Buckinghamshire Pilot Draft Local Nature Recovery Strategy

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Tables and Figures

Buckinghamshire Pilot Local Nature Recovery Strategy Overview

This document represents the outputs of the Buckinghamshire Pilot Local Nature Recovery Strategy (LNRS) only and references how the process, steps and methodology were tested. Its primary purpose is to provide Defra with lessons learned from testing their draft process for completing a LNRS. It does not represent a finalised version of a Local Nature Recovery Strategy for Buckinghamshire and has not been through any political sign off process within Buckinghamshire Council.

The final LNRS will need to take account of the formal guidance and regulation to be published by Defra to accompany the Environment Bill and then formally consulted on with stakeholders ahead of a formal sign off by Buckinghamshire Council. In addition a number of outstanding issues, questions, learning points and gaps have been identified by the Pilot Area Team (PAT) as part of the pilot process and these will need to be reflected on and addressed as part of the next steps towards the production of a final LNRS for Buckinghamshire.

The following pilot LNRS is for illustrative purposes only to show what a LNRS for Buckinghamshire might look like; and this version should be used to help inform Defra of the final regulations and guidance.

1. Introduction

Buckinghamshire's Natural Environment

Buckinghamshire's natural environment is the foundation of our health, prosperity, identity, and heritage. It boasts varied landscapes – from the low-lying farmland of Aylesbury Vale, the floodplain grasslands of the Upper Ray Valley, the ancient woodland, chalk grasslands and internationally important chalk streams of the Chiltern Hills, to the streams and rivers that feed the River Thames.

But nature is highly fragile, and while Buckinghamshire's countryside may look green and pleasant, it disguises dramatic declines in species diversity and abundance. Nature is declining at an unprecedented rate, with 41% of species having declined in the UK since 1970[1] These include some of our best-known wildlife such as skylarks, yellowhammers, water voles, hares, hedgehogs, frogs, and toads.

Purpose and context of Local Nature Recovery Strategies

To address the alarming decline of nature, the concept of Local Nature Recovery Strategies, each contributing to national ambitions of a nature recovery network, represent a turning point that paves the way for nature's recovery at a national scale, and draws on work already completed locally, such as, for Buckinghamshire, through the Buckinghamshire and Milton Keynes Natural Environment Partnership. LNRSs also give a voice to the people who live or work in or visit each LNRS area and to those who farm and manage the land.

In line with the Government's 25 Year Environment Plan to "leave the environment in a better state than we found it", The Environment Bill 2020[2] will mandate the creation of Local Nature Recovery Strategies and require a minimum 10% Biodiversity Net Gain for new developments in England.

Defra developed an outline, 5-step process for the creation of the pilot LNRS which must be evidence-based, locally led, and collaboratively produced. The ambition is to create a nationwide system of such spatial strategies which will provide the mechanism to deliver nature's recovery and help to direct potential funding streams such as the new Schemes delivering environmental land management and Biodiversity Net Gain.

Buckinghamshire's Draft Pilot LNRS

In August 2020, Buckinghamshire was selected along with four other pilot areas (Cumbria, Northumberland, Greater Manchester, and Cornwall) to trial the Defra 5-step outline process of producing a pilot LNRS. Buckinghamshire Council is leading the project locally, along with the support of a Pilot Area Team ("PAT"). The PAT comprises representatives from Buckinghamshire Council along with Berks, Bucks and Oxon Wildlife Trust (BBOWT), Buckinghamshire & Milton Keynes Natural Environment Partnership (the "NEP"), Chilterns Conservation Board, Environment Agency, Forestry Commission and Natural England.

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[1] State of Nature Report https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf
[2] Environment Bill https://bills.parliament.uk/Publications/41447/Documents/196/21003.pdf

Buckinghamshire's aim for the eventual finalised LNRS is for it to support nature's recovery to create more, bigger, better, and joined-up habitats across Buckinghamshire and deliver wider nature-based environmental benefits.

The Buckinghamshire pilot LNRS team has worked with this aim in mind throughout, and with stakeholders to identify opportunities and priorities for nature's recovery. The pilot LNRS is co-owned and co-created by the PAT and stakeholders in Buckinghamshire.

The purpose of the pilot is to help test the process of production of a LNRS for Defra, whilst at the same time helping to shape a plan and gather evidence for where nature recovery projects and funding would be best-placed locally. The pilots have also been undertaken to help Defra develop the approach to LNRS implementation and prepare for the development of regulations, statutory guidance and supporting evidence and tools in advance of the Environment Bill being passed into law.

The two products that have been developed and produced by each pilot area are:
- A Statement of Biodiversity Priorities; and
- A Local Habitat Map(s).

In addition, the pilot process also tested how the LNRS sits within the local context and other local environmental spatial frameworks. For Buckinghamshire, this includes (but is not limited to) the new Buckinghamshire Local Plan (in development), the Chilterns AONB Management Plan, the NEP's emerging (updated) Biodiversity Action Plan 'Forward to 2030', the emerging Biodiversity Net Gain policies, Future Schemes, and the natural capital, ecosystem services and biodiversity opportunity mapping exercises that have recently been undertaken locally (Appendix 1).

LNRS pilot process

The approach to developing the LNRS is heavily based on clauses 95-99 of the Environment Bill 2020[3], which will mandate the creation of LNRSs across England. Defra's outline process for the pilot LNRS areas consists of five steps each area had to follow, testing how well they work in practice. The pilot area experiences and learning is being fed back to Defra to be taken into account as they produce final guidance for the production of LNRSs. The outline process steps are as follows:

[3] Environment Bill https://bills.parliament.uk/Publications/41447/Documents/196/21003.pdf

> Step 1 - Locally held data is added to the map, including locally identified wildlife sites;
>
> Step 2 - A written description of the LNRS area, including its key habitats and potential opportunities to create or improve them, based on ecological sub-areas, is produced;
>
> Step 3 - Outcomes to be achieved through creation or improvement of habitat are agreed, and those Outcomes considered to be a priority are identified;
>
> Step 4 - Potential measures for creating or improving habitat to achieve the agreed Outcomes are established; and
>
> Step 5 - Suitable locations for the delivery of the potential measures are identified and added onto map of existing habitat (established in Steps 0 and 1)

The statement of biodiversity priorities is a product of steps 2,3 and 4 combined, whilst the product of step 5 is the local habitat map. These two products will be the legally required elements of an LNRS as set out in the Environment Bill Clause 99.

Clause 99(2) of the Environment Bill sets out that the content of the Statement of Biodiversity Priorities should include:

a) a description of the strategy area and its biodiversity,
b) a description of the opportunities for recovering or enhancing biodiversity, in terms of habitats and species, in the strategy area,
c) the priorities, in terms of habitats and species, for recovering or enhancing biodiversity (taking into account the contribution that recovering or enhancing biodiversity can also make to other environmental benefits), and
d) proposals as to potential measures relating to those priorities.

Clause 99 (3) states that the Local Habitat Map should include:

a) national conservation sites in the strategy area,
b) any nature reserves in the strategy area provided under section 21 of the National Parks and Access to the Countryside Act 1949, and
c) other areas in the strategy area which in the opinion of the responsible authority—
   i. are, or could become, of particular importance for biodiversity, or
   ii. are areas where the recovery or enhancement of biodiversity could make a particular contribution to other environmental benefits.

The following sections of the document are referenced to which Clause of the Environment Bill to which it relates.

It is important to note, however, that significant details will continue to be subject to change until the publication of secondary legislation and statutory guidance required by the Bill. A key role for the pilots is to inform the development of the Statement of Biodiversity Priorities and Local Habitat Maps.

How will the finalised LNRS strategy be used?

The pilot LNRS itself does not itself involve funding to deliver specific projects on the ground or in the community.

However, once finalised, it is intended that the shared creation of a LNRS will:

- help to channel investment into local priorities for nature's protection and enhancement
- encourage all organisations and individuals interested in nature recovery locally to work effectively together to achieve agreed Outcomes for nature within Buckinghamshire
- guide local initiatives to conserve and enhance biodiversity
- support delivery of the Buckinghamshire Biodiversity Accounting[4] system, which currently being developed to meet the upcoming mandatory biodiversity net gain requirements and provide a financial incentive for development to support the delivery of LNRSs. The LNRS will identify priority zones where offsetting sites could be located
- be incorporated into local planning decision-making including as an evidence base to the New Local Plan for Buckinghamshire

In addition, landowners and land managers will be able to use the strategy to understand how their land can contribute to nature's recovery within Buckinghamshire as well as the measures that could be applied to achieve the Outcomes. The LNRS can help influence current agri-environmental schemes as well as Future Schemes that will reward the management of land to deliver public goods such as clean air and water, mitigation of and adaptation to climate change, beauty, heritage and engagement and thriving plants and wildlife.

The intention is for the final LNRS to be reviewed every 5 years to assess what has been achieved and to reflect any changes in opportunities or priorities.

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[4] Buckinghamshire's Biodiversity Accounting System (2021) https://bucksmknep.co.uk/biodiversityaccounting/

2. Statement of Biodiversity Priorities:

Environment Bill section 99 (2)(a) - A description of the strategy area and its biodiversity and section 99(2) (b) – A description of the opportunities for recovering or enhancing biodiversity, in terms of habitats and species, in the strategy area

Buckinghamshire's Nature

Buckinghamshire has a varied landscape. To the far north are remnants of royal hunting forests with ancient trees supporting rare species such as hazel dormice and black hairstreak butterflies. The woodlands quickly give way to a landscape dominated by low-lying farmland and floodplains of the Thame valley as you travel south into the Aylesbury Vale. The Upper Ray Valley is known for its concentration of floodplain grasslands and importance for wading birds with the nearby area around Bernwood famous for ancient woodland.

The Chiltern Hills to the south of the county are dramatically more diverse containing numerous areas of ancient woodland, chalk grasslands and internationally important chalk streams. This is where most of the sites designated for nature conservation in the county can be found along with several rare species such as the Chiltern Gentian and Chalkhill Blue butterfly. To the south of the Chiltern Hills lies the Thames Valley which features streams and rivers feeding into the River Thames on the southern county boundary. Open water bodies associated with gravel extraction sites are frequent and large areas of parkland can also be found here.

In total, 932ha are internationally designated as Special Areas of Conservation (SAC) within Buckinghamshire (0.60% of the total land area). The total amount of land nationally designated as Sites of Special Scientific Interest (SSSI) within Buckinghamshire is 251 ha, or 1.61% of the total area, with an additional 5,983ha (3.82%)[5] locally designated across Buckinghamshire as Local Wildlife Sites (LWS) and 200ha (0.13%) as a Local Nature reserves (LNR).

Designated sites for nature make a small percentage of land overall (5.48%). Buckinghamshire is dominated by cultivated land and improved grassland, making up 63% of the area (98,000 ha). Built-up areas, and infrastructure (roads, railways, pavements, and paths) make up 6.2% of the land area, with gardens comprising 6.0%. A breakdown of broad habitats can be found in Table 1 and seen in Figure 1.

The Government produces national targets for priority habitats and priority species which are protected to some degree in law[6]. Data on the extent of priority habitat in Bucks is insufficient but is believed to be less than the national average covering between 3% and 9.7% of land in the county. No data currently exists for the condition of these priority habitats and many are thought not to be in favourable management. Our waterbodies are monitored as part of the Water Framework Directive. Currently only 4 of

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[5] Mapping natural capital, ecosystem services and opportunities for habitat creation in Buckinghamshire. Jim Rouquette, Natural Capital Solutions (2020), https://bucksmknep.co.uk/projects/natural-capital-mapping/

[6] Natural Environment and Rural Communities (NERC) (2006) Act.

Buckinghamshire's 80 waterbodies are in good ecological status and none of the chalk rivers.

Table 1: Area and percentage of broad habitat types across Buckinghamshire

Broad Habitat	Area (Ha)	% Cover
Cultivated/ disturbed land	47,828	30.56
Uncertain agriculture	886	0.57
Improved grassland	50,519	32.28
Amenity grassland	5,165	3.30
Semi-natural grassland	8,454	5.4
Marshy grassland	267	0.17
Heathland	164	0.10
Fen, marsh, and swamp	81	0.05
Scrub	348	0.22
Trees/ Parkland	1,613	1.03
Broadleaved woodland	14,365	9.18
Coniferous woodland	1,788	1.14
Mixed woodland	2,265	1.45
Hedgerows	928	0.59
Water	1,222	0.78
Built-up areas	5,416	3.46
Infrastructure	4,235	2.17
Garden	9,429	6.03
Rock, exposure, and waste	425	0.27
Unclassified	176	0.11
Mixed/ other/ uncertain	916	0.59

Despite this, Buckinghamshire has an above average extent of traditional orchards, lowland dry acid grassland and lowland meadows; lowland mixed deciduous woodland is the single most extensive priority habitat in the county (1,682 ha) followed by Beech and Yew Woodland (1,191 ha) and lowland wood pasture and parkland (536 ha). [7] For a full report on the state of nature in Buckinghamshire, see Appendix 2.

For the purpose of developing the LNRS we have divided the county into four broad areas (North Buckinghamshire, Aylesbury Vale, Chilterns and Thames Valley) based on natural character as defined by Natural England's National Character Areas (Map 1). The following pages give an overview of the geology, landscape, habitats, species, constraints and opportunities within each area.

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[7] NEP's State of the Environment Report, 2016. Available at: https://bucksmknep.co.uk/projects/state-of-the-environment-report/ Accessed Sep 2020.

Figure 1: The four area divisions and the National Character Areas

North Buckinghamshire

Geology: To the very north of the county is part of the Yardley Whittlewood Ridge[8]; a gently undulating limestone plateau which creates a physical boundary between the catchments of the River Nene and River Great Ouse, south of which are the Bedfordshire and Cambridgeshire Claylands[9] with an underlying clay geology. The Bedfordshire Greensand Ridge[10] is a contrasting narrow and elevated outcrop of Greensand to the north east of the county.

Landscape: The Yardley Whittlewood Ridge retains a rural character and has remnants of the 13th century hunting forests. It is well wooded with ancient woodland, wood pasture and parkland and mature hedgerows. The Bedfordshire and Cambridgeshire Claylands form a gently undulating, lowland plateau dissected by shallow river valleys, dominated by large-scale arable farmland; the upper Great Ouse flows through this landscape in the north of the county. The Bedfordshire Greensand Ridge has associating acidic habitats such as acid grassland, heathland and woodland, providing views over the lower landscapes.

Key Habitats: While predominantly a farmed landscape there are several semi-natural habitats present, including lowland mixed deciduous woodland, wood pasture and parkland with ancient and veteran trees, and the Great Ouse river corridor. Ancient woodlands are concentrated to the very north of the county. The Bedfordshire Greensand Ridge in the east has a higher concentration of semi-natural habitat including heathland and acid grassland.

Hazel dormouse in the hand. Photo credit: Clare Gray (Gwent Wildlife Trust)

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[8] Natural England (2013): http://publications.naturalengland.org.uk/publication/6441192149483520; NCA profile available at the same link.
[9] Natural England (2014): http://publications.naturalengland.org.uk/publication/5091147672190976; NCA profile available at the same link.
[10] Natural England (2014): http://publications.naturalengland.org.uk/publication/5091147672190976; NCA profile available at the same link.

Key Species: Woodlands support butterflies including white admiral, wood white, purple hairstreak and black hairstreak, rare mammals such as hazel dormice and barbastelle bat along with saprophytic invertebrates. The agricultural areas support farmland birds, with meadow grasslands hosting rare plants such as green-winged orchids. Water voles are present on the Great Ouse.

Changes over time: Changes in farming practice since 1945 has seen a decline in a number of groups including farmland birds and arable weed species. Many kilometres of hedgerows have been removed to enlarge fields or left unmanaged leading to their gradual loss or reduced value through poorer structure or connectivity.

East West Rail will destroy the habitats and species that had established along the long disused track and other nearby areas. High levels of growth, particularly west of Milton Keynes will displace farmland species and increase demand for resources. Historic land drainage in the area, along with the disconnection of rivers from their floodplains has led to wetland habitats declining.

Opportunities for enhancing or recovering biodiversity: Work undertaken to produce the Biodiversity Action Plan for Buckinghamshire and Milton Keynes identified the following opportunities for this area.

To expand and link woodland, hedgerows and other semi-natural habitats via the promotion of sustainable and water friendly agricultural practices, which would also improve soil quality, water quality and ameliorate climate change. There are opportunities to better support farmland birds and pollinators within the farmed landscape.

There are also opportunities to restore the river Great Ouse corridor to improve habitat quality and fluvial connectivity to floodplains, remove barriers to fish passage, create landscape scale floodplain meadow, grazing marsh and wetland and to improve connectivity between isolated wildlife rich sites within the valley.

