger opportunities to aid nature's recovery under six specific themes:

- Improving water quality
- Managing flow
- Improving wildlife corridors
- Managing invasive non-native species (INNS)
- Working together
- Involving people

Figure 11
Chess Smarter Water Catchment achievements 2022 – 2025





This initiative is being funded by Thames Water and delivered by a mix of partners from statutory agencies, non-governmental organisations, water companies and academic institutions – all with an interest in the welfare of the Chess. The work is led by stakeholders to make sure it reflects local needs and considers local knowledge, and some of the headline achievements include:

- Creation of active citizen science community that is trained in multiple techniques covering ecological, physical habitat and chemical surveys. The citizen scientists have dedicated many thousands of hours to monitoring and assessment of the River Chess and contributed to data sets with local and national importance. The River Chess citizen science model is seen as an exemplar across much of the UK.
- Implementation and enablement of several major habitat-focussed projects, including arable reversion, chalk grassland creation, river channel improvements and the burying of electricity cables.
- The bringing together of 26 local farms into one cluster and funded projects that improve river water quality and wildlife habitats, including fencing, hedgerows and new techniques.
- Provided £312k of funds through a landowner grant scheme to support over £600k of arable reversion projects, fencing & board-walks, pond management, equipment, surveys and training.

10.1 Chess Smarter Water Catchment and Chess farmer cluster

The 25 Year Environment Plan commits to establishing more wildlife-rich areas across England that are better connected. Experts recommend large blocks of contiguous habitat (> 5000 ha) to establish thriving populations of species that can help to populate the rest of the landscape. A selection of current and potential landscape-scale nature recovery opportunities in the Chilterns National Landscape are described in this section.

The Chess catchment is one of three being piloted under the Thames Water's Smarter Water Catchments approach. The premise of the initiative is the core belief that working in partnership can address multiple challenges and deliver multiple benefits at scale.

The Chess Steering Group is led by a partnership of sector-based local stakeholders who have guided the development and delivery of a catchment plan, whilst ensuring it reflects local needs and considers local area knowledge. The first step on this journey was to co-create a catchment plan with the technical working group and bring in additional stakeholders who are responsible for ensuring the best plan is in place to achieve the objectives. The 10-year catchment plan was published in March 2021, detailing actions under six key themes: Improving water quality, Managing flow, Improving wildlife corridors, Managing invasive non-native species (INNS), Working together, and Involving people.

Thames Water seed funded £3million from 2020 to 2025 to support the Chess partnership with resources, project funding, community engagement and education, landowner and community grants, nature recovery including the creation of a farm cluster and river restoration. Monitoring and evaluation are embedded into all aspects of the programme.More information can be found about the initiative at [chesssmarterwatercatchment.org.](chesssmarterwatercatchment.org)

From 2020 to 2025 the Chess Valley Farmer Cluster has been supported by Smarter Water Catchments funding with the aim of delivering joined-up, long-term land management and support on the ground to cluster farmers. This support aims to focus on opportunities to reduce runoff and enhance infiltration, improve soil health, improve wildlife connectivity and achieve environmental improvements on farms in the cluster.


Hedge laying


River restoration

10.2 North Chilterns Landscape Partnership and North Chilterns farmer cluster

The North Chilterns Landscape is known for its combination of steep chalk escarpment with priority habitat flower-rich chalk downland and commons, rare arable plants of European importance, pockets of broadleaf woodlands, tranquil valleys, ancient routes, internationally rare chalk streams and a rich historic environment of hillforts and chalk figures.

All of these elements, along with areas of great scenic beauty and panoramic views over the surrounding landscape, combine to create a landscape that is nationally significant for its natural beauty.

The combination of an unusual concentration and extent of rare habitats and features within this unique landscape and a clustering of sites managed for conservation mean that the area is particularly well-placed to become a stronghold for nature's recovery and to catalyse nature recovery across the wider landscape.

In September 2024 a group of organisations came together to develop and shape nature's recovery across the North Chilterns landscape, connect people with nature, support delivery of the Chilterns Management Plan, Local Nature Recovery Strategies and other relevant strategic pieces of work. Five sub-groups have been formed on the following topics: Landscape and Heritage, Nature Recovery, People and Nature, Land Managers and Green Growth. Further information about the vision and objectives of the North Chilterns Landscape Partnership Chilterns Landscape Partnership can be found **here.**

From 2020 to 2022 the development phase of a project called 'Chalkscapes' (funded by National Lottery Heritage Fund) was focused within the North Chilterns area. The findings from this phase of this project are an important foundation for nature recovery in the North Chilterns.

The North Chilterns Landscape Partnership has outlined the following set of objectives in relation to nature recovery:

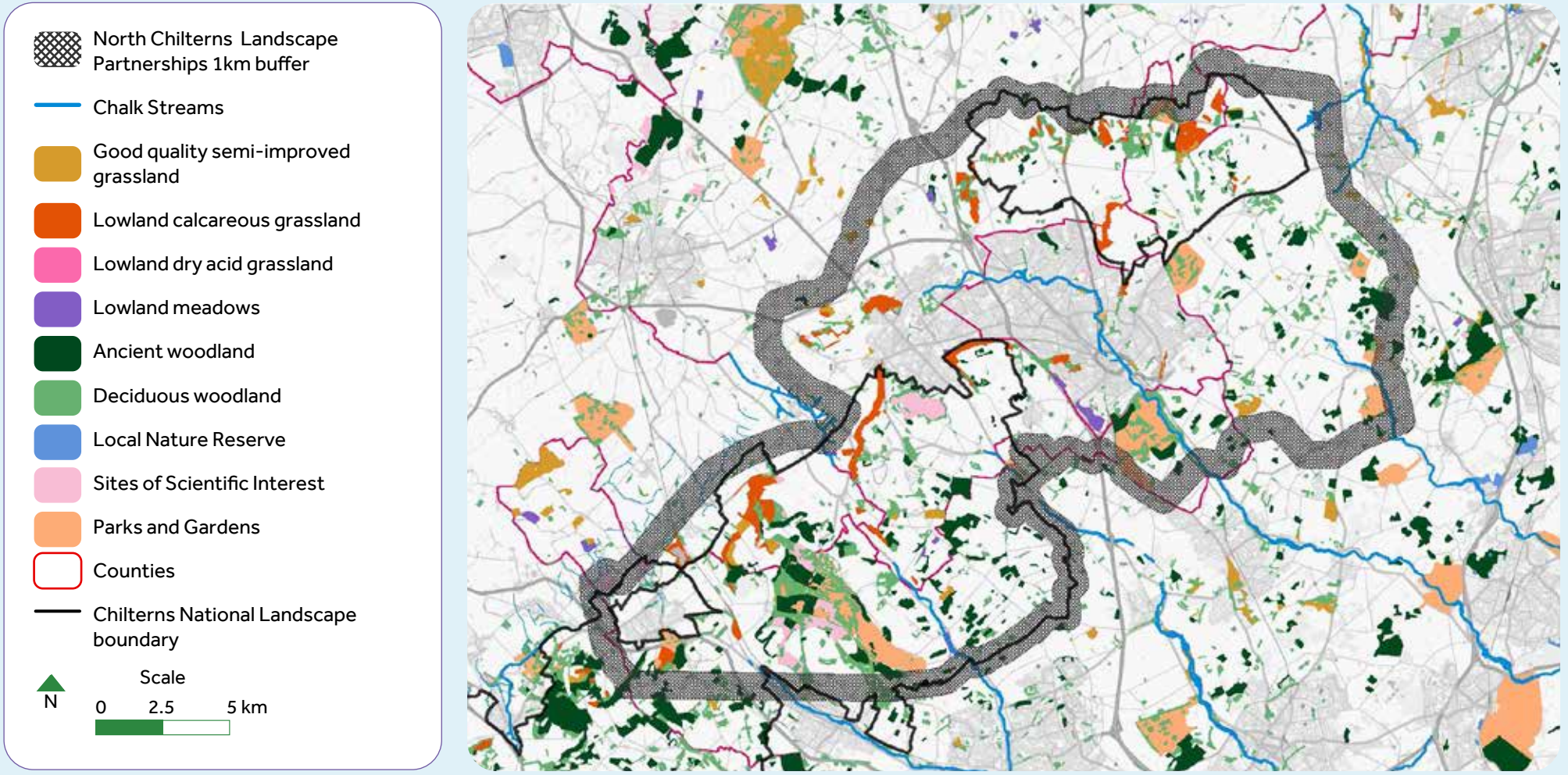
- More bigger, better and joined up nature restoration across the North Chilterns through creating, buffering and linking a mosaic of diverse wildlife-rich habitats at the macro- to micro-scale within and between existing protected sites.
- Seek opportunities to innovate and lead cutting-edge nature restoration techniques e.g. creating early successional habits in chalk grasslands and calcareous wood pasture/meadows.
- Link protected sites with wildlife-rich habitat through the mechanism of farm clusters or similar mechanisms.
- Support farmers and other land managers across the area to assess current condition and identify opportunities for actions to restore and create wildlife-friendly habitat and enhance species diversity.
- Support sustainable, nature-friendly farming using agri-environment schemes and Biodiversity Net Gain, for example to improve soil health, reduce runoff to protect chalk aquifers and streams, manage sites to protect and enhance fungi and to create areas for rare arable plants to thrive.
- Achieve recognition of internationally-rare chalk streams (including River Hit, Hiz, Flit and Lea) in the area to enable and support management of these rivers for climate resilience and biodiversity.
- Increase woodland and tree canopy cover using an evidence-led approach, and manage existing woodland to improve biodiversity (taking account of micro-habitat management).
- Fill knowledge gap around abundance and diversity of lichen and fungi in the North Chilterns chalk landscape.



- Assess and monitor trends (both landscape-scale and site based) in species across the North Chilterns chalk landscape in response to nature recovery activities.
- Keep track of most recent advances in our understanding of changes in species in chalk landscapes in relation to climate changes and nitrogen deposition. This should include controlling invasive species.
- Support delivery of management objectives within the Management Plan for the Chilterns National Landscape, Nature Recovery Plan and Protected Landscape Target and Outcomes Framework (PLTOF) targets.
- Carry out recovery activities in ways that conserve and enhance the Chilterns National Landscape, promoting understanding of its special qualities and connect people to nature.
- All of the above to contribute to landscape resilience of the 'inititiave' to end of sentence i.e. the **Big Chalk** initiative.

The North Chilterns farmer cluster established in 2022 with 16 members and has since grown to 19 member farms. The focus so far has been on hedgerow planting and restoration to improve habitat connectivity; as well as information sharing workshops on topics such as soil health, woodland management and chalk streams. All farms have had a farm carbon assessment and access to ecological advice. Funding has been provided by Affinity Water and the Farming in Protected Landscapes fund.

Map 19 North Chilterns Landscape Partnership map



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Case study: The North Chilterns Chalkscapes Project





Funded by the National Lottery Heritage Fund, Wild Chalk was designed to be the practical conservation and land management work at the heart of the Chalkscape's project in the North Chilterns. The wider Chalkscape project was centred on the chalk hills in and around the urban areas of Luton, Dunstable and Houghton Regis.

Two components of the project are described here:
(i) targeted site surveys of focus areas; and
(ii) species dossiers.

The intention was to focus practical delivery on five 'Focus Areas' (covering 4825 ha) identified as key opportunity areas for biodiversity. To achieve this, work was carried out during the development phase to identify the priority locations of a Nature Network for landscape and biodiversity enhancement based on the Lawton principles of Bigger, Better, More and Joined.

This was done by targeted site surveys to update habitat information to phase 1 level and record habitat condition and restoration potential. The second part of the project identified opportunities for habitat enhancement and creation in the short and longer term through initial discussions with key landowners.

These two pieces of work were used to update and digitise phase 1 habitat maps for all five Focus Areas and analyse the updated habitat information to refine the boundary of each Focus Area. This identified the core habitat and buffer areas, and key linkages and stepping-stones in line with the Lawton principles.

Species Dossiers

A key focus of this project was the conservation of rarer species of plants and animals through management of five microhabitat assemblage/ species guild dossiers for five habitat sub-categories of:

- Species-rich 'conservation' arable (including margins) and fallow
- Short and skeletal chalk grassland
- Exposed chalk: scrapes, sunken ways and banks
- Tall grassland and scrub edge
- Wood glades, rides and meadows.

There are over 50 rare and threatened plants and animals within the project area. This project saw a need to identify commonalities in management required for groups of these species, rather than tackling each species as an individual entity. The most cost-effective management is best achieved by identifying targeted actions that deliver multiple benefits for a range of threatened plants and animals.