There are opportunities to create new native woodland, particularly within the Whittleford Forest area; creating between woodland habitat connectivity.

The Whaddon Chase area is thought to be suitable for the creation or restoration of fens, hedgerows, lowland meadows, woodlands, wood pasture & parkland and ponds.

The Greensand Ridge is thought to be suitable for the creation or restoration of lowland meadows, fen, woodland, wood pasture & parkland, eutrophic standing water, reedbed, ponds, hedgerows and heathland.

Towns and urban areas, such as Buckingham and the fringes of Milton Keynes can be regenerated to improve opportunities for wildlife within the urban areas.

Aylesbury Vale

Geology: The Upper Thames Clay Vales[11] comprises predominantly Jurassic and Cretaceous clays and encircles the Midvale Ridge[12] which is a band of low-lying limestone hills; an unusual geology for the area.

Landscape: A predominantly agricultural area with mixed arable/pastoral farming. The River Thame and River Ray are dominant features of the landscape along with lakes associated with mineral extraction. The town of Aylesbury lies to the south and is the only major settlement. The area includes a remnant of the former Royal Forest of Bernwood.

Key Habitats: Hedgerows and mature field and hedgerow trees are a feature of the farmland. The rivers and associated riparian habitats are of interest here, especially the Upper Ray Valley which is known for its floodplain habitats including flood meadow grassland. There are numerous ancient woodlands in the Bernwood Area.

Key Species: The river valleys are regionally important for wading birds including small breeding numbers of lapwing and curlew. Nationally important numbers of breeding and wintering wildfowl are associated with the extensive floodplains, water-filled gravel pits and reservoirs. Nationally significant populations of native black poplar occur in the area.

The neutral and calcareous grasslands support rare plants and invertebrates. The woodlands support important populations of Bechstein's Bat, as well as uncommon and rare butterflies including the nationally rare black hairstreak and brown hairstreak butterflies. Arable land supports nationally important assemblages of farmland birds and arable weeds.

Changes over time: This area has seen high development pressure and expanding urban areas particularly around Aylesbury town. The Oxford to Cambridge growth arc concept will lead to high future development pressure in this area. High Speed Rail 2 also cuts through this area and has recently led to the loss of a number of sites of high value to wildlife, including ancient woodlands. Similarly, East West Rail will have a big impact on areas of habitat along the disused rail-line as it is reinstated. Historic land drainage has impacted watercourse ecology and reduced floodplain connectivity in this area.

Opportunities for enhancing or recovering biodiversity: Work undertaken to produce the Biodiversity Action Plan for Buckinghamshire and Milton Keynes identified the following opportunities for this area.

There are opportunities to create wetland habitats where hydrological conditions allow such as within the Upper Ray Valley. Reinstating the flood plain here can create a mosaic of habitats such as floodplain grassland, ponds and fens which will help support wading birds.

The area around Bernwood Forest consists of wooded farmland with opportunities identified to restore woodland and wood pasture & parkland, to create and restore lowland meadows, ponds and hedgerows.

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[11] Natural England (2014); http://publications.naturalengland.org.uk/publication/5865554770395136; NCA profile available at the same link.

[12] Natural England (2013); http://publications.naturalengland.org.uk/publication/5431100; NCA profile available at the same link

Veteran trees in fields and hedgerows can be conserved and future veterans planned for via new tree planting and favourable hedgerow management. Black poplars are characteristic of the areas and there are opportunities to plant more. Farmland can be more favourably managed to support farmland birds.

The Brill and Muswell Hills consists of steeply sloping hills in which there are opportunities for restoring woodland, lowland calcareous grassland and acid grassland. Ponds, and hedgerows can be created here.

The Thame Valley crosses this area and is a gently undulating valley along the river Thame. It has opportunities to better manage the river and streams, create lowland meadows, hedgerows, ponds and to restore wood pasture and parkland.

To the south of Aylesbury Vale there are opportunities to create and restore calcareous grasslands as well as connect up ancient woodlands. Land management that encourages Bechstein's bat and hairstreak butterflies can be supported.

Chilterns

Geology: The Chilterns[13] is underlain by chalk bedrock that rises up as a dip slope from the London Basin to form a steep north-west facing escarpment known as the Chiltern's Ridge. Clay soils cap the chalk hilltops in places such as Wendover Woods and Penn Wood. To the south the dip slope gives way to acid drift gravels.

Weston Turville Reservoir Photo credit: BBOWT/Jim Asher

Landscape: The Chilterns Ridge is a north-west facing escarpment offering long views over the adjacent Upper Thames Clay Vales to the Mid Vale Ridge and beyond. The ridge is divided by valleys which descend south-east towards the River Thames. The Chilterns is designated as an Area of Outstanding Natural Beauty[14] (AONB) with habitats associated with traditional land management over many millennia.

Key Habitats: Chalk streams are an internationally rare habitat. The Chilterns has 7 main chalk rivers totalling around 150km. Lowland calcareous grassland can be found along the slopes of the steep scarps and dry valleys, often as part of a mosaic with scrub.

Ancient Woodland is particularly concentrated in the central Chilterns and include the Chiltern's Beechwoods which are designated as a Special Area of Conservation (SAC). The woodlands are often interspersed with grassland, heaths, bogs and ponds. Ancient Box woodland can still be found in the Ellesborough area in the centre of the county.

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[13] Natural England (2013); http://publications.naturalengland.org.uk/publication/4977697; NCA profile available at the same link.
[14] https://www.chilternsaonb.org/

Where the land is farmed, ancient hedgerows and veteran trees can be found. Traditional Orchards, particularly cherry is most numerous south of the Chilterns Ridge. In the southern Chilterns heathland can be found on the acid gravels amongst pockets of acid grassland and birch woodland.

Key Species: The lowland grasslands support species of rare plants including many species of orchids and specialists such as the Chiltern gentian. The grasslands also support invertebrates such as Chalkhill Blue and Duke of Burgundy butterflies, glow worms and Roman snails. Juniper scrub can be found on the escarpments. The chalk streams support a huge range of aquatic plants, such as rare starworts and watercress. They also support animals such the water vole, fish including brown trout and a high diversity of aquatic invertebrates.

Bee orchid. Photo credit: BBOWT

The woodlands support numerous specialist species including a wide variety of plants, fungi and invertebrates, for example marsh violet, red helleborine and the black darter dragonfly. Farmland hosts rare arable weeds and farmland birds such as Corn Bunting and Yellowhammer.

Changes over time: Poor management of woodlands has led to a decline in the condition of some of the woodland habitats, reducing the number of species found in them. In recent years Ash dieback has had a dramatic effect on Ash trees which are now having to be removed from the countryside. Continued urbanisation of some areas has displaced farmland birds with intensification of agricultural practices further reducing the area they have available. None of our chalk streams currently achieve 'good' ecological status under the Water Framework Directive; a result of over abstraction, diffuse and point source pollution and channel modification over a number of years. Infrastructure projects including HS2 have had a dramatic impact on the landscape, clearing miles of vegetation and creating a barrier to species movement.

Opportunities for enhancing or recovering biodiversity: Work undertaken to produce the Biodiversity Action Plan for Buckinghamshire and Milton Keynes identified the following opportunities for this area.

The condition of existing wildlife habitat can be enhanced by promoting and supporting landowner and farmer led initiatives that prioritise nature and also deliver better soil health, carbon storage and improved hydrology.

In the area around Ashridge & Ivinghoe Beacon there are opportunities for creating calcareous grassland and arable field margins alongside restoring woodland. Wendover Woods area has the potential for more hedgerows. Woodlands could be more favourable managed so as to create habitat mosaics supporting an increased diversity of species.

There are opportunities to restore our important chalk rivers and streams, particularly in the Chess Valley and central Chilterns area. This includes ending unsustainable water abstraction from these areas.

The areas around Gomm Valley, Radnage Valley, Dunsmore Woods and the Chilterns Escarpment have areas of calcareous grassland with opportunities to create more and restore the existing grasslands alongside other priority habitats such as woodland, hedgerows and traditional orchards. Livestock grazing should be encouraged to manage the chalk grasslands as part of a wider mosaic of habitats.

Upper Hughenden Valley is wooded agricultural land with opportunities for woodland creation and management as well as improving the farmed environment via hedgerows and arable field margins. Hedgerows can be created to improve the habitat connectivity.

There are also opportunities to restore natural processes, including via the reintroduction of key species such as pine martins.

Thames Valley

Geology: The Thames Valley[15] is dominated by London Clay which is overlain by river-lain sands and gravels over much of the area.

Landscape: Features of the landscape include the River Thames (along the southern Bucks border) and is tributaries, streams, lakes, canals and open waterbodies resulting from mineral extractions in the area. The Colne Valley Regional Park, in the south-east corner of Bucks, is a mosaic of farmland, woodland and water with rivers, canals and lakes.

Cows grazing at Burnham Beeches Photo credit: Jeremy Young, City of London

Key Habitats: There are many notable habitats across the area, including acid grasslands, fens, heaths, orchards and ancient woodlands. Burnham Beeches is a designated SAC containing wood pasture and many ancient pollards. There are several good pond habitats particularly around Littleworth Common and within the designated areas. Parkland features in the area at sites including Black Park, Langley Park, Dorney, Cliveden and Dropmore.

Key Species: The grassland associated with the river valley is important for breeding birds. Temporary ponds on heathlands are important for starfruit. The ancient trees and woodlands support many species of fungi, rare plants, invertebrates and birds.

Changes over time: Urbanisation of nearby areas has increased the recreational pressure on a number of important sites for nature conservation, including Burnham Beeches SAC. This has led to a deterioration in the condition of the habitats which is now starting to be

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[15] Text and information taken from the Thames Valley National Character Area Profile (115), Natural England, Available at: http://publications.naturalengland.org.uk/publication/3865943 Accessed 24th August 2020.

addressed via the provision of alternative natural greenspaces and contributions towards habitat management. The changing climate has resulted in wetland habitats deteriorating. Land use has also changed in this area with land increasingly used for leisure purposes such as for equestrian and golf courses which typically are areas of limited biodiversity value. The close urban population causes issues such as fly tipping and air pollution.

Opportunities for enhancing or recovering biodiversity: Work undertaken to produce the Biodiversity Action Plan for Buckinghamshire and Milton Keynes identified the following opportunities for this area.

There are opportunities to manage and protect the areas historic parklands, including veteran trees, wood pasture, ancient woodland and commons.

The heathlands here can be protected and enhanced as part of a wider habitat mosaic. Better management of visitor pressure could help many of these habitats.

The Colne Valley provides connectivity with Hertfordshire and has opportunities for river restoration, reconnection with floodplains, the creation of new lakes and wetlands as well as other priority habitats.

> Environment Bill section 99 (2)(c) – "...taking into account the contribution that recovering or enhancing biodiversity can also make to other environmental benefits"

Buckinghamshire's Natural Capital and Nature Based Solutions

A Natural Capital approach considers the benefits that nature provides for people and the economy. These benefits are termed "ecosystem services" as they are derived from a healthy ecosystem or natural environment.

Buckinghamshire Council commissioned Natural Capital Solutions in 2020 to quantify and map the ecosystem services that are being provided in Buckinghamshire and look at where demand for these services is greatest to identify where there may be opportunities to use nature-based solutions (e.g. creating new habitats) to provide these services whilst also benefitting wildlife. A summary of the results for the 10 services assessed is provided below[16].

Carbon storage

Carbon can be stored naturally in soils and vegetation. Natural carbon storage has a major role to play in reducing net carbon emissions. In Buckinghamshire, carbon is stored predominantly in woodland which is more abundant in the southern half of the county but is also stored in undisturbed soils of other natural habitats such as meadows.

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[16] Rouquette (2020) Mapping natural capital, ecosystem services and opportunities for habitat creation in Buckinghamshire. Report for Buckinghamshire Council. https://bucksmknep.co.uk/projects/natural-capital-mapping/

Carbon sequestration

Vegetation can sequester carbon from the atmosphere. Woodland is the most efficient habitat at carbon sequestration and so the southern half of the county has the highest capacity for this service.

Air purification

Certain plants are effective at trapping airborne pollutants and reducing air pollution. Trees, particularly conifers (which do not shed their leaves during winter), are often more effective than grasses or herbaceous plants but it varies by species. The air purification capacity of the natural environment is greatest in the south of the county with isolated areas of high capacity in Aylesbury Vale.

The demand for air purification is highest in urban centres and along the main road network, particularly in Aylesbury and High Wycombe but also in Buckingham and towns in the Chilterns and South Bucks areas. There is a significant spatial disparity in air purification capacity and demand.

Noise regulation

Vegetation can diffuse and absorb noise pollution such as that from major roads, railways and airports. Noise can impact on health, wellbeing, productivity and the natural environment and the World Health Organisation (WHO) has identified environmental noise as the second largest environmental health risk in Western Europe (after air pollution). It is estimated that the annual social cost of urban road noise in England is £7 to £10 billion[17].

Woodland is the most effective habitat at absorbing noise. There is the greatest demand in Aylesbury, High Wycombe and Chesham with existing capacity being relatively low in urban areas.

Local climate regulation

Urban areas tend to be warmer than surrounding rural land because urban hard surfaces absorb more heat, which is then released back into the environment, coupled with energy released by human activity such as lighting, heating, vehicles and industry.

Our changing climate is predicted to make the overheating of urban areas a major health and economic issue. Woodland and water bodies have a moderating effect on the local climate, cooling the nearby air temperature.

The greatest capacity for climate regulation is in the south of the county with demand clustered around urban centres. Where large woodland areas are located adjacent to towns in the south of the county, they are particularly beneficial at moderating heat.

Water flow regulation

Water flow regulation describes the capacity of the land to slow water runoff and thereby reduce flood risk downstream. Flood events are predicted to become more frequent over

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[17] Defra (2013) Noise pollution: economic analysis. Crown Copyright.

the coming years as a result of climate change and there is a growing demand for using natural processes to reduce flood risk.

One of the best locations for slowing water runoff are areas of woodland on gently sloping surfaces. The steeper slopes of the Chilterns may be less effective for this service but areas around Penn Wood, Naphill Common, Dropmore and Farnham Common have woodland on gentle slopes and have excellent water flow regulation capacity.

Building up the organic content of damaged soils, cross-slope woody vegetation, attenuation features such as field corner storage ponds are examples of measures which improve and restore the flow regulation capacity of heavily managed landscapes.

Water quality regulation

Water quality regulation maps the risk of surface runoff becoming contaminated with high pollutant and sediment loads before entering a watercourse.

In the north of Buckinghamshire water quality regulation is generally lower, with arable fields, and especially those parts on slopes and close to watercourses, adding to contamination potential. Water quality regulation in the south is generally higher, especially those areas where less intensive land use such as pasture, hay meadows and woodland provide a buffer to watercourse, although diffuse pollution from agriculture and urban areas is still a significant pressure. Further measures to ameliorate the impact of agriculture on water quality, including establishing riparian buffers, use of cover crops, building up soil structure and reducing cattle poaching of river banks, are required if we are to meet water quality targets under the Water Environment Regulations.

Agricultural production

The majority of Buckinghamshire has a medium to low food production capacity. This is due to the predominant Agricultural Land Classification for the region being Grade 3, along with significant areas of Grade 4. Smaller areas of higher-grade land are found in the centre of the county to the west and south of Aylesbury.

Gallow Bridge Farm. Photo credit: BBOWT

Timber production

Forestry remains an important component of the rural economy and many areas of woodland are still valued primarily on their timber value. The average yield of timber per hectare per year was mapped based on species mix and yield class.

There are patches of high timber and wood fuel production capacity scattered throughout the south of Buckinghamshire and some in the west. Coniferous woodland provides the highest yield, but Buckinghamshire has predominantly broadleaved woods.

Accessible nature

Access to greenspace is being increasingly recognised for the multiple benefits that it can provide to people including a variety of health and wellbeing benefits. The two key components are public access and the perceived naturalness of the space.

Accessible nature capacity is highest in Burnham Beeches, Penn Wood, Ashridge Estate and Bernwood Forest. Hotspots also occur around other large accessible sites, especially in the south. Accessible nature capacity is moderate around the outskirts of major urban centres, especially High Wycombe, which has a number of accessible greenspaces nearby. Access is lowest in more rural areas in the northern half of the county, where public footpaths provide the only access in predominantly agricultural areas.

Pressures facing Buckinghamshire's Natural Environment

There are many pressures facing the natural environment in Buckinghamshire which if unchecked will have dramatic impacts on our wildlife and habitats in the future. The following are a summary of some of the key pressures in Buckinghamshire and the potential impacts on our natural environment.

Climate Change

Climate change will lead to hotter, drier summers and warmer, wetter winters with an increased number of extreme weather events, alongside changes in seasonal timings.

This is likely to lead to an increase in pests, invasive species and diseases which are adapted to the new conditions and a reduction in native species that cannot adapt quickly enough. The resulting change to the composition and location of ecological communities can affect the habitat quality and the services it can provide society, for example reducing air quality and increasing urban temperatures.

The habitats in the river valleys are at particular risk with wetland habitats drying out and lower river flows changing the aquatic ecology.

Development

Development can result in the direct loss of habitats and species but also the fragmentation and loss of connectivity of the ecological network. Indirect impacts can put pressure on nearby habitats leading to their deterioration. Some species are affected more than others, for example specialist farmland birds are often displaced whereas bird species more easily able to exploit gardens may benefit. This is a particular concern in the Aylesbury Vale area where urban growth is replacing farmland.

Poorly planned development can increase flood risk elsewhere or reduce water quality. It can also increase pollution and reduce people's access to nature. Well-planned development includes features to balance run-off to avoid increased flood risk downstream, clean up run-off water and provide green corridors and features for wildlife to thrive and move through the urban landscape.

Development pressure is highest around existing urban areas, particularly in north Bucks around Milton Keynes, around Aylesbury town and in the south of the county where overspill from neighbouring authorities is anticipated at some point.

Flood Risk

Historic flood risk management and land drainage activities have caused long-lasting harm to the river environment, including the dredging, straightening and embanking of river channels and the extensive under-drainage of floodplain land, particularly in the flashy clay catchments. Modified watercourses no longer flow and flood naturally and don't contain the variety of micro-habitats many species require; they also convey flood waters more quickly to downstream areas of flood risk rather than allowing the floodplain to act as effectively as possible in attenuating flood flows. In-river structures can be barriers to fish migration. Damaged river morphology is one of the biggest causes of failure of ecological objectives under the Water Framework Directive.

Over Abstraction

Chalk streams have been subject to a range of threats in recent years. The pumping of water and over-abstraction from the chalk aquifer in combination with a changing climate has resulted in large lengths drying out with the death of fauna and flora. The presence of weirs and culverts stops the movement of species up and down stream and reduces the ability of upper reaches being recolonised. Although there has been some good progress in addressing abstraction pressures on some chalk streams (for example the River Wye) and removing or bypassing some barriers to allow recovery of fish populations following droughts, much further progress is required.

Land Management

River Chess at Latimer Photo credit: Allen Beechey

There are many pressures on our land with land managers carrying the burden to maximise food production at ever reduced costs. Where this results in intensive farming it can have devastating consequences for our wildlife and natural environment, with knock on effects to our society and economy. For example, the overuse of pesticides and reduction in habitat can wipe out pollinators, which are necessary to pollinate many of our crops.

Creating large areas of land with few natural habitats prevents species from moving through the landscape to find food and shelter, isolating populations. Even more subtle management changes can have negative effects, such as changes to grazing regimes of meadow grasslands which can cause them to scrub over or produce a species poor sward, decreasing the biodiversity and overall resilience of the ecosystem. These changes are particularly evident in the Thame Valley where golf courses and equine uses are becoming more popular.

More sustainable, less resource-intensive land management will be critical to nature's recovery along with landscape-scale land-use change and much improved connectivity between areas of high biodiversity value.

Pollution

Sound pollution is generated by human activities including from roads, railways, aircraft, construction and factories. In can deter wildlife from living in certain areas and interrupt the communication of some species such as bats.

Light pollution is particularly bright in Aylesbury and High Wycombe and along the M40. It deters some nocturnal species from using these areas affecting the available foraging habitat to them.

Waste, diffuse and point source pollution can have direct impacts on watercourses and connected habitats. These pressures include isolated incidents, agricultural runoff, soil erosion, poor water treatment and runoff from roads. Impacts include sedimentation of river gravels, eutrophication, reduction in water quality resulting in loss of in-channel plant and invertebrate diversity, and in extreme cases acute pollution can result in fish kills.

Particulates are emitted from vehicles and road surfaces with dust emitted from construction and quarrying. Dust can land on nearby vegetation weakening or killing it. Particulates can affect the soil chemistry and alter species composition.

Non-Native Invasive Species

Invasive species can outcompete native wildlife or destroy whole ecosystems often causing other costly impacts in the process. Diseases such as Ash die-back and Box moth blight threaten to remove entire species from the landscape and with it the associated specialist lichens, fungi and invertebrates. The invasive signal crayfish is now present throughout the watercourses of the county and has replaced the native white-clawed crayfish.

Priority Outcomes for Local Nature Recovery

> **Environment Bill s99 (2)(c) the priorities, in terms of habitats and species, for recovering or enhancing biodiversity (taking into account the contribution that recovering or enhancing biodiversity can also make to other environmental benefits), and (d) proposals as to potential measures relating to those priorities.**

Summary of method
Collecting and consolidating Outcomes, Benefits and Activities *(Note: Any reference to 'activities' within this document means 'measures' in relation to wording in Environment Bill)*

The content of the Buckinghamshire pilot LNRS has taken a strong lead from two invaluable sources of information about the nature of Buckinghamshire, these are:

1. The Buckinghamshire and Milton Keynes Natural Environment Partnership's ("NEP") draft local Biodiversity Action Plan (BAP) to 2030; and

2. Stakeholder engagement

The NEP's draft local BAP is the latest iteration of a document which has been updated and refreshed regularly. It has been produced with the help of expert input and sets out key Outcomes for biodiversity across Buckinghamshire. An exercise was undertaken by the LNRS team to extract the key Outcomes from the draft local BAP to create an initial list which could then be built upon.

Stakeholder engagement was carried out through: three stakeholder workshops, farmer workshops, and an online survey. We engaged with a total of 358 stakeholders representing a variety of sectors: agriculture and land managers, parish and town councils, central government/agencies, conservation organisations, and individuals with a passion for nature in Buckinghamshire. Full details of the stakeholder engagement process are contained within Appendix 3.

Stakeholders' responses were analysed and suggested 'Outcomes', 'Benefits', and 'Activities' relating to local nature recovery were extracted by consultants 3KQ and further refined by the PAT team.

In this context the terms 'Outcomes', 'Benefits' and 'Activities' were intended to have the following meanings:

- 'Outcomes': changes for nature, e.g. more native broadleaved woodland,
- 'Benefits': the ecosystem services resulting from achievement of Outcomes, e.g. increased carbon storage,
- 'Activities': the specific or general things which need to be done to achieve the Outcomes, e.g. plant woodland within urban areas.

As the total number of responses was well over a thousand, and there was considerable repetition and cross over between responses, it was necessary to consolidate these to more representative lists. It should be noted that the consolidation process included the Outcomes which had been extracted from the draft local BAP.

Further consideration of the list of Outcomes was given, with each one being associated with the national Nature Recovery Network (NRN) objective[18] it achieves. The NRN objectives are listed below, with shortened names given in bold:

- **Protected sites:** To restore protected sites on land (including freshwater) to favourable condition so nature can thrive,
- **Wildlife rich habitat (other):** Create or restore additional wildlife-rich habitat outside of protected sites,
- **Woodland:** Support work to increase woodland cover,
- **Species and Connectivity:** Recover threatened and iconic animal and plant species by providing more, diverse and better connected habitats,
- **Ecosystem Services:** Achieve a range of environmental, economic, and social benefits, such as carbon capture, flood management, clean water, pollination, and recreation,

Consideration of the long lists in the context of the NRN objectives created the realisation by those processing the data in the PAT team that many of the Benefits would actually fit within the Ecosystem Services NRN objective. Therefore, Outcomes and Benefits were further combined into a single list, and

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[18] https://www.gov.uk/government/publications/nature-recovery-network/nature-recovery-network#:~:text=NRN%20objectives&text=create%20or%20restore%20500%2C000%20hectares,work%20to%20increase%20woodland%20cover

with the help of technical experts in the PAT team working on the pilot LNRS were further consolidated to a list of 107.

To demonstrate the way in which the consolidation process was undertaken, the single Outcome **'More designated sites for nature conservation'** was created from 12 individual responses, including:

- Introduce nature reserves to return rare flora and fauna to the Vale,
- Increase the area of high-quality biodiversity sites and associated buffer and connected to other sites across landscape,
- Increase area of core and high-quality biodiversity sites - e.g. LWS, SSSIs, local and national nature reserves,
- Increase area of core and high-quality biodiversity sites (e.g. LWs, SSSIs, NRs),
- Linford nature reserve is a great example of biodiversity. There should be so many more Site's like this,
- More nature reserves,

Selection of Priority Outcomes

Defra require the pilot LNRS to produce a prioritised list of Outcomes, alongside the long list of Outcomes that the pilot LNRS is seeking to achieve.

With a long list of 107 consolidated Outcomes under the 5 NRN objective headings, it was considered by the pilot LNRS team to produce a prioritised list that further refinement was necessary. This was because it was felt that not only were there too many but also that no formal prioritisation process had yet been carried out.

Prioritisation was therefore undertaken with three primary motivations:

- To shorten the long list by approximately 50% to create a shorter prioritised list,
- To capture a consensus of the most important Outcomes from the experts with local knowledge,
- To take into account the frequency with which issues were raised by stakeholders,

To do this, seven PAT local experts were asked to select up to 50% of the Outcomes from within each of the five NRN objective categories. The total number of times each was selected was counted and those selected by the most experts were prioritised. To differentiate between Outcomes with the same number of PAT local expert selections, stakeholder popularity (in this context 'stakeholder popularity' means the number of responses each consolidated outcome was created from) was taken into account, with those scoring highest, being used to decide which Outcomes should be priorities.

Table 2 below shows the total number of Outcomes and the number prioritised for each of the NRN objectives:

Table 2: Outcomes by NRN objective, total and prioritised

NRN Objectives	Total	Prioritised
Protected Sites	9	5
Wildlife rich habitat (other)	31	15
Woodland	9	5
Species and Connectivity	30	15
Ecosystem Services	28	14
TOTAL	107	54

Potential Activities (Measures) to Achieve Priority Outcomes

Sorting and consolidating

Activities were kept separate from the Outcomes and benefits through the consolidation process (discussed above). Consolidation of 715 Activities resulted in a consolidated list of 133 Activities.

Matching Activities to Priority Outcomes

Matching Activities to Outcomes was undertaken using two excel spreadsheets, one containing all of the consolidated Outcomes and another containing all of the consolidated activities.

For each Outcome, Activities (through assigning each a code that would help achieve the outcome were copied across to be associated with the 'Outcome'. All of the prioritised Outcomes could be matched to relevant Activities but some of the residual Outcomes could not be matched to relevant Activities.

Resulting priorities for restoring nature in Buckinghamshire

The full list of prioritised Outcomes and their associated Activities is contained within the following table. These are grouped under the relevant NRN objective in the left-hand column. The right-hand column includes a 'YES' where the prioritised Outcome is represented in the LNRS Mapping process as a 'Conservation Feature', (a more detailed explanation of the mapping process and conservation features can be found in the following 'Local Habitat Maps' section).

The full long list of consolidated Outcomes and Activities, along with the full methodology is included in Appendix 4. We must stress that, at this point a final review of the Outcomes and activities has not been conducted by the PAT. Much more work needs to be undertaken to ensure that the prioritised list is representative of stakeholder views and previous work in Bucks (e.g., BAP, and other key strategies, which are outlined in Appendix 1).

Table 3: Prioritised Outcomes and associated Activities

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Protected Sites	More sites designated for nature conservation	- Restore and create and buffer designated sites - Designate more sites for nature conservation	YES
Protected Sites	Designated sites are protected by suitable habitat buffers	- Restore and create and buffer designated sites	YES
Protected Sites	Ancient Woodland (and irreplaceable habitats) protected and in favourable management	- Collect data on woodland condition - Better management of existing woodland (including retention of deadwood) that is planned for the long term and suitably funded. - Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market - Coordinated squirrel control within woodlands through funding - Manage woodland for owls - Identify barriers to good habitat management - Support LWS owners to manage and protect sites	YES
Protected Sites	Favourable condition of SSSIs	- Restore and create and buffer designated sites - More promotion and marketing of existing designated areas and species to be found there	YES
Protected Sites	Reduced pressure on sites of higher nature conservation value due to there being more alternative Accessible Natural Greenspace	- Create Suitable Alternative Natural Greenspace (SANG's) to reduce recreational pressure (including Chiltern Beechwoods and Burnham Beeches SAC	
Wildlife rich habitat (other)	More Lowland Calcareous Grassland	- Better protection for priority habitats - Coordinate management of chalk (calcareous) grassland and encourage livestock grazing - Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Wildlife rich habitat (other)	More ponds	- Create new clean water ponds, lakes and reservoirs for wildlife, climate resilience - Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites	YES
Wildlife rich habitat (other)	Improve WFD ecological status of Rivers and Streams	- Link with Thames catchment study with Environment Agency - Catchment sensitive farming and land management - Promote a catchment based approach - Connections from escarpment headwaters into River Thame catchment - Stage 0 restoration on some headwaters - Enhance the condition of the watercourses and reinstate meanders (e.g. River Great Ouse and Ouzel) - Enhance river corridors as nature corridors and remove barriers to fish passage - Better protection (e.g. LWS designation) and awareness of chalk streams, including the removal of barriers and mitigation of harmful infrastructure (Heathrow) - Stop water pollution through improve wastewater management and drainage infrastructure taking enforcement action (especially on sewerage) - Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites	YES
Wildlife rich habitat (other)	Improved condition of priority habitats	- Better protection for priority habitats - Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites	YES
Wildlife rich habitat (other)	More wildflower verges	- Better investment and management and monitoring for nature of parks, road verges and other green spaces - Use road verges to connect grasslands	YES
Wildlife rich habitat (other)	Improve the condition of chalk streams	- Stop unsustainable abstraction for chalk aquifers and chalk streams to protect the habitat - Better protection (e.g. LWS designation) and awareness of chalk streams, including the removal of barriers and mitigation of harmful infrastructure (Heathrow)	YES
Wildlife rich habitat (other)	More habitat mosaics	- Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Wildlife rich habitat (other)	Restoration and Enhancement of the Ray Valley and Bernwood Area	- Restore wetland areas of the River Thame and Ray	YES
Wildlife rich habitat (other)	More semi-natural habitats	- Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making	YES
Wildlife rich habitat (other)	Better condition of semi-natural habitats	- Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making	YES
Wildlife rich habitat (other)	More biodiversity in recreation green spaces	- Biodiversity as key part of green infrastructure - Manage parks in a more wildlife friendly way, for example reduced mowing and less herbicides.	
Wildlife rich habitat (other)	Farmland rich in wildlife	- Recognise link between soil type and habitat and its management - Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation) - Achieve best practice in farmland management for wildlife - Engage and support land owners to manage their land for nature. Including access to advice and funding and via facilitation groups and farm clusters. - Encourage uptake of environmental stewardship schemes - More leadership by, and collaboration between landowners/farmers/managers, to manage wildlife - More education of public by landowners/farmers/managers to promote the environment - Support for farming in urban fringe - Coordination between the LNRS, ELM and BNG - ELM to recognise whole farm systems - Improve management for wildlife on equine and shooting (game) sites	