10.3 The Misbourne Catchment

The Chilterns National Landscape HS2 'Landscape and Biodiversity Connectivity project', funded by the HS2 Additional Projects Fund, focuses on delivering nature recovery on farmed land using (i) a farmer cluster model, and (ii) by reaching out to other farmland owners interested in biodiversity improvements.

Highlights of this project to date have included hedgerow work, supplementary bird feeding and the expansion of the 'Tracking the Impact' project into the Misbourne area to monitor landscape-scale nature recovery. This work on farmlands will continue to be a core and vital element of the Chilterns Conservation Board's work, but there is an ambition to grow support in this area across a wider variety of priority habitat types and land uses to ensure resilient connections across the entire catchment area including local wildlife sites.

Despite efforts to improve the River Misbourne by many people over many years, the health of the river is declining and it is currently assessed as being of 'Poor' ecological status. The river is under pressure from several sources including abstraction for domestic water supply and sewage pollution; and the river and its catchment are both under pressure from construction of the HS2 rail line.

In response to growing calls from the local communities for a plan to 'Mend the Misbourne', the Chilterns Chalk Streams Project held a series of workshops in 2023–24 to develop an evidence-based catchment plan for the river that would help better drive and co-ordinate positive action. These were well attended by representatives of local community groups, conservation charities, town, parish and county councils, water companies and the Environment Agency.

Based on the River Restoration Centre's Catchment Planning approach, attendees worked together to identify the key pressures on the entire river and neighbouring landscape, as well as possible management options and where they would be most effective.



River Misbourne in dry phase

This created a plan to which all our partners and stakeholders have contributed and therefore includes a shared vision, ownership and responsibility for delivery. It was used as the basis for a successful application to the HS2 Additional Projects Fund for a five-year programme of improvement on the river, which together with upgrades and improvements to water company infrastructure will not only arrest the decline, but will start the process of 'Mending the Misbourne'.

More information, including about the main pressures and impacts, as well as the development of the catchment plan, can be found in our StoryMap 'Mending the Misbourne'.



Giant hogweed



Himalayan Balsam



Downstream of Chalfont St Giles





10.4 Nature-Ridge: the Chilterns National Landscape as a migration corridor for species and a focus for delivering 30by30

A distinctive chalk ridge runs north-easterly from the Wiltshire end of the North Wessex Downs National Landscape to the Chilterns National Landscape in Bedfordshire.

An important topographic feature central to the **'Big Chalk vision'**, it connects a mosaic of grasslands, woodlands, streams, meadows, and farmland habitats. Running through this 'corridor' is a network of chalk and other grassland habitat types that could act as stepping stones for the south to north migration of chalk specialist species in response to climate change. Winding through this mosaic are the Ridgeway National Trail and Icknield Way, current iterations of ancient trails, leaving a landscape steeped in cultural heritage.

There is, therefore, a strategic opportunity to integrate aspects of nature recovery, heritage, access and public understanding, health and well-being, social inclusion and climate change, to deliver transformational change across two adjacent protected landscapes, with the Ridgeway National Trail as a golden thread linking the two National Landscapes.

The Ridgeway National Trail is regarded as 'Britain's oldest road'. Following the same route over the high ground used since prehistoric times it's popular with walkers, runners, cyclists, horse riders and people using mobility scooters, for its amazing views, landscape, wildlife and history.

Farmland heritage is important along the entire corridor alongside many archaeological monuments including Stone Age and Bronze Age barrows, Iron Age hillforts and chalk figures, such as white horses. Important chalk grassland and woodland sites along the way are designated SSSIs.







Cholsey Marshes



Water testing training – Pangbourne



Withymead Nature Reserve

10.5 Mend the Gap programme

The Mend the Gap programme is enhancing the areas of the Chilterns and North Wessex Downs National Landscapes that have been negatively impacted by the electrification of the Great Western Railway mainline.

It is a £3.75 million programme that aims to enhance the wetland and chalk habitats in the National Landscapes between Reading and Didcot. Funded by Network Rail, the vision of the Mend the Gap programme is that "The outstanding landscape that links the Chilterns and the North Wessex Downs will be enhanced and enriched for wildlife, residents and visitors, helping to heal and soften the scars left by electrification of the Great Western main line."

The programme is delivering landscape enhancement projects that will support nature recovery in this special landscape and help to reduce and compensate for the visual harm done to the Chilterns and North Wessex Downs National Landscapes by the electrification of the Great Western main line, where it runs through the two National Landscapes.

Nature recovery highlights as of February 2025 are:

- Over 4 km of hedge and over 500 trees have been planted
- 283 hectares of land are being enhanced for wildlife
- 113 landowners have engaged with the programme
- Formation of the South Chilterns Farm Cluster
- Landowners along the River Thames have been engaged to support nature recovery
- Over 167 partnerships have formed through the projects
- Over 6,500 children have been given greater access to and awareness of nature in the Thames valley

Wetland or wetland access projects funded in the area to date include Withymead Nature Reserve, Cholsey Marshes, Sulham Wetland, Cleeve Meadow and the Englefield River Pang, with potential funding identified for South Stoke, Pangbourne Meadow, Mill Brook and Cholsey Brook. Chalkland projects include the Rectory Farm Grassland Restoration and a suite of plant surveys with local landowners to improve grassland and woodland management.

These projects have been developed with landowners and other specialist partners, including most of the parish councils and schools in the area, the Wildlife Trust, Environment Agency, Action for the River Kennet (ARK) and Thames 21.

The programme is due under the current funding to run until 2028 and will support the South Chilterns Catchment Partnership and the Chilterns National Landscape Nature Recovery Plan objectives.



Tring Ringing Group (winter ringing project) Yellowhammer



Winter supplementary bird feeding project



Chalk grassland SSSI restoration at Lodge Hill

10.6 Central Chilterns Farmer Cluster

The Central Chilterns Farmer Cluster has 18 members who farm c. 6,500 hectares across the Buckinghamshire area of the Chilterns. It is facilitated and hosted by the Chilterns National Landscape and has been funded through the Chalk, Cherries and Chairs Landscape Partnership Scheme, supported by the National Lottery Heritage Fund from 2019. More recently, Rothschild Foundation have also funded nature recovery projects initiated by the cluster.

Farmers in the cluster care deeply about the way they farm their land and the wildlife their farms support, and came together to make a difference on a landscape scale. From the outset, the Cluster Farmers wanted to find out more about the wildlife that lives on their farms, get excited by it, understand what it needs and explore options to help.