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
		- Buckinghamshire Council to lead by example through best practice land management on agricultural estate	
Wildlife rich habitat (other)	More overall biodiversity (minimum of doubling nature)	- Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making - Achieve best practice in farmland management for wildlife - Biodiversity as key part of green infrastructure - Designate more sites for nature conservation	
Wildlife rich habitat (other)	Better environmental and wildlife records	- More and better integrated data on species and habitats - Undertake research on designed landscapes, parks and gardens - Record, protect and plan for future, veteran and ancient trees - Collect data on woodland condition - More information on natural capital value - Create a monitoring plan for the LNRS - A better understanding of the Bechstein's bat population in this region via survey work and plans on how to expand their population	
Wildlife rich habitat (other)	More wetland wildlife through functioning floodplains	- Habitat restoration projects on watercourses (e.g. flood meadow pastures, wet woodland) and waterside buffers - Reconnect rivers with their floodplain - Reintroduce beavers - Address unsympathetic use of land in floodplain - Payments for land set aside to flood - Restore wetland areas of the River Thame and Ray - Establish Natural Flood Management Schemes which create new wetland habitats	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Woodland	More native woodland	- Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats - Promote woodland creation grant support and management planning - Plant woodland within urban areas - Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon - Plant woodland within agricultural land - Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats. - Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites	YES
Woodland	More hedgerows in better ecological condition	- Better management of hedgerows and plant trees in existing hedges - Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites	
Woodland	Protect all ancient woodland	- Better protection for priority habitats	YES
Woodland	More woodland in favourable management	- Collect data on woodland condition - Better management of existing woodland (including retention of deadwood) that is planned for the long term and suitably funded. - Create a market for woodland produce - Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market - Coordinated squirrel control within woodlands through funding - Manage woodland for owls - Identify barriers to good habitat management - Support LWS owners to manage and protect sites	YES
Woodland	More wet woodland	- Habitat restoration projects on watercourses (e.g. flood meadow pastures, wet woodland) and waterside buffers	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Species and Connectivity	Good connectivity of woodland habitats	- Create new hedgerows (with trees) to act as habitat connectivity corridors - Increase of Rewilding creating a connected landscape for wildlife - Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.	YES
Species and Connectivity	Good connectivity of wetland habitats	- Minerals plan to provide opportunities for wetland creation - Reconnect rivers with their floodplain - Restore wetland areas of the River Thame and Ray - Establish Natural Flood Management Schemes which create new wetland habitats	YES
Species and Connectivity	Improved habitat connectivity, (including cross border) for ecological resilience	- Ensure the LNRS creates connections into other administrative areas - Better understanding of how nature corridors function	YES
Species and Connectivity	Better habitat connectivity across farmland	- Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation) - Achieve best practice in farmland management for wildlife - Engage and support land owners to manage their land for nature. Including access to advice and funding and via facilitation groups and farm clusters. - Encourage uptake of environmental stewardship schemes - More leadership by, and collaboration between landowners/farmers/managers, to manage wildlife - Support for farming in urban fringe - Coordination between the LNRS, ELM and BNG - ELM to recognise whole farm systems	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Species and Connectivity	Connectivity of green spaces	- Require (via policy) well designed GI in new developments which functions for biodiversity and people, such as Suds, urban trees and green roofs, open space, landscape buffers, nature corridors. - Protect and enhance green infrastructure between developed areas - Production of a green infrastructure map to inform decision making - Create greener transport links (greenways) - A56, Better investment and management and monitoring for nature of parks, road verges and other green spaces - More Accessible Natural Greenspace (including along rivers and new woodland, nature trails and country parks) with better access from settlements - Install wildlife bridges/tunnels to improve passage for wildlife and reduce wildlife killed on transport corridors	YES
Species and Connectivity	Connectivity between priority habitats	- Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making - Embed the Lawton Principles (more, bigger, better, joined up) within planning policy	YES
Species and Connectivity	Dark corridors for nocturnal wildlife	- Limit light pollution	
Species and Connectivity	Rivers reconnected to floodplains	- Reconnect rivers with their floodplain - Restore wetland areas of the River Thame and Ray - Establish Natural Flood Management Schemes which create new wetland habitats	YES
Species and Connectivity	Fewer invasive, non-native species causing problems for native wildlife	- Forward planning to reduce the impacts of Ash dieback including the planting of replacement species. - Eradicate Oak Processionary Moth - Removal of exotic conifers and replacement with native habitats - Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market - Removal of invasive wetland species such as floating pennywort - Removal of Rhododendron from woodland via engagement and funding. - Mink control - Coordinated squirrel control within woodlands through funding	

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Species and Connectivity	Improved connectivity of rivers (fish passage)	- Enhance river corridors as nature corridors and remove barriers to fish passage - Connections from escarpment headwaters into River Thame catchment - Better understanding of how nature corridors function	
Species and Connectivity	Protection for, and more Black Poplar	- Plant more Black Poplar	
Species and Connectivity	Rare or notable (priority) wildlife species are protected	- A better understanding of the Bechstein's bat population in this region via survey work and plans on how to expand their population - Create a water vole recovery strategy including reintroductions - Management for Otters, including watercourses and Hyde Land Lakes - Manage woodland for owls - Manage land for wetland birds	
Species and Connectivity	Favourable condition of invertebrate assemblages	- Planting for pollinators	
Species and Connectivity	An increase in farmland birds (including objectives for specific species)	- Buckinghamshire Council to lead by example through best practice land management on agricultural estate	
Species and Connectivity	Recovery of wetland birds	- Manage land for wetland birds	

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Ecosystem Services	Better awareness, understanding and engagement with nature and the countryside through achieving ANGSt targets	- More Accessible Natural Greenspace (including along rivers and new woodland, nature trails and country parks) with better access from settlements - More understanding of, and engagement with nature (including green prescribing) for health and wellbeing benefits. - Use signage and visitor centres to help engage people. - Educational programmes in schools about nature and fund training for young people. - Provide more walks and activities linked to nature (e.g. fungi forays, 30 days wild, urban peregrines) - Engage local communities with nature, create opportunities for volunteers funding small projects (e.g. bats in churches project)	
Ecosystem Services	Improved Green Infrastructure (following NEP's GI Vision and principles)	- Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making - Require (via policy) well designed GI in new developments which functions for biodiversity and people, such as Suds, urban trees and green roofs, open space, landscape buffers, nature corridors. - Protect and enhance green infrastructure between developed areas - Production of a green infrastructure map to inform decision making - Biodiversity as key part of green infrastructure - Ensure the long term management of newly created habitats	

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Ecosystem Services	Regenerate towns and major urban areas and build biodiversity better into planning	- Successfully embed biodiversity net gain into the planning system - Integrate the LNRS into spatial planning policies - Incorporate requirements for biodiversity into all sectors (planning, farming, health etc.) - Embed the Lawton Principles (more, bigger, better, joined up) within planning policy - Require (via policy) well designed GI in new developments which functions for biodiversity and people, such as Suds, urban trees and green roofs, open space, landscape buffers, nature corridors. - Protect and enhance green infrastructure between developed areas - Biodiversity as key part of green infrastructure - Create greener transport links (greenways) - Maximise nature spaces in OxCam Arc - More tree retention and planting (promote the urban tree challenge fund) using species which will adapt to climate change and continue to improve air quality - Education for decision makers such as local authorities on the value of nature and how to restore nature, particularly within planning decisions	
Ecosystem Services	Plant and protect urban trees/woodland, 30% Canopy Cover	- Require (via policy) well designed GI in new developments which functions for biodiversity and people, such as Suds, urban trees and green roofs, open space, landscape buffers, nature corridors. - More tree retention and planting (promote the urban tree challenge fund) using species which will adapt to climate change and continue to improve air quality -Plant woodland within urban areas	
Ecosystem Services	Better physical and mental health and wellbeing resulting from access to Natural Greenspace	- Incorporate requirements for biodiversity into all sectors (planning, farming, health etc.) - More understanding of, and engagement with nature (including green prescribing) for health and wellbeing benefits.	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Ecosystem Services	Farming and other land management gives greater ecosystem services	- Recognise link between soil type and habitat and its management - Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation) - Achieve best practice in farmland management for wildlife - Engage and support land owners to manage their land for nature. Including access to advice and funding and via facilitation groups and farm clusters. - Encourage uptake of environmental stewardship schemes - More leadership by, and collaboration between landowners/farmers/managers, to manage wildlife - More education of public by landowners/farmers/managers to promote the environment - Support for farming in urban fringe - Coordination between the LNRS, ELM and BNG - ELM to recognise whole farm systems - Improve management for wildlife on equine and shooting (game) sites - Buckinghamshire Council to lead by example through best practice land management on agricultural estate	YES
Ecosystem Services	Better flood attenuation through functioning floodplains, and soils	- Payments for land set aside to flood - Reconnect rivers with their floodplain - Understand groundwater in Chilterns and gravels of Thames, re suitability for NFM and interaction with infrastructure - Better understanding of flooding (upstream causes) and better flood warning and resilience (especially relating to groundwater) - Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation)	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Ecosystem Services	Clean Water	- Stop water pollution through improve wastewater management and drainage infrastructure taking enforcement action (especially on sewerage) - Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation) - Reduce the use of chemicals and pesticides and ban neonicotinoids - Collaboration with water company initiatives	YES
Ecosystem Services	Clean Air	- Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon	YES
Ecosystem Services	Less air, water, light, noise pollution	- Stop water pollution through improve wastewater management and drainage infrastructure taking enforcement action (especially on sewerage) - Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation) - Reduce the use of chemicals and pesticides and ban neonicotinoids - Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon - Reduce fly tipping & litter through education, community involvement, enforcement and fines - Limit light pollution - Collaboration with water company initiatives	YES
Ecosystem Services	Mitigate climate change and store carbon with vegetation (especially trees) and soil	- Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon - Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation) - Ensure that wildlife can move as required to respond to climate change	YES

NRN Objectives	Outcome (prioritised)	Associated Activities (consolidated, from stakeholder input)	Mapped Conservation Features
Ecosystem Services	Control flooding with NFM, catchment base approach	- Establish Natural Flood Management Schemes which create new wetland habitats - Understand groundwater in Chilterns and gravels of Thames, re suitability for NFM and interaction with infrastructure - Catchment sensitive farming and land management - Promote a catchment based approach	YES
Ecosystem Services	More ecosystem services through nature-based solutions	- More information on natural capital value - More tree retention and planting (promote the urban tree challenge fund) using species which will adapt to climate change and continue to improve air quality - Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon - Establish Natural Flood Management Schemes which create new wetland habitats	YES
Ecosystem Services	Healthy soil organic matter for carbon sequestration, water retention and soil biology	- Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation)	YES

Discussion

It is likely that the lists of Outcomes and Activities represent many of the issues which need to be addressed in the pilot LNRS Statement of Biodiversity Priorities, however, it is also recognised that there are significant shortcomings which need addressing.

The process which has led to the production of consolidated lists of Outcomes and Activities, evolved as we progressed through the stakeholder engagement. It has responded to the large numbers of comments made by stakeholders and the need to rationalise the data to a level where it could be understood. It was also a result of the time constraints of the stakeholder engagement.

Given more time, the process implemented would have been different and would have included more iterations of reviewing and revising the list of Outcomes and activities with stakeholders and the PAT experts. The data processing was chiefly carried out by two members of the PAT team in a relatively few days and this constrained the level of analysis given to the data and the level of group oversight of the process.

Although the processing has been effective in getting to a result which is relatively true to the input received, it is clear that some issues, have become dominant whilst others have been obscured due to the necessary consolidation and simplification process e.g. there is no mention of Great Crested Newts but Trees and Woodlands are featured repeatedly. The approach has also generalised some issues and specific Outcomes and Activities have therefore been overlooked e.g. the specific Activity "reduce sewage inlets into Thame" had to be combined with other similar activities to make a more general consolidated Activity "Stop water pollution through improve wastewater management and drainage infrastructure taking enforcement action (especially on sewerage)".

It is important to note that although the PAT team were able to 'up vote' the Outcomes they felt were most appropriate to be prioritised, the opportunity was not given for new Outcomes (or Activities or Benefits) to be created, mainly due to time-constraints within the pilot LNRS timetable.

When the full lists of consolidated Outcomes and Activities are compared, it is clear that there are gaps where some Outcomes do not have Activities which can deliver them and where some Activities do not have Outcomes to associate with. For example, the 'Outcome': "Protection for and more Wild Service Trees" could not be associated with a specific 'Activity' and the 'Activity': "Provide habitat for swifts" was not associated with a specific 'Outcome'.

Next Steps

Further work is needed to produce a more complete and accurate set of Outcomes, Benefits and Activities which link together cohesively. To do this, a proactive approach should be taken to creating a structured (almost formulaic) list of Outcomes, Benefits and Activities using standardised terminology. The lists should be categorised (e.g. for habitats, for species, for benefits for people) and

hierarchical (e.g. high level covering a wide area or range of issues, down to more specific location and topic based) to ensure a wide scope is considered and to ensure that high level overarching principles have a place, as well as covering very specific issues.

The PAT should set out the structure for the approach which can be populated using:

- PAT knowledge and experience;
- input already collected from stakeholders; and
- key information extracted from pre-existing strategies and other documents (see Appendix 1 for a list of relevant documents).

Greater time and capacity need to be dedicated to data analysis before further stakeholder engagement can then be used to:

- Add to the lists of Outcomes, Benefits and Activities, if necessary;
- Input into prioritisation of Outcomes, Benefits and Activities; and
- Identify potential Activities on a map.

It will be important to ensure that the final list of biodiversity priorities for the LNRS is:

- Agreed to, by not only the PAT but also the consensus of stakeholders, with special attention to those in a position to help deliver it; and
- Fit for the purpose of informing government grants, such as the Local Nature Recovery Scheme and two other associated Schemes.

Further work is also required to ensure that Outcomes and Activities align with conservation features which are mapped in the resulting LNRS Habitat Maps.

3. Local Habitat Maps

Environment Bill section 99 (3) A local habitat map referred to in subsection (1)(b) is a map identifying—

(a) national conservation sites in the strategy area,

(b) any nature reserves in the strategy area provided under section 21 of the National Parks and Access to the Countryside Act 1949, and

(c) other areas in the strategy area which in the opinion of the responsible authority—

 (i) are, or could become, of particular importance for biodiversity, or

(ii) are areas where the recovery or enhancement of biodiversity could make a particular contribution to other environmental benefits.

Baseline Maps

A series of baseline maps were produced to illustrate the current Buckinghamshire environment. These are provided in full at Appendix 2 (with details and citations available at Appendix 5), and cover the following aspects:

- Broad habitat types and land use in Buckinghamshire
- High quality habitats in Buckinghamshire
- Designated national and local conservation sites in Buckinghamshire
- Priority habitats and ancient woodland
- Composite of above two maps: designated national and local conservation sites plus priority habitats in Buckinghamshire
- Boundary areas relevant to conservation (i.e. National Character Areas, river catchment boundaries, the AONB and nature reserves managed by conservation charities)
- Ecological Status of WFD Waterbodies in Buckinghamshire
- Combined geology of Buckinghamshire and Local Geological Sites
- Simplified soil types across Buckinghamshire
- Natural England's National Character Areas, covering Buckinghamshire

Appendix 7 also displays the ecosystem services demand and supply maps[1].

Two of these maps in particular have been selected to display here provide a summary of the "baseline" habitat in Buckinghamshire.

- Figure 1 shows the distribution of broad habitat types and land use across Buckinghamshire (which correlates to Table 1, above).
- Figure 2 overlays both the priority habitats and ancient woodland in Buckinghamshire, with national and local designated sites.
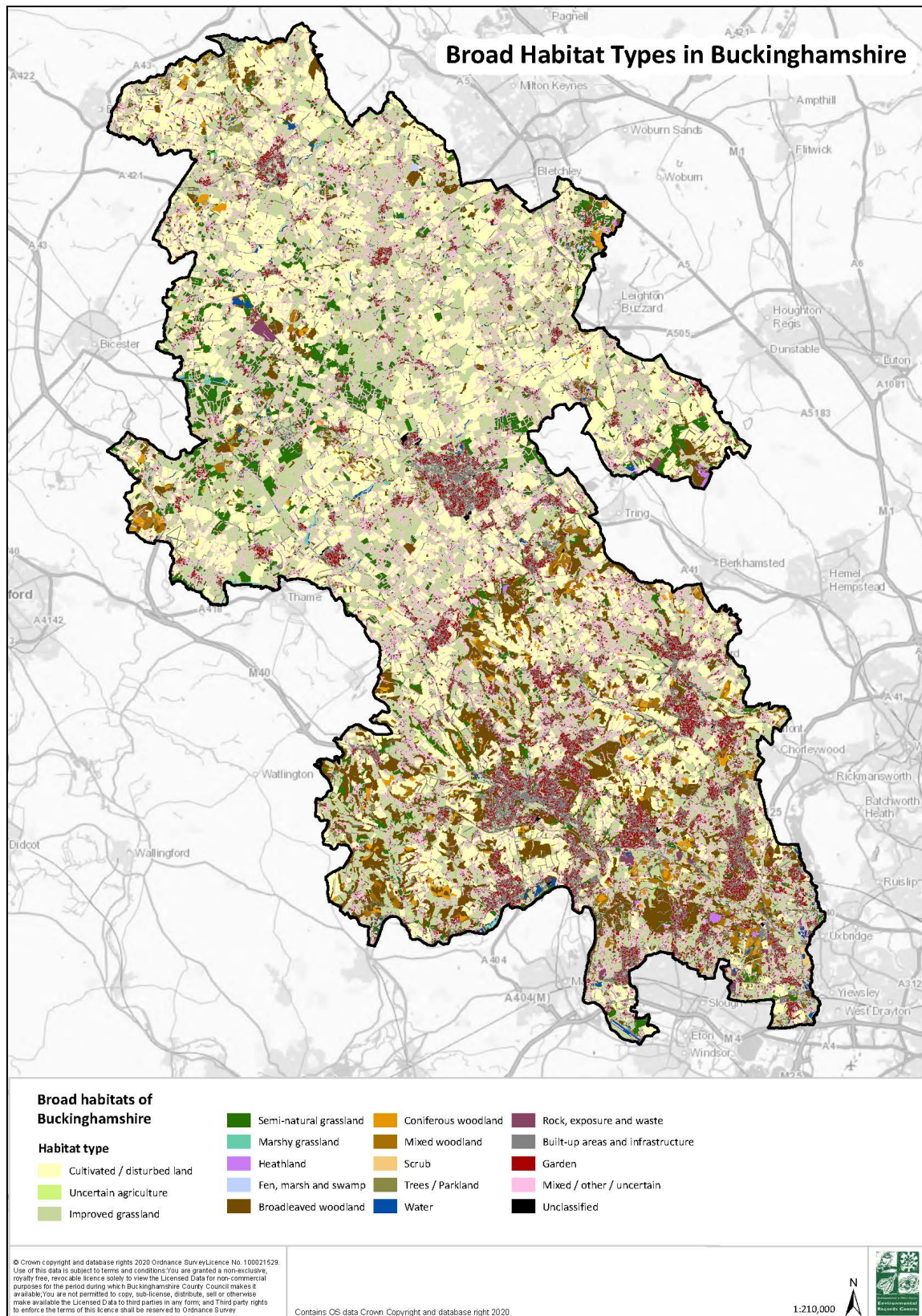
Figure 2: The distribution of broad habitat types and land use across Buckinghamshire (correlates to Table 1, above)

National and Local Sites
Priority Habitats and Ancient Woodland

Key

National Nature Reserves
Special Areas of Conservation
Sites of Special Scientific Interest
Local Nature Reserves
Biological Notification Sites
Local Wildlife Sites
Road Verge Nature Reserves
Floodplain Grazing Marsh
Open Water /Stream/River
Lowland Fen
Lowland Heath
Lowland Beech / Yew Woodland

Lowland Calcareous Grassland
Lowland Dry Acid Grassland
Lowland Meadow
Lowland mxd Deciduous Woodland
Lowland Wood-pasture and Parkland
Purple Moor Grass and Rush Pasture

Reedbed
Traditional Orchard
Wet Woodland
(Other) good Semi-improved Grassland
Ancient Semi Natural Woodland (ASNW)
Plantation on ASNW

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Figure 3: Priority habitats, ancient woodland and national and local designated sites in Buckinghamshire.

Proposed locations for nature's recovery

Following Defra guidance two options of local habitat maps were developed which include:

- A base Ordnance Survey-type map, a map of habitats and the locations of nationally designated wildlife sites.
- The locations of Local Nature Reserves, other Local Wildlife Sites and other sites that have been identified as being important for biodiversity (e.g., Roadside Nature Reserves).
- Proposed locations for delivering both the priority and other desired Outcomes and measures.

The Buckinghamshire LNRS Pilot was one of three pilots that trialled the use of Systematic Conservation Planning (SCP) to develop the local habitat maps with Biodiversify. Over a thirteen-week period (February – April) Biodiversify led the SCP process with the PAT 'step 5 working group' (who also led the stakeholder engagement process). This process involved five main stages (data sharing, introduction to the SCP approach, discussing constraints and features, presentation of conservation feature data and initial target setting, and creation of revised plans and discussion of final results). A full description of these stages can be found in Appendix 6.

Systematic Conservation Planning (SCP) is an evidence-based approach, which uses available environmental data and stakeholder priorities to develop a local habitat map. This is a widely used approach for developing conservation area systems and ecological networks around the world (Groves and Game, 2016; Margules and Pressey 2000), but has been used less in the U.K. (with the exception of developing priorities for National Nature Reserves with Natural England, and a natu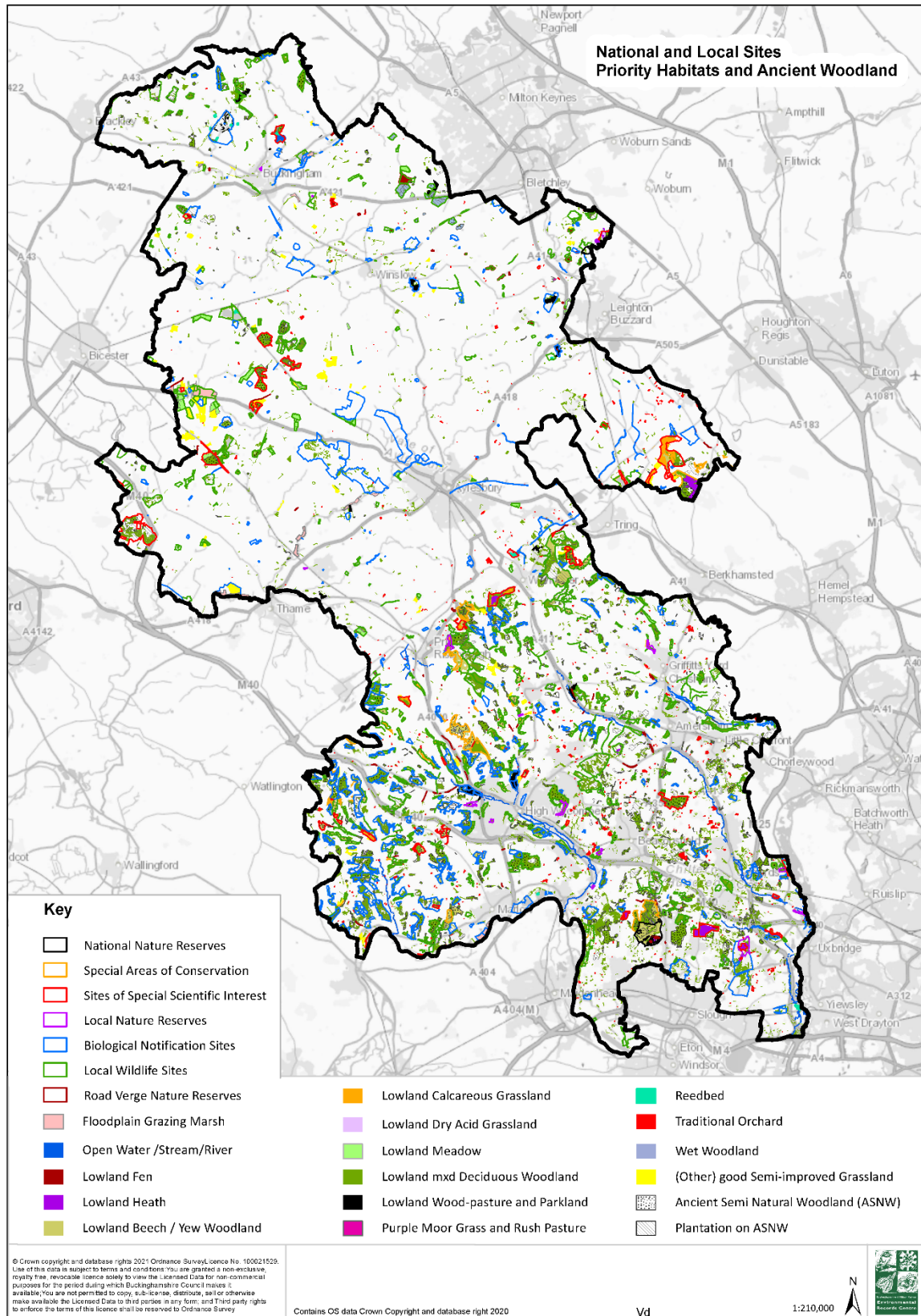re recovery network with the Berks, Bucks and Oxon Wildlife Trust). SCP provides an efficient, repeatable, transparent, and equitable approach for conservation decision making and for clear spatial prioritisation of activity. SCP ensures that conservation aims and priorities (relating to stakeholder Outcomes) are clearly articulated, and quantitative targets for these priorities are agreed prior to undertaking any mapping.

Systematic Conservation Planning produces networks that align with the Lawton principles and CARE principles: **C**onnected: networks of connected conservation areas ("joined up"); **A**dequate: enough of each conservation feature is selected to ensure its long-term persistence ("bigger and better"); **R**epresentative: every aspect of biodiversity is represented ("more"); and, **E**fficient: achieves the conservation goals at minimum cost to other sectors, partly by considering the network as a whole, rather than on a site-by-site basis**.**

Through this trial of SCP, the working group explored five different scenarios of local habitat maps (see Appendix 6 for full details). Two of these maps have been selected and presented as drafts in the main body of this report. ***These should be treated as maps for illustrative purposes only***, as the PAT may wish to continue to work with Biodiversify, the SCP consultant, to revise all stages of the process (e.g., decisions on data included and not included) and come up with a final product that more closely ties stakeholder Outcomes and measures (or activities) with the local habitat map. As this is the first time SCP has been

used to create a map that fits the requirements of the LNRS, more thought and testing is required, to provide robust guidance for future development of local habitat maps.

Ultimately, the local habitat map will be designed to reflect all agreed stakeholder Outcomes and measures from the shortlist of biodiversity priorities which can be mapped (i.e., there is available environmental data to show spatially where Outcomes can be achieved, and therefore activities can be undertaken).

Constructing the local habitat maps

The planning region, zones and conservation features

To create the local habitat maps, the whole of Buckinghamshire was divided up into a series of 5 ha hexagonal planning units. These planning units are what is used to display the final selection of zones, which represent where stakeholder priorities (Outcomes) are present.

In order to produce a plan which can readily support implementation, SCP encourages decision-makers to group actions into zones which are ultimately what is mapped. These zones are bespoke, being created and defined by stakeholders (in this case the PAT working group). Due to time pressures we were limited to creating four zones. These zones reflect actions (e.g., to protect important sites for wildlife, to maintain priority habitat condition and extent, or to restore or create habitat), and include nature conservation sites, or conservation features that reflect stakeholder priorities (which in SCP are referred to as 'conservation features'). Here we outline the zones and their associated conservation features:

Zone 1 - Protected sites and nature reserves

- Nationally or locally designated sites for nature conservation
- Nature reserves (BBOWT, National Trust, Woodland Trust)

Zone 2 - Maintain and Enhance

- Priority habitats
- Ancient & Semi-Natural Woodland, Ancient Replanted Woodland
- Other important habitats: scrub, rivers and ponds

Zone 3 - Restore or Recover

- Potential restoration areas for priority habitats
- Woodland – high priority, managed and unmanaged
- Chilterns AONB
- Roadside Nature Reserves
- Biodiversity Opportunity Areas
- Ecosystem Services Opportunities
    - to sequester and store carbon
    - to reduce surface runoff
    - to reduce soil erosion and improve water quality
    - to ameliorate air pollution

  o   to regulate local climate (e.g., reduce urban heat)
  o   to increase access to natural greenspace

Zone 4 – Wider Landscape

- Areas outside of zones 1 – 3, which are still deemed important to support nature's recovery, but do not contain spatially distinct features that were used in the mapping.

When looking at the Outcomes presented in the Statement of Biodiversity Priorities, the conservation features selected above align with 67% (or 36 of 54) of the Outcomes (as indicated in the 'Mapped Conservation Features' column of Table 2 in the Statement of Biodiversity Priorities section).

During stage 1 of SCP (data sharing) there was a lot of data considered and a lot of decisions made about what to include or not include in the SCP process. Following this there was a lot of processing of data undertaken by Biodiversify to ensure these could be used in SCP. The full details of this data processing have not been summarised here or in Appendix 6, as more work must be done by Biodiversify and the working group to complete and document this work. As an interim measure, we have outlined the data that was included in the local habitat maps in Table 3 and Appendix 1 and 7. We have also summarised the data which was considered, but not used, in Appendix 7.

To create the two options for Local Habitat Maps, the working group assigned a relative score of priority (or importance) to the conservation features present in Zones 2 and 3. This was a simple qualitative score of a high ('H'), medium ('M') or low ('L') priority. This was based on their expert judgement about the relative importance of all of these features compared to each other. These qualitative scores were taken by Biodiversify, and then assigned a quantitative target for each H, M or L for inclusion in the map (e.g., map 1: H=0.7, M=0.5, L=0.2). These scores were relative to each other, to maintain the H, M or L priority set by the working group, and have no other significance in terms of the quantitative value that was set. As will be seen in Appendix 6, various scenarios were explore with different quantitative values assigned to conservation features (still maintaining the relative importance of the H, M or L priority set by the working group), to explore the impact these targets had on the final map – extent of and connectivity between zones.

Please note the working group is not entirely comfortable with the assignment of these scores, as this work was done over a very short period (over just two weeks and a two-hour meeting). Additionally, the working group is not entirely comfortable with the selection of the conservation features included in the zones (listed above). Therefore, in any further development of the SCP process for Buckinghamshire, the PAT would want to revise these conservation features and the priorities set against them to ensure the working group feels confident that these better reflect the stakeholders' shortlist of biodiversity priorities.

Calculating the baseline for Buckinghamshire's Nature

In order to provide a comparison, the area of land in Buckinghamshire currently well managed for nature was calculated. To do this, Biodiversify calculated the area of land covered with the following:

1. Protected areas (SACs, SSSIs, NNRS, LNRSs, LWSs, BNSs).
2. Areas under current known conservation ownership (BBOWT, National Trust and Woodland Trust)
3. Priority habitats (as defined by BMERC, the local records centre and the national PHI dataset)

This came to a total area of 23,285.4ha, which represents a total percentage coverage of Buckinghamshire of 14.9%. This baseline can be further worked on (e.g., to include Ancient Woodland, and other sites owned and managed by conservation groups or private landowners), and it is our intention to establish the Bucks baseline in our follow-on work from the LNRS Pilot.

This area of 14.9% is an important baseline to compare to the coverage of the local habitat maps produced through the SCP process – one is 41%, and two is 69.3%. Some counties and organisations are creating aspirations of 30% of land well managed for nature by 2030 (e.g. the Wildlife Trusts), and others are setting targets to 'double nature' (e.g., Cambridgeshire Local Nature Partnership, Natural Cambridgeshire, and the Environmental Principles for the OxCam Arc). Whilst the aspiration for Buckinghamshire's nature has not been decided, these sorts of visions / aspirations are what a local habitat map could reflect. Hence the importance of calculating the baseline for nature in 2021.

Local Habitat Map 1

Local Habitat Map 1 was developed to represent most closely a 'doubling nature' ambition (aspiring for coverage of at least 30% of Buckinghamshire compared to the 14.9% baseline). Note this map corresponds to Scenario D in Appendix 6. This creates a network covering 639 km^2, where 41% of land in Buckinghamshire is covered. A breakdown of the area and proportion coverage of Buckinghamshire is shown in Table 1, and the map can be seen in Figure 3.

For this map, all of the protected sites and nature reserves listed above were 'locked in' to the process and fully displayed on the map (i.e., representing 100% coverage of these sites). For zones 2 and 3, the targets set for the conservation features are displayed in Table 2. The conservation features were assigned a high ('H'), medium ('M') or low ('L') priority by the working group, to which Biodiversify assigned a quantitative target for inclusion in the map.

For example, the majority of priority habitats were assigned a 'H' and Biodiversify assigned a corresponding quantitative target of 0.7. This means that 70% of the mapped area for each priority habitat (using Natural England PHI and BMERC priority habitat data) had to be included in the local habitat map. Some priority habitats (e.g., 'No main habitat but additional habitats present') were assigned a 'M' and a corresponding quantitative target of

0.5. This means that only 50% of the mapped area of this priority habitat had to be included in the map.

Previous work by the NEP identified an overall target of 20% enhancement of priority habitats. In the 'Restore or Recover' zone, this was used to set the target for all priority habitats in this zone. The dataset used for the restoration potential was the Natural England National Habitat Network Maps, so Biodiversify took the area of each habitat specified in the Biodiversity Action Plan and applied this to the NE dataset.

When compared to other important landscapes for conservation, such as the Chilterns AONB and the Biodiversity Opportunity Areas (BOAs), there was fairly good correspondence of the local habitat map and these areas. The priority for BOAs was 'H' with a corresponding quantitative target of 0.7, and the priority for the Chilterns AONB was 'M' with a corresponding quantitative target of 0.5. The group was undecided about the targets that should be set for these two types of landscapes, and we did explore assigning a 'H' (0.7 target) to the Chilterns AONB and a 'M' (0.5) to BOAs. The resulting map can be seen in Appendix 6 (scenario E). As can be seen, this pulls much of the zones 2 & 3 to within the Chilterns AONB. Further work is required to discuss and come to a resolution about the relative importance these landscapes should be given in the map.

Table 4: The area and proportion coverage of zones 1 – 3 in Local Habitat Map 1.