Farmers need to support to ensure their farms are fit-for-the-future – balancing the needs of employing wildlife-friendly and sustainable farming methods but also supporting viable rural businesses. Click here to find out more about this exciting collaboration. Click here for summary information.

10.7 Data and knowledge gaps

Previous sections have identified data and knowledge gaps by priority habitat. Here we list landscape-scale gaps in current data and understanding:

- Assess impact of light and noise pollution on nature recovery in the Chilterns National Landscape
- Effects of habitat fragmentation by road and rail network on nature recovery in Chilterns and best use of methods such as connectivity structures to address this
- Understand implications of nature recovery actions and climate change for landscape character assessments
- Revisit Historic Landscape Characterisation and relate it to current land use/landscape character
- Distribution and population trends (including historic nesting sites) in bats, apodiformes and hirondines across the Chilterns National Landscape



Advising farmers



One stretch of over 30km of hedge planting/ coppicing

11. Monitoring and Evaluation of nature recovery in the Chilterns National Landscape



Evidence-based monitoring to guide effective action and lasting impact

11.1 Why should we monitor nature recovery?

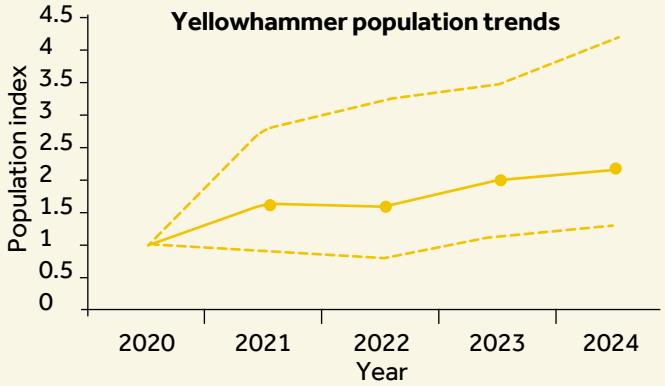
We could ask whether it would be better to spend our limited financial resources on action-led projects across the Chilterns National Landscape rather than monitoring trends in species or changes in habitat in response to our efforts.

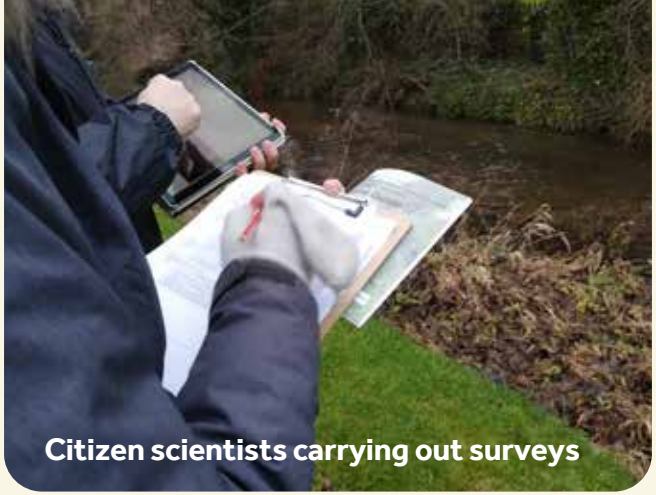
There are several reasons why we feel it is important to measure the outcomes of our efforts to action nature recovery:

- To set a baseline when the current state of the environment is not known
- To measure trends over time to determine how well (if at all) our actions have worked, and benefitted wildlife and biodiversity
- To help assess climate change impacts
- To provide evidence for policymakers and funders to ensure investment in our actions
- To demonstrate that our actions offer value-for-money to investors
- To provide evidence of success (or failures!) to guide action for other organisations and to share knowledge across the Chilterns National Landscape and beyond
- To excite and engage farmers and landowners and to share with them the impact they are making
- To provide feedback into our management efforts so that we continuously improve and can challenge our environmental endeavours



Riverfly monitoring




Citizen scientists carrying out surveys


Riverfly training

11.2 What should we record when we monitor nature recovery?

Exactly what is recorded will depend on the questions being asked, and the objectives of our different nature recovery projects. Monitoring efforts should be standardised and reproduceable, with robust quality assurance such that third parties could follow the prescribed methodology to achieve the same results, and data gathered are as accurate and precise as possible.

If we are tracking changes in species in response to restoration efforts or habitat quality improvements, then recording species abundance is preferable to recording presence or absence. Recording abundance enables us to track upward or downward trends in species through time. If we are tracking changes in water chemistry, for example to measure potential explanatory factors preventing nature recovery, then such data should be accompanied by appropriate quality assurance (e.g. concentrations from certified reference materials measured at the time of sample analysis should also be recorded as part of the dataset).

When monitoring changes arising from restoration projects it is desirable to have 'control areas' to compare those areas that have received some action against. Changes in species abundance, for example, will occur due to natural process (e.g. flooding and drought) and these control areas, which should be as similar to the treated project area as possible, enable us to determine whether a change has occurred naturally rather than due to any action that we have taken.

11.3 What are the challenges to monitoring nature recovery?

There are many challenges to successfully monitoring nature recovery. The limited availability of funding often means that monitoring is not the top priority when designing a project or carrying out an action to improve habitat and/or species health. This means that there is a poor evidence base to support many nature restoration activities.

To monitor the recovery of nature in response to interventions, long-term monitoring is needed, because it can be decades before project outcomes are likely to be fully realised and because natural processes can cause temporary changes in metrics that mask longer-term trajectories. For example, a few years of unusually warm weather in early spring might boost insect and pollinator numbers over the following summer periods, temporarily masking a backdrop of general decline in species abundance.

Most projects are funded for a maximum of five years which doesn't enable long-term monitoring to be embedded into the project from the start. Long-term monitoring can then prove to be prohibitively expensive, and continuity of efforts can prove problematic when different funding streams are stitched together.

Once trained in monitoring techniques, keeping people enthused to continue with long-term monitoring is another challenge.

Monitoring at the large spatial scale required to record landscape-scale changes can also be expensive and resource intensive because the number of sampling points increases to adequately cover the terrain, and many people hours are needed to carry out the fieldwork. Some project sites can be difficult to access, and time-consuming for staff to travel to. All of these factors need to be carefully thought through when creating a monitoring and evaluation programme to assess the success of a nature recovery action.