Zone	Area (km²)	Proportion of Bucks covered
Protected sites and nature reserves	159.48	10.19%
Maintain and Enhance	212.64	13.59%
Restore or Recover	267.23	17.08%
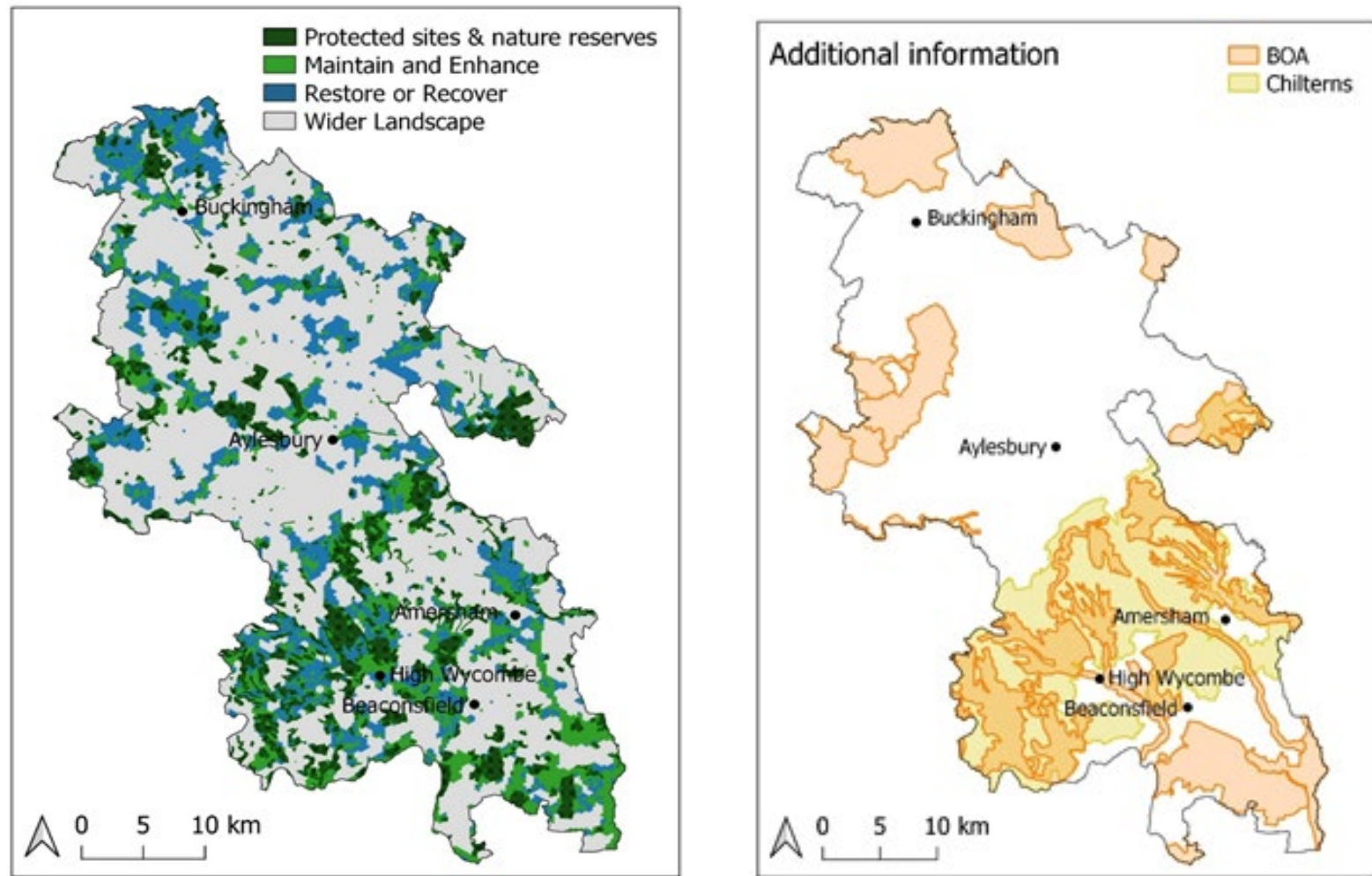
Figure 4: Local Habitat Map 1 (left) and map of Biodiversity Opportunity Areas AONB for comparison (Right). Note: the map is for illustrative purposes only. Created by Biodiversify for Buckinghamshire Council (2021). Contains Natural England data © Natural England copyright 2021. Contains Ordnance Survey data © Crown copyright and database right 2020. Contains Natural England and Forestry Commission information licensed under the Open Government Licence v3.0. Contains BMERC data © Buckinghamshire & Milton Keynes Environmental Records Centre (BMERC) 2021. Contains Freshwater Habitats Trust data © 2020. Contains data supplied by J. Rouquette, (2020) to Buckinghamshire Council.

Local Habitat Map 2

Local Habitat Map 2 was developed to cover a much greater area of Buckinghamshire, which included a network covering 1084 km^2, where 69.3% of land in Buckinghamshire is covered. Note this map corresponds to Scenario C in Appendix 6. A breakdown of the area and proportional coverage of Buckinghamshire is shown in Table 4, and the map can be seen in Figure 4.

As with Local Habitat Map 1, all of the protected sites and nature reserves listed above were 'locked in' and displayed on the map (i.e., representing 100% coverage of these sites). For zones 2 and 3, the targets set for the conservation features are displayed in Table 2. The conservation features were assigned a 'H', 'M' or 'L', which Biodiversify assigned a quantitative target for inclusion in the map.

For example, the majority of priority habitats were assigned a 'H' and Biodiversify assigned a corresponding quantitative target of 1.0. This means that 100% of the mapped area for each priority habitat (using Natural England PHI and BMERC priority habitat data) had to be included in the local habitat map. Some priority habitats (e.g., 'No main habitat but additional habitats present') were assigned a 'M' and a corresponding quantitative target of 0.7. This means that only 70% of the mapped area of this priority habitat had to be included in the map.

In the 'Restore or Recover' zone included opportunities to enhance wider environmental benefits (e.g., opportunities to reduce soil erosion and improve water quality, and carbon sequestration capacity) which were assigned a 'M' priority and a corresponding quantitative target of 0.7. This means that 70% of the mapped area of these ecosystem services in Rouquette (2020) was included in the 'Restore or Recover' zones of local habitat map 2.

When compared to other important landscapes for conservation, such as the Chilterns AONB and the BOAs, there was good correspondence of the local habitat map and these areas. This is because the priority for BOAs was 'H' with a corresponding quantitative target of 1.0, and the priority for the Chilterns AONB was 'M' with a corresponding quantitative target of 0.7.

A key thing to note is that Local Habitat Map 2 shows much greater connectivity between areas and greater coverage of zones 1 - 3 as this is what we had asked for by setting such high targets (of 1, or 100% coverage) for the 'H' priority conservation features.

Table 5: The area and proportion coverage of zones 1 – 3 in Local Habitat Map 2.

| Zone	Area (km^2)	Proportion of Bucks covered
Protected sites and nature reserves	159.48	10.19%
Maintain and Enhance	537.25	34.33%
Restore or Recover	387.70	24.77%
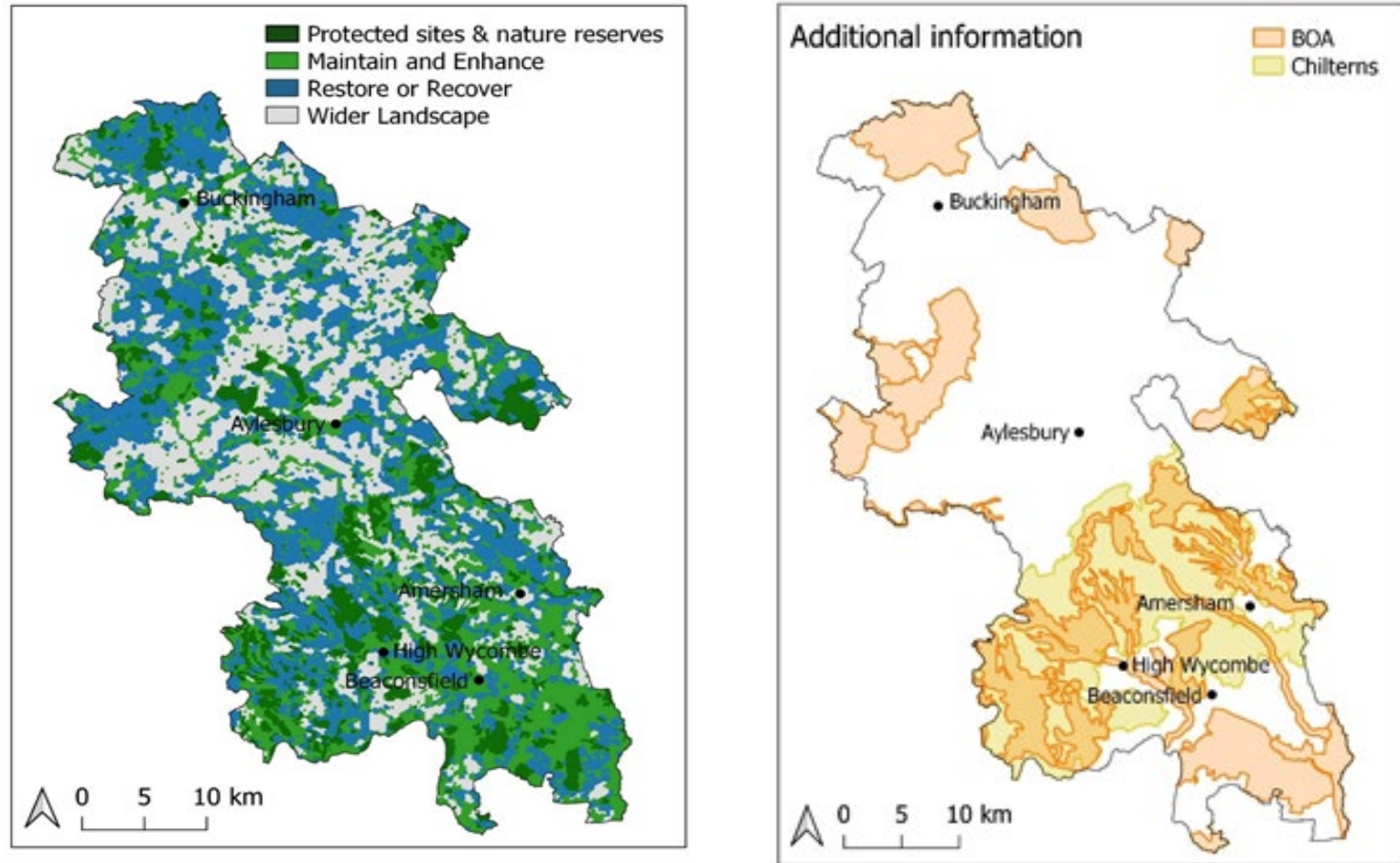
Figure 5: Local Habitat Map 2 (Left) and map of Biodiversity Opportunity Areas AONB for comparison (Right). Note: the map is for illustrative purposes only. Created by Biodiversify for Buckinghamshire Council (2021). Contains Natural England data © Natural England copyright 2021. Contains Ordnance Survey data © Crown copyright and database right 2020. Contains Natural England and Forestry Commission information licensed under the Open Government Licence v3.0. Contains BMERC data © Buckinghamshire & Milton Keynes Environmental Records Centre (BMERC) 2021. Contains Freshwater Habitats Trust data © 2020. Contains data supplied by J. Rouquette, (2020) to Buckinghamshire Council.

Table 6: Conservation feature and target table. Showing all conservation features represented in zone 2 (Maintain & Enhance) and zone 3 (Restore or Recover), the total area that these cover in Buckinghamshire (Area (ha)), the zone that were assigned to by the working group, the priority they were assigned by the working group (Target group), the corresponding quantitative target that was set for map 1 or map 2 (e.g., Map 1 proportion), and the target area for the conservation feature that was included in the maps (e.g., Map 1 target). The data source and also reference to the baseline and opportunity map numbers (corresponding to the numbers presented in Appendix 7).

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
Ancient & Semi-Natural Woodland	5,723.00	Maintain & Enhance	H	0.7	4,006.10	1	5,723.00	Ancient Woodland Inventory	4
Ancient Replanted Woodland	3,638.27	Maintain & Enhance	H	0.7	2,546.79	1	3,638.27	Ancient Woodland Inventory	4
PH- Traditional orchard	362.72	Maintain & Enhance	H	0.7	253.91	1	362.72	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Acid grassland LWPP	12.89	Maintain & Enhance	H	0.7	9.03	1	12.89	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Broadleaved, mixed, and yew woodland LWPP	7.57	Maintain & Enhance	H	0.7	5.30	1	7.57	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Calcareous grassland LWPP	0.15	Maintain & Enhance	H	0.7	0.10	1	0.15	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Chalk headwaters	7.77	Maintain & Enhance	H	0.7	5.44	1	7.77	NE Priority Habitats Inventory & BMERC local priority habitats data	4

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
PH- Chalk rivers (not including chalk headwaters)	66.23	Maintain & Enhance	H	0.7	46.36	1	66.23	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Coastal and floodplain grazing marsh	52.21	Maintain & Enhance	H	0.7	36.55	1	52.21	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Coniferous woodland LWPP	0.41	Maintain & Enhance	H	0.7	0.29	1	0.41	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Deciduous woodland	10,908.12	Maintain & Enhance	H	0.7	7,635.69	1	10,908.12	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Eutrophic standing waters: priority	19.86	Maintain & Enhance	H	0.7	13.90	1	19.86	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Good quality semi-improved grassland	852.65	Maintain & Enhance	H	0.7	596.86	1	852.65	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Grassland, possibly unimproved LWPP	23.74	Maintain & Enhance	H	0.7	16.62	1	23.74	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Grassland, probably improved LWPP	187.36	Maintain & Enhance	M	0.5	93.68	0.7	131.15	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Improved grassland LWPP	171.17	Maintain & Enhance	M	0.5	85.59	0.7	119.82	NE Priority Habitats Inventory & BMERC local priority habitats data	4

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
PH- Lowland beech and yew woodland LWPP	1,196.19	Maintain & Enhance	H	0.7	837.33	1	1,196.19	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Lowland calcareous grassland	568.61	Maintain & Enhance	H	0.7	398.03	1	568.61	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Lowland dry acid grassland	34.17	Maintain & Enhance	H	0.7	23.92	1	34.17	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Lowland fens	64.16	Maintain & Enhance	H	0.7	44.91	1	64.16	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Lowland heathland	137.77	Maintain & Enhance	H	0.7	96.44	1	137.77	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Lowland meadows	507.03	Maintain & Enhance	H	0.7	354.92	1	507.03	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Lowland mixed deciduous woodland LWPP	1,350.90	Maintain & Enhance	H	0.7	945.63	1	1,350.90	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Mixed woodland LWPP	41.47	Maintain & Enhance	H	0.7	29.03	1	41.47	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Neutral grassland LWPP	173.65	Maintain & Enhance	H	0.7	121.55	1	173.65	NE Priority Habitats Inventory & BMERC local priority habitats data	4

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
PH- No main habitat but additional habitats present	1,202.98	Maintain & Enhance	M	0.5	601.49	0.7	842.09	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Other neutral grassland LWPP	18.53	Maintain & Enhance	H	0.7	12.97	1	18.53	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Purple Moor Grass & Rush pastures	14.08	Maintain & Enhance	H	0.7	9.85	1	14.08	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Reedbeds	12.77	Maintain & Enhance	H	0.7	8.94	1	12.77	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Scrub woodland LWPP	0.52	Maintain & Enhance	H	0.7	0.36	1	0.52	NE Priority Habitats Inventory & BMERC local priority habitats data	4
PH- Wet woodland	201.08	Maintain & Enhance	H	0.7	140.76	1	201.08	NE Priority Habitats Inventory & BMERC local priority habitats data	4
Habitat- Scrub	348.06	Maintain & Enhance	M	0.5	174.03	0.7	243.64	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Habitat- Water, fresh	1,221.70	Maintain & Enhance	H	0.7	855.19	1	1,221.70	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Lowland fens (LFN)	250.80	Restore or Recover	20% BAP baseline	5*	5.00	1.4*	7.00	Natural England National Habitat Network Maps	10

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
Purple moorgrass and rush pasture (PMG)	211.38	Restore or Recover	20% BAP baseline	5*	5.00	1.4*	7.00	Natural England National Habitat Network Maps	10
Reedbeds (RDB)	38.50	Restore or Recover	20% BAP baseline	15*	15.00	1.4*	21.00	Natural England National Habitat Network Maps	10
Lakes (LAK)	12.75	Restore or Recover	H	0.7	0.80	1	12.75	Natural England National Habitat Network Maps	10
Lowland heathland (LHL)	413.64	Restore or Recover	20% BAP baseline	20*	20.00	1.4*	28.00	Natural England National Habitat Network Maps	10
Lowland acid grassland (LAG)	136.68	Restore or Recover	20% BAP baseline	50*	50.00	1.4*	70.00	Natural England National Habitat Network Maps	10
Lowland calcareous grassland (LCG)	3,437.57	Restore or Recover	20% BAP baseline	100*	100.00	1.4*	140.00	Natural England National Habitat Network Maps	10
Lowland meadows (LMW)	3,971.79	Restore or Recover	20% BAP baseline	125*	125.00	1.4*	175.00	Natural England National Habitat Network Maps	10
Ancient Woodlands (ANSW)	3,485.58	Restore or Recover	20% BAP baseline	400*	400.00	1.4*	560.00	Natural England National Habitat Network Maps	10
Wood-pasture & parkland (WPP)	11,661.02	Restore or Recover	20% BAP baseline	100*	100.00	1.4*	140.00	Natural England National Habitat Network Maps	10

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
Traditional orchards (TRO)	9,909.84	Restore or Recover	20% BAP baseline	50*	50.00	1.4*	70.00	Natural England National Habitat Network Maps	10
Higher priority woodland creation area	13,477.04	Restore or Recover	M	0.5	6,738.52	0.7	9,433.93	Forestry Commission Woodland Habitat Networks	3
Unmanaged woodland	8,400.56	Restore or Recover	L	0.2	1,680.11	0.4	3,360.22	Forestry Commission Actively Managed Woodland	3
Actively managed woodland- Grants	8,121.67	Restore or Recover	M	0.5	4,060.84	0.7	5,685.17	Forestry Commission Actively Managed Woodland	3
Biodiversity opportunity areas	45,791.65	Restore or Recover	H	0.7	32,054.15	1	45,791.65	BMERC Biodiversity Opportunity Areas	18
Important freshwater area	4,209.49	Restore or Recover	H	0.7	2,946.64	1	4,209.49	Freshwater Habitats Trust Important Freshwater Areas	5
Road Verge Nature reserve	27.16	Restore or Recover	L	0.2	5.43	0.4	10.87	BMERC Road Verge Nature Reserves	6
Chilterns AONB	42,208.46	Restore or Recover	M	0.5	21,104.23	0.7	29,545.92	BMERC boundary areas relevant to conservation	6
Opportunities to reduce surface runoff	30,232.30	Restore or Recover	M	0.5	15,116.15	0.7	21,162.61	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1

Conservation feature	Area (ha)	Zone	Target group	Map 1 proportion (except * which is in ha)	Map 1 target (ha)	Map 2 proportion (except * which is in ha)	Map 2 target (ha)	Data source	Map
Opportunities to reduce soil erosion and improve water quality	26,910.27	Restore or Recover	M	0.5	13,455.14	0.7	18,837.19	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Opportunities to ameliorate air pollution	25,000.55	Restore or Recover	M	0.5	12,500.27	0.7	17,500.38	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Opportunities to regulate local climate (reduce urban heat)	3,719.83	Restore or Recover	M	0.5	1,859.92	0.7	2,603.88	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Opportunities to increase access to natural greenspace	30,263.25	Restore or Recover	M	0.5	15,131.63	0.7	21,184.28	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Carbon Sequestration Capacity	16,150.30	Restore or Recover	M	0.5	8,075.15	0.7	11,305.21	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1
Carbon Storage Capacity	14,058.60	Restore or Recover	M	0.5	7,029.30	0.7	9841.02	Broad habitat types in Buckinghamshire (Rouquette, 2020)	1

Linking the local habitat maps to action on the ground

An important aspect of SCP is that it asks stakeholders to think about Outcomes for nature and the wider environment first, and then actions that can be undertaken to achieve these Outcomes. The conservation features mapped reflect Outcomes, and the zones reflect different types of actions, e.g.:

Zone 1 - Protected sites and nature reserves

- Maintain designated sites as designated in status and in good ecological condition
- Maintain land management of nature reserves to have the primary goal of nature conservation and in good ecological condition

Zone 2 - Maintain and Enhance

- Priority habitats and Ancient & Semi-Natural Woodland, Ancient Replanted Woodland:
  - Maintain those already in good condition
  - Enhance those in poor condition
- Other important habitats: scrub, rivers and ponds
  - Maintain those that can be considered in good ecological condition (e.g., supporting biodiversity)
  - Enhance those habitats that are considered in poor condition

Zone 3 - Restore or Recover

- Priority habitats – create new priority habitats
- Woodland – restore poor ecological quality woodland (e.g., lacking species and structural diversity) or plant new woodland
- Landscapes for conservation (e.g., Chilterns AONB and Biodiversity Opportunity Areas) – restore and recover habitats to create a more connected landscape that supports greater species and habitat diversity
- Ecosystem Services - restore and recover habitats to support the delivery of nature-based solutions and generation of wider environmental benefits (e.g., carbon storage, climate regulation, reduced soil runoff, improved water quality).
- Ecosystem Services – create accessible natural greenspace, or improve access to greenspace

Zone 4 – Wider Landscape

- Activities which are not spatially explicit can be undertaken anywhere, e.g., planting or restoring hedgerows, creating wildflower meadows, implementing green infrastructure in urban areas, etc
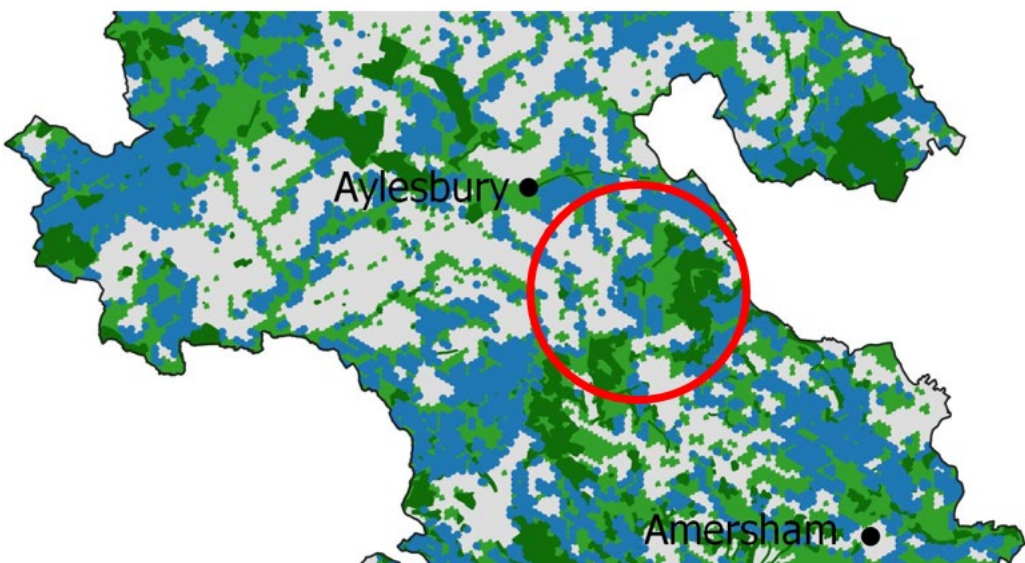
We have undertaken a very preliminary assessment of the stakeholder activities which have been prioritised against the shortlist of biodiversity priorities (presented in the previous section). Here, we have taken the condensed list of activities and aligned these with the conservation features in each zone and present these in Tables 3 – 6.

Similar to the Outcomes in the Statement of Biodiversity Priorities, some of these actions are very high level (e.g., 'Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making'), and others are very specific (e.g., 'Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats').

The PAT has not undertaken a comprehensive assessment of this set of activities, so these may change considerably following more time to review and collate a complete set of activities that represent stakeholder views, previous work in Bucks (e.g., the Biodiversity Action Plan), and PAT expert judgment about a robust set of management options for different conservation features and zones.

One aspiration we have of the final Local Habitat Map, would be that it enables users to zoom into specific locations and generate a list of Outcomes present in that area and a corresponding list of options for actions on the ground (e.g., Table 7).

Table 7: Example of an interactive Local Habitat Map that lists Outcomes (*) and options for activities (-) for an area selected on the map (red circle). Note this is for illustrative purposes only and is not a complete set of stakeholder Outcomes and activities represented.

Outcomes for nature:

*Deciduous woodland

- Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
- Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market
- Manage woodland for owls, Bechstein's Bat, and black hairstreak butterflies

- Replace introduced species with native species - e.g. restore coppice management and conifer Plantations on Ancient Woodland Sites (PAWS) back to native broad-leaved woodlands where appropriate.
- Enhance river corridors by planting wet woodland, including native willow, poplar and alder
- Conserve veteran trees in fields hedgerows and woodlands; increase hedgerow planting, particularly where these will link patches of woodland
- Lowland calcareous grassland
- Better protection for priority habitats

*Creation of calcareous grassland

- Coordinate management of chalk (calcareous) grassland and encourage livestock grazing

Recovery zone:

*Reedbeds

- Better protection for priority habitats
- Creation of reedbeds
- Undertake habitat banking to create reedbeds

*Carbon sequestration

- Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce pollution and capture carbon
- Better support for land management to increase biodiversity, reduce soil erosion and enhance carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation)

*Access to green space

- Create more Accessible Natural Greenspace (including along rivers and new woodland, nature trails and country parks) with better access from settlements
- Create Suitable Alternative Natural Greenspace (SANG's) to reduce recreational pressure (e.g., on Chiltern Beechwoods)
- Mitigation for damage to habitats from recreational pressure by encouraging public access away from best/sensitive wildlife sites.
- Encourage good practice with development to plan, create and incorporate features of biodiversity and well-design green infrastructure to reduce flood risk and water conservation, provide access to nature (e.g. ensure ANGSt standards are met); including linking and enhancing existing semi-natural habitats and targeted environmental enhancements – e.g. ponds, hedgerows, hedgerow trees including conserving and planning for the replacement of ancient and veteran trees, and species-rich grasslands (such as areas found along road verges, green lanes and field margins) as well as conserving, strengthening, restoring and creating links between native woodlands, hedgerows, orchards and historic parkland to support biodiversity.
- Create buffers, and manage them, around high-quality habitats
- Bring traditional orchards back into active management

*Rivers and streams and catchment management

- Undertake physical habitat restoration on morphologically damaged rivers to improve ecological condition and restore connectivity with floodplains

- Remove or bypass barriers to fish movement to restore connectivity on watercourses
- Adopt diffuse and point source pollution reduction measures to improve water quality and achieve targets under the Water Environment Regulations
- Implement nature-based solutions to flood risk management including land-use change, soil health improvements, run-off attenuation features, cross-slope woodland planting and leaky dams
- Reinstate flood meadow pasture to allow for seasonal high-water levels and summer grazing; and to support its associated species assemblages

Table 8: Example activities listed by stakeholders assigned to the Protected Sites and Nature Reserves zone of Local Habitat Maps 1 & 2.

Sites	Example activities
Protected Sites and Nature Reserves	Restore and create and buffer designated sites
	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
	Create Suitable Alternative Natural Greenspace (SANG's) to reduce recreational pressure (including Chiltern Beechwoods and Burnham Beeches SAC
	Mitigation for damage to habitats from recreational pressure by encouraging public access away from best/sensitive wildlife sites
	Support LWS owners to manage and protect sites
	More promotion and marketing of existing designated areas and species to be found there
	Better protection (e.g. LWS designation) and awareness of chalk streams, including the removal of barriers and mitigation of harmful infrastructure (Heathrow)
	Designate more sites for nature conservation

Table 9: Example activities listed by stakeholders assigned to different conservation features in the Maintain & Enhance zone of Local Habitat Maps 1 & 2 (where a '-' is displayed there were no specific activities mentioned by stakeholders for the corresponding conservation feature, and this requires)

Conservation feature	Example activities
Ancient & Semi-Natural Woodland	Better protection for priority habitats
	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
	Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites
	Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market
	Coordinated squirrel control within woodlands through funding
	Manage woodland for owls
	Identify barriers to good habitat management
Ancient Replanted Woodland	As above
Priority habitats (applicable to all)	Better protection for priority habitats
	Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites
	Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making
PH- Traditional orchard	Create more traditional orchards, particularly those with heritage varieties (e.g. Aylesbury Prune)
PH- Acid grassland LWPP	Include acid pasture in the greensand ridge area in agri-environment schemes
PH- Broadleaved, mixed, and yew woodland LWPP	Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
	Promote woodland creation grant support and management planning
	Plant woodland within urban areas
	Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon
	Plant woodland within agricultural land

Conservation feature	Example activities
	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
	Collect data on woodland condition
	Better management of existing woodland (including retention of deadwood) that is planned for the long term and suitably funded.
	Create a market for woodland produce
PH- Calcareous grassland LWPP	Coordinate management of chalk (calcareous) grassland and encourage livestock grazing
PH- Chalk headwaters	Connections from escarpment headwaters into River Thame catchment
PH- Chalk rivers (not including chalk headwaters)	Better protection (e.g. LWS designation) and awareness of chalk streams, including the removal of barriers and mitigation of harmful infrastructure (Heathrow)
PH- Coastal and floodplain grazing marsh	Establish Natural Flood Management Schemes which create new wetland habitats
	Restore wetland areas of the River Thame and Ray
	Habitat restoration projects on watercourses (e.g. flood meadow pastures, wet woodland) and waterside buffers
PH- Coniferous woodland LWPP	-
PH- Deciduous woodland	Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
	Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market
	Coordinated squirrel control within woodlands through funding
	Manage woodland for owls
	Identify barriers to good habitat management
PH- Eutrophic standing waters: priority	-
PH- Good quality semi-improved grassland	-

Conservation feature	Example activities
PH- Grassland, possibly unimproved LWPP	-
PH- Grassland, probably improved LWPP	-
PH- Improved grassland LWPP	-
PH- Lowland beech and yew woodland LWPP	-
PH- Lowland calcareous grassland	Coordinate management of chalk (calcareous) grassland and encourage livestock grazing
PH- Lowland dry acid grassland	Include acid pasture in the greensand ridge area in agri-environment schemes
PH- Lowland fens	-
PH- Lowland heathland	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
PH- Lowland meadows	Habitat restoration projects on watercourses (e.g. flood meadow pastures, wet woodland) and waterside buffers
PH- Lowland mixed deciduous woodland LWPP	Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
PH- Mixed woodland LWPP	Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
PH- Neutral grassland LWPP	-
PH- No main habitat but additional habitats present	-
PH- Other neutral grassland LWPP	-
PH- Purple Moor Grass & Rush pastures	-
PH- Reedbeds	-

Conservation feature	Example activities
PH- Scrub woodland LWPP	-
PH- Wet woodland	Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
Habitat- Scrub	Create and allow more areas of scrub
	Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites
Habitat- Water, fresh	Create new clean water ponds, lakes and reservoirs for wildlife, climate resilience

Table 10: Example activities listed by stakeholders assigned to different conservation features in the Restore or Recover zone of Local Habitat Maps 1 & 2 (where a '-' is displayed there were no specific activities mentioned by stakeholders for the corresponding conservation feature)

Conservation feature	Description
Priority habitats (applicable to all)	Better protection for priority habitats
	Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites
	Follow the Lawton Principles (more, bigger, better, joined up) in LNRS decision making
Lowland fens (LFN)	-
Purple moorgrass and rush pasture (PMG)	-
Reedbeds (RDB)	-
Lakes (LAK)	Create new clean water ponds, lakes and reservoirs for wildlife, climate resilience
Lowland heathland (LHL)	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
Lowland acid grassland (LAG)	Include acid pasture in the greensand ridge area in agri-environment schemes
Lowland calcareous grassland (LCG)	Coordinate management of chalk (calcareous) grassland and encourage livestock grazing
Lowland meadows (LMW)	Habitat restoration projects on watercourses (e.g. flood meadow pastures, wet woodland) and waterside buffers

Conservation feature	Description
Ancient Woodlands (ANSW)	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
	Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market
	Coordinated squirrel control within woodlands through funding
	Manage woodland for owls
	Identify barriers to good habitat management
Wood-pasture & parkland (WPP)	Expand and buffer wood pasture and parklands
Traditional orchards (TRO)	Create more traditional orchards, particularly those with heritage varieties (e.g. Aylesbury Prune)
Higher priority woodland creation area	Better protection for priority habitats
	Large scale broadleaf woodland creation projects, but must be careful not at the expense of other habitats
	Promote woodland creation grant support and management planning
	Plant woodland within urban areas
	Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon
	Plant woodland within agricultural land
	Create more beech woodland and heathland to buffer and connect Burnham Beeches SAC to other nearby habitats.
	Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites
Unmanaged woodland	Collect data on woodland condition
	Better management of existing woodland (including retention of deadwood) that is planned for the long term and suitably funded.
	Create a market for woodland produce

Conservation feature	Description
	Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market
	Coordinated squirrel control within woodlands through funding
	Manage woodland for owls
	Identify barriers to good habitat management
	Support LWS owners to manage and protect sites
Actively managed woodland-Grants	Collect data on woodland condition
	Better management of existing woodland (including retention of deadwood) that is planned for the long term and suitably funded.
	Create a market for woodland produce
	Landscape scale deer management to aid woodland establishment and management, supported through funding to landowners and venison market
	Coordinated squirrel control within woodlands through funding
	Manage woodland for owls
	Identify barriers to good habitat management
	Support LWS owners to manage and protect sites
Biodiversity opportunity areas	Use Biodiversity Opportunity Areas as focus for nature conservation
Important freshwater area	Create new clean water ponds, lakes and reservoirs for wildlife, climate resilience
	Habitat restoration projects on watercourses (e.g. flood meadow pastures, wet woodland) and waterside buffers
	Reconnect rivers with their floodplain
	Reintroduce beavers
	Address unsympathetic use of land in floodplain
	Payments for land set aside to flood
	Restore wetland areas of the River Thame and Ray