Despite all these difficulties there are very successful schemes to help monitor nature recovery at the national scale (e.g. Breeding Bird Survey, Wider Countryside Butterfly Survey, National Plant Monitoring scheme, ARMI Riverfly, Modular River Survey) which are run by organisations such as British Trust for Ornithology, Butterfly Conservation, UK Centre for Ecology and Hydrology, Joint Nature Conservation Committee, Plantlife, ARMI Riverfly and Cartographer. It is important within the Chilterns that we don't try to re-invent the wheel, but work with, and contribute data to, these national initiatives where possible.



Rapid Habitat Assessment at Butlers Hangings SSSI



Citizen science in action



Learning riverfly

11.4 New approaches to monitoring nature recovery at scale in the Chilterns National Landscape

We are grateful for the long history of survey work carried out by trained professionals that has given us an understanding of the extent and condition of the habitats and species within the Chilterns (our 'baseline'). As previously discussed, the Protected Landscape Targets and Outcomes Framework will track progress with aspects of nature recovery at national landscape scale using data collated from government organisations such as Natural England, Forestry Commission and Defra.

Because of the scale of the resource (cost and staff) needed to do this the framework is set up to use data that is already being collated by government organisations. At the same time, exciting opportunities to capture data in innovative ways are under development and being trialled by lots of other stakeholders and local groups interested in nature recovery.

11.4.1 The role of citizen science in monitoring nature recovery

Citizen science describes the involvement of volunteers in scientific research including environmental monitoring activities. There are multiple models of citizen science, ranging from projects shaped and organised by volunteers themselves to 'contributory citizen science' where the project is set up and managed by a professional scientist. Popular examples of contributory citizen science initiatives at national and global scale are iNaturalist, eBird and Riverfly Monitoring Initiative.

When embedded in nature, citizen science activities have been shown to enhance nature connectedness and benefit personal well-being (Pocock et al., 2023). If we recognise that nature and human well-being are interdependent, then nature-based citizen science can be considered, not only as a way of tracking environmental data and establishing trends in nature recovery in response to a biodiversity and climate change crisis, but also to support people's mental and physical health.

Citizen science has risen in popularity for the users of environmental data because it is seen as a cost-effective data collection method, and technological advances (such as smartphones) are making data collection easier and enabling standardised approaches.

More volunteers are getting interested in citizen science because it is a means for people to engage with their environment and contribute to something important. Volunteers can pick and choose the activity that they get involved with, and there are now many different types of activity available.

Citizen Science, however, is not without its challenges, which include:

- Ensuring robustness and validity of the data being generated by participants.
- The resource needed to be invested in continuous recruitment, training of volunteers, ongoing support for the data collection method, provision of feedback.
- Turning data into knowledge and action 'on the ground' at timescales that keep citizen scientists motivated in the activity
- Enabling and supporting a greater diversity of citizen scientists engaged in activities

An example of a citizen science activity that has been developed to study trends in nature recovery across the central area of the Chilterns National Landscape is called 'Tracking the Impact'.

Case study: Tracking the Impact, a citizen science case study



Funded by the National Lottery Heritage Fund, Tracking the Impact is an award-winning landscape-scale citizen science project covering the central area of the Chilterns National Landscape setting out to initially baseline and, over the long term, track the populations trends of birds, butterflies and plants.

Working in partnership with BTO, UKCEH, Plantlife, Butterfly Conservation, BBOWT and BMERC the project covers 78 randomly generated 1 km survey squares where volunteers are recruited to carry out Breeding Bird Surveys, Wider Countryside Butterfly Survey and/or National Plant Monitoring Scheme, working to national methodologies. Data are mapped annually on interactive online maps and helps provide landscape scale trends for species over time. The project invests heavily in training of the 250+ volunteers that have signed up through surveys methodology training and species ID courses for birds, butterflies and plants. In addition, volunteers are offered opportunities to participate in a range of other surveys such as chalk grassland Rapid Habitat Assessment, Amphibian and Reptile Surveys and new innovative trials for AI moth and hedgehog ID.

Data are not only used to track the trends of our key species but also helps decision-making and planning for farmers and landowners considering Countryside Stewardship and other agri-environment options, supporting funding bids and helping farmers adjust their land management decisions. Recent financial support from Rebel Restoration has enabled the project to continue into 2025/2026.

You can find out more information about Tracking the Impact, including a downloadable case study here: [Tracking the Impact | Chilterns National Landscape]

Case study: Citizen science flow monitoring training on the River Chess with the Environment Agency (2023)



You can find out more information about Citizen Science activities in and around the River Chess here: [Citizen Science | Help us to monitor and improve water quality and ecology in the R Chess catchment | Smarter Water Catchment]

In the Chess catchment, funding from Thames Water through the Chess Smarter Water Catchment programme has enabled us to trial a new approach to integrating citizen science activities. The work started with a baseline assessment to draw together data from different sources (e.g. Environment Agency and water company records) and understand gaps in our knowledge of river health.

We then identified the questions that we wanted the citizen science activities to answer, focusing on the sources and impacts of nutrients and fine sediment in the river and on the risk to river health of emerging contaminants. We assessed which nationally available toolkits would be useful to answer our research questions, and which questions would lend themselves to bespoke analysis. This enabled us to plan a comprehensive group of activities to carry out in the catchment that could work in combination to answer our questions.

Over four years of activity we have:

- Used cutting-edge innovative water quality sensors to provide stakeholders with real-time measurements of water quality in the river;
- Trialled a new methodology to identify locations where fine sediment is entering the river;
- Identified critical emerging contaminants that may be causing harm to aquatic life in the river;
- Tracked nutrient concentrations and flow;
- Used Riverfly and SmartRivers methodologies to understand the effects of pollution on river invertebrates; and
- Used a geomorphological assessment tool (MoRPh) to track outcomes from our river restoration projects.

11.4.2 The role of cutting-edge science in monitoring nature recovery

Whilst Citizen Science may offer part of the solution it doesn't address all the challenges of environmental monitoring, such as the reliance on volunteer networks, scarce funding to support such initiatives and data limitations. Alternative approaches are also needed, and/or can be combined with citizen science initiatives. Emerging innovative technologies offer the possibility of remote monitoring over large geographical areas (e.g. to assess the state of nature at landscape scale), high-frequency point data (e.g. tracking water quality during storm events), and long-term repeatability of data to track environmental trends over decades.

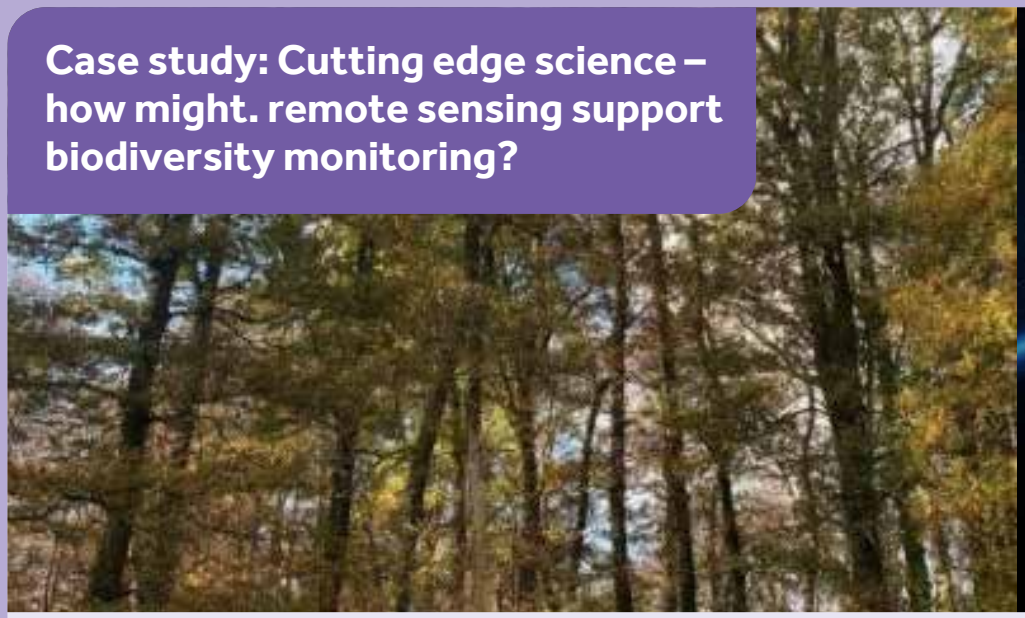
Some of these innovations being trialled around the Chilterns National Landscape area are:

- Audio monitoring for insect pollinators
- eDNA (e.g. in river monitoring initiatives searching for INNS or presence of key charismatic species such as otter and beaver)
- Passive sensors (e.g. for emerging contaminants of concern in rivers)
- Earth remote sensing (e.g. for assessing extent of habitat such as chalk grassland outside priority habitat inventory)



Flow monitoring at River Chess

Case study: Cutting edge science – how might. remote sensing support biodiversity monitoring?





In October 2023, the Buckinghamshire and Milton Keynes Natural Environment Partnership (the NEP), in conjunction with the Oxford-to-Cambridge Pan Regional Partnership and SA Catapult, based at the Westcott Innovation Centre in Buckinghamshire, brought together experts from across the Buckinghamshire, Milton Keynes and wider Oxford-to-Cambridge area to explore together the possible innovative uses of ever-improving precision satellite and drone imagery and remote technology for biodiversity management.

Four innovative "use cases" for the technology and biodiversity management were co-created focussed on assessing habitat condition and makeup remotely, and on ongoing monitoring. Such information could support the more labour-intensive requirements of ground- and in-person surveying, and provide high-quality information to support decision-making for farmers, landowners, local government, wildlife organisations and developers. Each of the four proposals was created independently but was found to complement the others, forming a vision of what a systemic solution could look like, namely:

Open Data for Biodiversity – whereby up-to-date open biodiversity data from drone, satellite and other sources, is made openly available to assist with habitat monitoring. Such a system could help derive a Habitat Baseline of sufficient quality to offer better data to help uncover and value Overlooked Biodiversity.

For example, technology could be an important tool in assessing the relative value of different land uses, including for biodiversity enhancement. Such a system could also help uncover and value...

Overlooked Biodiversity (such as traditional orchards, which were used as a case study at the workshop). Monitoring and high-resolution satellite data could help analyse vegetation and, together with with site surveys and additional data, could be used to compare the biodiversity-related benefits of a habitat on local biodiversity with other nearby sites. Such analysis could be used by organisations involved in biodiversity-related credit markets.

The NEP is now looking to bring partners and funding together to take these project proposals to further stages of development.

More detail can be found on our website here bucksmknep.co.uk/projects/monitoring-at-a-landscape-scale/

12. Next steps

This plan describes the overall strategy for nature recovery across the Chilterns National Landscape. It sets the context for action by describing current priority habitats and the need for improvements to wider habitat outside protected sites to enable nature to flourish.

Throughout the plan, case studies are used to illustrate current activities aimed at creating and restoring well-connected, wildlife-rich habitats that also allow species to move in response to land use and climate change.

We want this plan to inspire and catalyse action that results in nature flourishing across the Chilterns National Landscape and for more people to benefit from being better connected with nature. Next steps include working with our partners across the landscape on a delivery plan to fund, enable and monitor activities that will achieve the priority outcomes described in this document.

Key to our approach will be to dovetail our work with the delivery of Local Nature Recovery Strategies in the four counties that cover the Chilterns and to ensure that our nature recovery aspirations deliver the multiple benefits for nature, climate, people and the local economy as befits a National Landscape fit for the 21st Century.

Looking to the future



13. Appendix

Appendix 1 Long list of species for the Chilterns National Landscape Nature Recovery Plan

Common name	Scientific name
Adder	*Vipera berus*
Adonis blue	*Polyommatus bellargus*
Annual knawel	*Scleranthus annuus*
Autumn gentian	*Gentianella amarella*
Autumn lady's-tresses	*Spiranthes spiralis*
Barbastelle bat	*Barbastella barbastellus*
Basil thyme	*Clinopodium acinos*
Beaver	*Castor fiber*
Bechstein`s bat	*Myotis bechsteinii*
Bee species	*Smicronyx reichi*
Bell heather	*Erica cinerea*
Birds nest orchid	*Neottia nidua-avis*
Bluebell	*Hyacinthoides non-scriptus*
Box	*Buxus sempervirens*
Broad fruited cornsalad	*Valerianella rimosa*
Broad leaved cudweed	*Filago pyramidata*
Brown galingale	*Cyperus fuscus*
Brown hairstreak	*Thecla betulae*
Brown trout	*Salmo trutta*
Bullfinch	*Pyrrhula pyrrhula*
Bullhead	*Cottus gobio*