Conservation feature	Description
	Establish Natural Flood Management Schemes which create new wetland habitats
	Develop a habitat bank to support biodiversity net gain policy and direct funds to the right sites
Road Verge Nature reserve	Use road verges to connect grasslands
	Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon
Chilterns AONB	Reduce development (especially in the AONB and protected areas)
	Mitigation for damage to habitats from recreational pressure by encouraging public access away from best/sensitive wildlife sites
	More understanding of the Countryside Code
Opportunities to reduce surface runoff	Establish Natural Flood Management Schemes which create new wetland habitats
	Better, more biodiverse SuDS
Opportunities to reduce soil erosion and improve water quality	Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation)
Opportunities to ameliorate air pollution	Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon
	More tree retention and planting (promote the urban tree challenge fund) using species which will adapt to climate change and continue to improve air quality
Opportunities to regulate local climate (reduce urban heat)	Create new clean water ponds, lakes and reservoirs for wildlife, climate resilience
	More tree retention and planting (promote the urban tree challenge fund) using species which will adapt to climate change and continue to improve air quality
	Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon
Opportunities to increase access to natural greenspace	More Accessible Natural Greenspace (including along rivers and new woodland, nature trails and country parks) with better access from settlements

Conservation feature	Description
	Require (via policy) well designed GI in new developments which functions for biodiversity and people, such as Suds, urban trees and green roofs, open space, landscape buffers, nature corridors.
	Protect and enhance green infrastructure between developed areas
	Create greener transport links (greenways)
	Create Suitable Alternative Natural Greenspace (SANG's) to reduce recreational pressure (including Chiltern Beechwoods and Burnham Beeches SAC
	Mitigation for damage to habitats from recreational pressure by encouraging public access away from best/sensitive wildlife sites
Carbon sequestration & storage	Plant vegetation and woodland buffers adjacent to roads and urban areas to screen, reduce and pollution and capture carbon
	Better support for land management to increased biodiversity, reduced soil erosion and enhanced carbon sequestration (using direct drilling, min-till, cover crops and good crop rotation)

Table 11: Example activities assigned to the Wider Landscape zone of Local Habitat Maps 1 & 2

Activities (Measures)
Receive resource to deliver strategy
Create a monitoring plan for the LNRS
Ensure the LNRS creates connections into other administrative areas
More information on natural capital value
Successfully embed biodiversity net gain into the planning system
Integrate the LNRS into spatial planning policies
Incorporate requirements for biodiversity into all sectors (planning, farming, health etc.)
Embed the Lawton Principles (more, bigger, better, joined up) within planning policy
Production of a green infrastructure map to inform decision making
Biodiversity as key part of green infrastructure
Build new developments on brownfield sites (but protect gardens)
Prevent development from impacting on watercourses
Education for decision makers such as local authorities on the value of nature and how to restore nature, particularly within planning decisions
Maximise nature spaces in OxCam Arc
Restore the damage caused by HS2
Designate land as Wildbelt (especially around towns)
Designate more sites for nature conservation
Improve landscape quality
Understand, protect and restore historic and designed landscapes

Activities (Measures)
Better understanding of how nature corridors function
Create new hedgerows (with trees) to act as habitat connectivity corridors
Better management of hedgerows and plant trees in existing hedges
Ensure that wildlife can move as required to respond to climate change
Increase of Rewilding creating a connected landscape for wildlife
More and better integrated data on species and habitats
Undertake research on designed landscapes, parks and gardens
Record, protect and plan for future, veteran and ancient trees
Reduce impact of domestic pets (cats and dogs) on wildlife, by excluding access to some areas, encouraging access to others and educate owners on the need to control dogs.
Restore and create and buffer designated sites
Support the Colne Valley Regional Park and increase its status and review/update GI Strategy
Integrate Aylesbury Vale Garden Town into the landscape and improve the delivery of biodiversity Outcomes
Buckinghamshire Council to lead by example through best practice land management on agricultural estate
Manage parks in a more wildlife friendly way, for example reduced mowing and less herbicides.
Better investment and management and monitoring for nature of parks, road verges and other green spaces
Reduce the use of chemicals and pesticides and ban neonicotinoids
Reduce fly tipping & litter through education, community involvement, enforcement and fines
Stop water pollution through improve wastewater management and drainage infrastructure taking enforcement action (especially on sewerage)
Limit light pollution
Maintain and promote canal towpaths and footpaths for cycling, walking and nature
Provide more walks and activities linked to nature (e.g. fungi forays, 30 days wild, urban peregrines)
More understanding of, and engagement with nature (including green prescribing) for health and wellbeing benefits.
Engage local communities with nature, create opportunities for volunteers funding small projects (e.g. bats in churches project)
Encourage the public to manage their own, communities and church's land for wildlife
Education for the general public on how they can help wildlife, reduce their impacts, buy sustainably sourced produce and change behaviours, garden for wildlife, reduce water use.
Educational programmes in schools about nature and fund training for young people.
Better collaboration between NGOs, local authorities, landowners, Defra and ecologists
Use signage and visitor centres to help engage people.
Forward planning to reduce the impacts of Ash dieback including the planting of replacement species.
Eradicate Oak Processionary Moth
Removal of exotic conifers and replacement with native habitats
Removal of invasive wetland species such as floating pennywort
Removal of Rhododendron from woodland via engagement and funding.
Mink control
Introduction of Keystone Species

Activities (Measures)
A better understanding of the Bechstein's bat population in this region via survey work and plans on how to expand their population
Reintroduce beavers
Create a water vole recovery strategy including reintroductions
Management for Otters, including watercourses and Hyde Land Lakes
Planting for pollinators
Plant more disease resistant Elm
Plant more Black Poplar
Provide habitat for swifts
Manage land for wetland birds
Reintroduce lost wetland plants
Funding that prioritises biodiversity over other Outcomes
Ensure the long-term management of newly created habitats
Minerals plan to provide opportunities for wetland creation
Recognise link between soil type and habitat and its management
Achieve best practice in farmland management for wildlife
Engage and support landowners to manage their land for nature. Including access to advice and funding and via facilitation groups and farm clusters.
Encourage uptake of environmental stewardship schemes
More leadership by, and collaboration between landowners/farmers/managers, to manage wildlife
More education of public by landowners/farmers/managers to promote the environment
Support for farming in urban fringe
Coordination between the LNRS, ELM and BNG
ELM to recognise whole farm systems
Improve management for wildlife on equine and shooting (game) sites
Collaboration with water company initiatives
Link with Thames catchment study with Environment Agency
Catchment sensitive farming and land management
Promote a catchment-based approach
Stage 0 restoration on some headwaters
Enhance the condition of the watercourses and reinstate meanders (e.g. River Great Ouse and Ouzel)
Enhance river corridors as nature corridors and remove barriers to fish passage
Reconnect rivers with their floodplain
Stop unsustainable abstraction for chalk aquifers and chalk streams to protect the habitat
Understand groundwater in Chilterns and gravels of Thames, re suitability for NFM and interaction with infrastructure
Better understanding of flooding (upstream causes) and better flood warning and resilience (especially relating to groundwater)
Install wildlife bridges/tunnels to improve passage for wildlife and reduce wildlife killed on transport corridors

Caveats and Next Steps

Whilst we have presented two illustrative local habitat maps in this report, the PAT believe there is a substantial amount of additional work that would be required to complete the SCP process in order to reach a finished product for the pilot. Currently these maps are not complete enough to have confidence in these being used as a prototype for creating the Local Habitat Map for the actual Buckinghamshire LNRS.

The following work would still need to be completed:

- **Baseline recalculation:** the Bucks baseline for nature calculation of 14.9% does not include ancient woodland or land owned by other conservation NGOs or landowners (apart from BBOWT, NT and Woodland Trust). This needs to be revisited with time to incorporate additional data.
- **Outcomes, measures and conservation features:** more work needs to be done to rationalise the shortlist of biodiversity priorities (Outcomes and measures) in order to be confident that what stakeholders provided represents a comprehensive set of recommendations for the LNRS, then these need to be aligned with conservation features which are mapped through SCP.
- **Data:** we need to revisit the collation, review and rationalisation of datasets. This needs to be based on the agreed conservation features (in the above step), and needs to include an assessment of what some of the datasets really mean (e.g., there were many woodland datasets from multiple sources, and more time is required to ensure the best datasets or if a combination of datasets could be used to reflect opportunity areas for certain habitats or species). We also were unable to assess whether any species data could be used in SCP and would like to investigate this further too.
- **Targets:** the working group need to come to an agreement on the quantitative targets that should be used for all conservation features. There were significant differences in opinion about priorities (H, M, L) set for the landscapes (e.g., Chilterns AONB and BOAs), and more time is needed to discuss this and come to a collective agreement which we believe reflects stakeholder priorities.
- **Overall coverage:** the two maps present options of relatively low coverage (40%) and higher coverage (70%) of Buckinghamshire. The PAT need more time to consider what sort of coverage would represent stakeholder priorities, and importantly what would be most appropriate for the end uses of the Local Habitat Map. If this is to be used by local planners then one would suggest fewer higher- priority areas for nature's recovery would be most useful, however if this map is to inform payments through the Local Nature Recovery Scheme then the PAT believe the map should contain a much greater coverage of Buckinghamshire.
- **Zones:** the four zones presented in the pilot are just examples of zones that reflect different types of actions. It could be that a bigger number of zones, or different type of zones could be created. As an example, the PAT discussed the option of having an agriculture-related zone to help address the potential links with the Future Schemes.

Outcomes and Activities: the need for further technical review, refinement and sense-checking with stakeholders

Whilst the shortlist of stakeholder Outcomes have been prioritised based on the methodology set out in the report, the PAT did not have time to rationalise the priority Outcomes using their own experience, knowledge and expertise, to ask questions such as whether the priorities make technical sense, need further refinement, or whether there are . obvious gaps in the Outcomes that need addressing. This is a key piece of work that needs to be revisited.

In addition, the associated measures (activities required to achieve the Outcomes) also need to be technically reviewed, rationalised and consolidated by the PAT and carefully considered as to how they should be grouped in relation to the Outcomes. The speed of the pilot has not enabled this phase of work to be done.

Following this period of technical review of the Outcomes and measures by the PAT, a further round of stakeholder engagement would be required to sense-check the prioritised Outcomes and associated measures.

Indeed, the phasing of the stakeholder engagement for the final LNRS ideally would be more iterative and aligned with the various steps, to ensure stakeholders directly influence the mapping work, rather than being run concurrently as happened during the pilot due to time and resource constraints.

Mapping: the SCP process could be scrutinised and completed in full;

The PAT is conscious that the full SCP process has not been completed within the pilot scope and timescales; and as such, are considering completing it in order to be able to demonstrate to themselves and Defra what the final mapped output might look like within a specific landscape using this methodology. This would then be able to demonstrate the linkages between specific landscapes of Buckinghamshire and specific measures to achieve the priority Outcomes.

It is recognised that more detailed scrutiny and consideration is required over the caveats and assumptions regarding data input, the granularity of measures, the ability to link stakeholder Outcomes to the mapped SCP outputs (not all were mapped or mappable), as well as running possible extra scenarios. This includes closer consideration of how to better integrate existing data, such as the recent natural capital opportunity mapping completed for Buckinghamshire, into the process. As such, the PAT would wish to revisit these decisions and questions ahead of the production of any final LNRS were the SCP to be used.

Ideally the final mapping product would be interactive and enable the user to drill down into the habitat maps to specific locations or landscapes within the proposed zones and identify which Outcomes and associated measures are relevant in that spatial area. The completion of the SCP would allow an example of this to be demonstrated. In addition, the PAT need to complete the process of directly linking the proposed priority Outcomes to the proposed mapping.

Timescales of the pilot mean that full reflection by the PAT has not as yet been undertaken in relation to the spatial zones proposed in the LNRS - particularly in terms of their function and how the mapping and zones would be used by respective stakeholders for multiple purposes i.e. land managers, conservationists, planning policy planners, developers, community groups, etc, in relation to the Outcomes and measures.

Linkage to other Spatial Plans

Existing spatial plans (planning and environmental) could be important informants to the LNRS process, as well as future recipients of its findings; equally, the process of reviewing those spatial plans and local strategies that could be relevant to the LNRS process deserves further attention than could be given within the pilot, so that previous lessons and work can be brought into the process, and future plans build on the findings and objectives within an LNRS.

Whilst an analysis of other spatial plans that would inform the LNRS was undertaken in the pilot process, there was limited time to meaningfully test how the LNRS would relate/be integrated with respect to all of these. As such, the specific focus was on the latest draft of the updated Buckinghamshire and Milton Keynes Natural Environment Partnership's Biodiversity Action Plan, looking at priorities for biodiversity to 2030 for the area, and the emerging Buckinghamshire local plan. It is likely that other specific spatial strategies' objectives and Outcomes relevant to the pilot LNRS were picked up as part of the stakeholder engagement process; however, the PAT is conscious that this aspect needs much closer and systematic review. For instance, further consideration is required in relation to linkage of the LNRS Outcomes measures to any future review of the Chilterns AONB management plan.

Two specific sessions were held with the local planning policy planners, to explore how the LNRS would relate to the new Buckinghamshire Local Plan i.e. likely evidence base, possible translation of proposed LNRS zones into planning policy (e.g. zones of opportunity v zones of constraint) and linkage to emerging biodiversity net gain policy. However, understanding the integration of the LNRS with other spatial plans would require more time to allow for a more thorough exploration of relevant spatial plans. A session is planned to look at the draft outputs of the LNRS and how this relates to the Ox/Cam Arc Local Nature Capital Plan.

Governance – lessons for the future

The PAT has brought together a varied blend of technical expertise from across the various partner organisations including the local protected landscape (AONB) and the Local Nature Partnership. The formation of specific working groups i.e. mapping, stakeholder, etc, worked well, and enabled specific details and actions to be undertaken by these groups with the PAT maintaining the overview of the process.

In terms of future membership of the PAT, it may be helpful to also include wider stakeholder representation I.e. land management and planning policy, in addition to the existing members, to ensure key-end users are embedded at the heart of the process.

It should also be noted that for the pilot process, there has not been any political sense-checking at the responsible authority in terms of the draft outputs, due to the speed of the pilots. Clearly a full political sign off process would need to be undertaken in relation to the final LNRS following a full consultation subject to requirements of guidance.

Really clear guidance on governance is required especially in relation to roles on each of these groups I.e. Pilot Area Team, technical working groups, Collaborative Development Group and representation on each.

Resourcing

Resource capacity and adequate time to do the work needed to produce a LNRS is critical The PAT team consider that are specific officers are required for:

- Overall coordination
- a data / GIS mapping specialist,
- stakeholder engagement and comms,
- processing stakeholder data

Delivery, financing and monitoring

The PAT also recognises that much further work and consideration is required in terms of how the LNRS priority Outcomes and measures would be delivered and by whom, how they might be financed and how the success of the LNRS in terms of nature's recovery would be monitored over time. It is not clear whether successful implementation of Biodiversity Net Gain and future Schemes would provide enough funding for delivery of an LNRS alone. All of these are crucial to the eventual success of any LNRS.

Review and reflection

A crucial next step is for the PAT to fully reflect on the process that has been tested and identify additional lessons learned, to provide Defra with further valuable, and more strategic, lessons, including:

- how the process might be run differently to deliver the final LNRS;
- how the LNRS might be used in local decision-making; and
- resourcing required for each step, including IT requirements i.e. GIS, data analysis and mapping capability.

Finally

The partner organisations involved in Buckinghamshire PAT are very grateful that Buckinghamshire was chosen to be one of the five national pilots and we hope that the lessons learnt are invaluable in helping contribute to the final guidance that will accompany the Environment Bill and the requirement to produce local nature recovery strategies.

The partnership work undertaken as part of this pilot will put Buckinghamshire in a good position to follow the formal guidance and regulations once issued by Defra, that will set out how the formal LNRS will be required to be produced.

In the meantime, we look forward to working closely with Defra to provide any further information and discussion that could be useful, based on the pilot work, in developing the finalised full regulations and guidance.

5. List of Appendices

Appendix Number	Title
1	Strategies and Policies of Relevance
2	Step 2, The State of Nature in Buckinghamshire
3	Stakeholder Engagement Report
4(a)	Stakeholder Data Processing Methodology
4(b)	Stakeholder Data Processing
5	Baseline Maps – explanation and data sources
6	Biodiversify Local Habitat Maps Method
7	Environmental Data considered and used in the pilot