Common name	Scientific name
Burnt orchid	*Neotinea ustulata*
Chaffinch	*Fringilla coelebs*
Chalk eyebright	*Euphrasia pseudokerneri*
Chalkhill blue	*Polyommatus coridon*
Chiltern gentian	*Gentianella germanica*
Cirl bunting	*Emberiza cirlus*
Common heather	*Calluna vulgaris*
Common lizard	*Zootoca vivipara*
Common toad	*Bufo bufo*
Copse bindweed	*Fallopia dumetorum*
Coralroot	*Cardamine bulbifera*
Corn bunting	*Emberiza calandra*
Corn buttercup	*Ranunculus arvensis*
Corn chamomile	*Anthemis arvensis*
Corn cleavers	*Galium tricornutum*
Corn spurrey	*Spergula arvensis*
Cornflower	*Centaurea cyanus*
Crested cow wheat	*Melampyrum cristatum*
Cross leaved heath	*Erica tetralix*
Cuckoo	*Cuculus canorus*
Curlew	*Numenius arquata*

Common name	Scientific name
Cut grass	*Lolium temulentum*
Deptford Pink	*Dianthus armeria*
Desmoulins whorl snail	*Vertigo moulinsiana*
Devil's bit scabious	*Succisa pratensis*
Devil's bolete	*Boletus satanus*
Dingy skipper	*Erynnis tages*
Dodder	*Cuscuta epithymum*
Downland plume	*Oxyptilus pilosellae*
Duke of Burgundy	*Hamearis lucina*
Dwarf spurge	*Euphorbia exigua*
Eagle's claw	*Anaptychia ciliaris*
English eyebright	*Euphrasia officinalis subsp. anglica*
European eel	*Anguilla anguilla*
Fairy shrimp	*Chirocephalus diaphanus*
Few-flowered fumitory	*Fumaria vaillantii*
Field fleawort	*Tephroseris integrifolia subsp. integrifolia*
Field gromwell	*Buglossoides arvensis*
Field woundwort	*Stachys arvensis*
Fine leaved sandwort	*Sabulina tenuifolia*
Fine lvd fumitory	*Fumaria parviflora*
Flat-sedge	*Blysmus compressus*
Flat-stalked pondweed	*Potamogeton friesii*
Flea sedge	*Carex pulicaris*

Common name	Scientific name
Fly orchid	*Ophrys insectifera*
fly species	*Ellipteroides alboscutellatus*
Forester moth	*Adscita statice*
Fringed gentian	*Gentianopsis ciliata*
Frog orchid	*Coeloglossum viride (Dactylorhiza viridis)*
Frogbit	*Hydrocharis morsus-ranae*
Gatekeeper	*Pyronia tithonus*
gentian species	*Gentianella amarella subsp. amarella*
gentian species	*Gentianella amerella subsp. anglica*
Ghost orchid	*Epipogium aphyllum*
Glow worm	*Lampyris noctiluca*
Grass poly	*Lythrum hyssopifolia*
Grass wrack pondweed	*Potamogeton compressus*
Great crested newt	*Triturus cristatus*
Great pignut	*Bunium bulbocastanum*
Greater water-parsnip	*Sium latifolium*
Green finch	*Chloris chloris*
Green hairstreak	*Callophrys rubi*
Green-winged orchid	*Anacamptis morio*
Grey partridge	*Perdix perdix*
Grizzled skipper	*Pyrgus malvae*
Ground pine	*Ajuga chamaepitys*
Harvest mouse	*Micromys minutus*

Common name	Scientific name
Hawfinch	*Coccothraustes coccothraustes*
Hazel dormouse	*Muscardinus avellanarius*
Heath cudweed	*Omalotheca sylvatica*
Heath dog violet	*Viola canina*
Hedgehog	*Erinaceus europaeus*
Henbane	*Hyoscyamus niger*
Hornet robberfly	*Asilus crabroniformis*
House martin	*Delichon urbicum*
House sparrow	*Passer domesticus*
Interrupted brome	*Bromus interruptus*
Juniper	*Juniperus communis*
Kestrel	*Falco tinnunculus*
Kingfisher	*Alcedo atthis*
Lady orchid	*Orchis purpurea*
Lapwing	*Vanellus vanellus*
Large fruited prickly-sedge	*Carex muricata subsp. muricata*
Carline thistle leafhopper	*Euscelis venosus*
Leisler's bat	*Nyctalus leisleri*
Lesser butterfly orchid	*Platanthera bifolia*
Lesser marshwort	*Helosciadium inundatum*
Lesser redpoll	*Acanthis cabaret*
Lesser spearwort	*Ranunuclus flammula*
Lesser spotted woodpecker	*Dendrocopos minor*

Common name	Scientific name
Linnet	*Linaria cannabina*
Liquorice piercer	*Grapholita pallifrontana*
Loddon pondweed	*Potamogeton nodosus*
Maiden pink	*Dianthus deltoides*
Man orchid	*Orchis anthropophora*
Marsh fritillary	*Euphydryas aurinia*
Marsh helleborine	*Epipactis palustris*
Marsh stitchwort	*Stellaria palustris*
Marsh tit	*Poecile palustris*
Meadow ant hoverfly	*Microdon devius*
Military orchid	*Orchis militaris*
Mistle thrush	*Turdus viscivorus*
mollusc species	*Pseudanodonta complanata*
Monkey orchid	*Orchis simia*
Mountain bulin snail	*Ena montana*
Mousetail	*Myosurus minimus*
Musk orchid	*Herminium monorchis*
Narrow-fruited cornsalad	*Valerianella dentata*
Narrow-leaved helleborine	*Cephalanthera longifolia*
Narrow-lipped helleborine	*Epipactis leptochila*
Nathusius pipistrelle	*Pipistrellus nathusii*
Needle spike-rush	*Eleocharis acicularis*
Night-flowering catchfly	*Silene noctiflora*

Common name	Scientific name
Nightingale	*Luscinia megarhynchos*
Noble chafer	*Gnorimus nobilis*
Norfolk bladder moss	*Physcomitrium eurystomum*
Old man of the woods	*Strobilomyces strobilaceus*
Opposite leaved pondweed	*Groenlandia densa*
Orange fruited elm lichen	*Caloplaca luteoalba*
Otter	*Lutra lutra*
Pale dog violet	*Viola lactea*
Palmate newt	*Lissotriton helveticus*
Pasque flower	*Pulsatilla vulgaris*
Penny royal	*Mentha pulegium*
Perfoliate Penny-cress	*Microthlaspi perfoliatum*
Pheasant's eye	*Adonis annua*
Prickly poppy	*Roemeria argemone*
Purple milk vetch	*Astragalus danicus*
Red backed shrike	*Lanius collurio*
Red helleborine	*Cephalanthera rubra*
Red hemp nettle	*Galeopsis angustifolia*
Red star-thistle	*Centaurea calcitrapa*
Red tipped cudweed	*Filago lutescens*
Red-shanked carder bee	*Bomber ruderarius*
Reed bunting	*Emberiza schoeniclus*
Round fruited rush	*Juncus compressus*

Common name	Scientific name
Rugged oil beetle	*Meloe rugosus*
Rye brome	*Bromus secalinus*
Sainfoin	*Onobrychis viciifolia*
Serotine bat	*Eptesicus serotinus*
Sheeps bit	*Jasione montana*
Shepherds needle	*Scandix pecten-veneris*
Shrill carder bee	*Bombus sylvarum*
Silver spotted skipper	*Hesperia comma*
Skylark	*Alauda arvensis*
Slender bedstraw	*Galium pumilum*
Slender tare	*Ervum gracile*
Small blue	*Cupido minimus*
Small heath	*Coenonympha pamphilus*
Small-leaved sweet briar	*Rosa agrestis*
Small-flowered catchfly	*Silene gallica*
Song thrush	*Turdus philomelos*
Spotted flycatcher	*Muscicapa striata*
Spreading hedge parsely	*Torilis arvensis*
Spurge laurel	*Daphne mezereum*
Stag beetle	*Lucanus cervus*
Star fruit	*Damasonium alisma*
Starling	*Sturnus vulgaris*
Stinking chamomile	*Anthemis cotula*

Common name	Scientific name
Stone curlew	*Burhinus oedicnemus*
Strawberry clover	*Trifolium fragiferum*
Striped lychnis	*Shargacucullia lychnitis*
Swift	*Apus apus*
Tasteless water-pepper	*Persicaria mitis*
Tawny owl	*Strix aluco*
Thorrow wax	*Bupleurum rotundifolium*
Toasted waxcap	*Cuphophyllus colemannianus*
Tree pipit	*Anthus trivialis*
Tree sparrow	*Passer montanus*
Turtle dove	*Streptopelia turtur*
Upright chickweed	*Moenchia erecta*
Wall	*Lasiommata megera*
Wall bedstraw	*Galium parisiense*
Water violet	*Hottonia palustris*
Water vole	*Arvicola amphibius*
White admiral	*Limenitis camilla*
White helleborine	*Cephalanthera damasonium*
White letter hairstreak	*Satyrium w-album*
White-clawed crayfish	*Austropotamobius pallipes*
Whorled water-milfoil	*Myriophyllum verticillatum*
Wild candytuft	*Iberis amara*
Willow tit	*Poecile montanus*

Common name	Scientific name
Wood warbler	*Phylloscopus sibilatrix*
Woodcock	*Scolopax rusticola*
Yellow bird's nest	*Hypopitys monotropa*
Yellow downlooker snipefly	*Rhagio strigosus*
Yellow meadow ant	*Lasius flavus*
Yellow vetchling	*Lathyrus aphaca*
Yellow wagtail	*Motacilla flava*
Yellowhammer	*Emberiza citrinella*



Nightingale
(*Luscinia megarhynchos*)

13. Appendix 2 Screenshot of spreadsheet used to help identify the Chilterns National Landscape priority species for the Nature Recovery Plan

common name	scientific name	S41 species	ref in NCA doc	Countryside Stewardship	IUCN	IUCN count	ref in Chilterns mgmt plan?	Chilterns SAC qualifying or distinctive feature	IPA	BftB	BoCC (2021) status	BoCC (2021) count	schedule 1 birds	schedule 8 plants	Chilterns stronghold or "responsibility"?	total count A: statutory and policy. includes inclusion on county LNRS	In need of conservation effort	Actionable - able to respond	NEEDS BESPOKE CONSERVATION ACTION (CAT D)	Characteristic of important habitat	Flagship, popular, iconic	Recordable - useful for citizen science	Indicator - liable to reflect changes	total count B: NRP criteria	A+B count
Ground pine	*Ajuga chamaepitys*	1	1	1	EN	1				1				1	1	7	1	1		1		1	1	5	12
Pasque flower	*Pulsatilla vulgaris*	1	1		VU	1	1			1					1	6	1	1		1	1	1	1	6	12
Wild Candytuft	*Iberis amara*	1	1	1	VU	1	1			1						6	1	1		1		1	1	5	11
Broad leaved cu	*Filago pyramidata*	1	1	1	EN	1				1				1		6	1	1		1		1		4	10
Lapwing	*Vanellus vanellus*	1		1	EN g	1	1				red	1				5	1	1		1	1	1	1	6	11
Duke of Burgund	*Hamearis lucina*	1	1	1	EN g	1				1						5	1	1	1	1	1	1	1	7	12
Corn bunting	*Emberiza calandra*	1	1	1	NT g	1					red	1				5	1	1	1	1		1	1	6	11
Marsh Tit	*Poecile palustris*	1		1	VU g	1				1	red	1				5	1	1		1		1	1	5	10
willow tit	*Poecile montanus*	1		1	EN g	1				1	red	1				5	1	1		1		1	1	5	10
Stone curlew	*Burhinus oedicnemus*	1			VU g	1				1	amb	1	1			5	1			1		1	1	4	9
Penny royal	*Mentha pulegium*	1		1	CR	1				1				1		5	1	1	1	1		1	1	6	11
Pheasant's eye	*Adonis annua*	1	1	1	EN	1				1						5	1	1		1		1	1	5	10
lesser spotted w	*Dendrocopos minor*	1		1	EN g	1				1	red	1				5	1			1	1	1		4	9
Juniper	*Juniperus communis*	1	1		NT	1	1			1						5	1	1	1	1	1	1		6	11
stag beetle	*Lucanus cervus*	1	1		LC gb			1		1						4	1	1		1	1	1	1	6	10
Broad fruited co	*Valerianella rimosa*	1		1	EN	1				1						4	1	1		1		1	1	5	9
Small-flowered	*Silene gallica*	1		1	EN	1				1						4	1	1		1		1	1	5	9
hawfinch	*Coccothraustes coccot*	1		1	EN g	1					red	1				4	1	1		1		1	1	5	9
Shepherds need	*Scandix pecten-veneris*	1	1	1	EN	1										4	1	1		1		1	1	5	9
Turtle dove	*Streptopelia turtur*	1		1	CR gb	1					red	1				4	1	1	1	1	1	1	1	7	11

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