Buckinghamshire Local Nature Recovery Strategy Pilot – A Summary of Buckinghamshire's Nature

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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%)[2] locally designated across Buckinghamshire as **Local Wildlife Sites (LWS)** and 200ha (0.13%) as a **Local Nature Reserves (LNR)**.

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

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

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

[1] Extracted from "Mapping Natural Capital, Ecosystem Services and Opportunities for Habitat Creation in Buckinghamshire", Natural Capital Solutions 2020

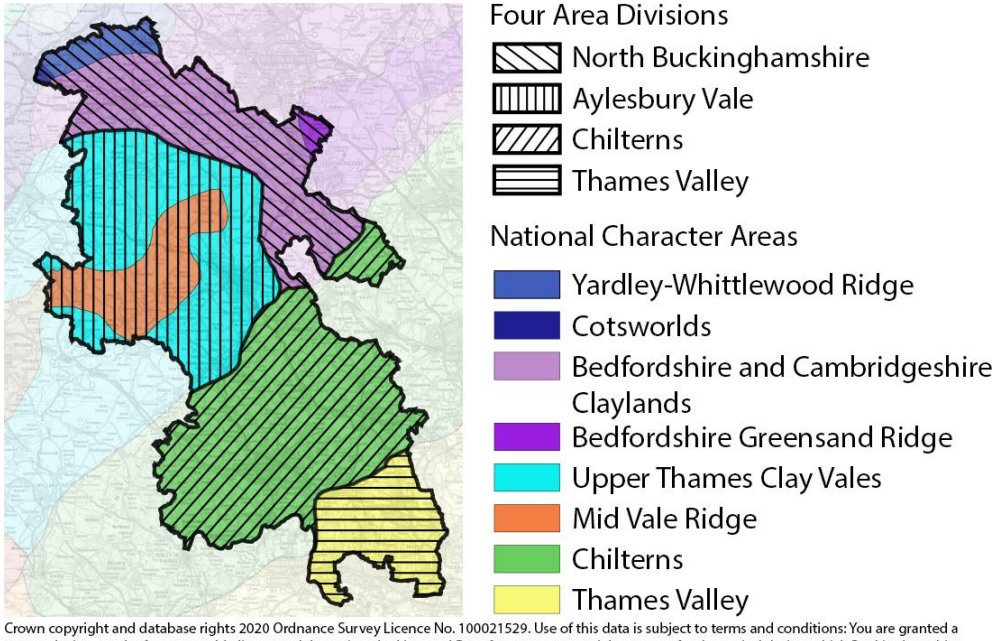
[2] Mapping natural capital, ecosystem services and opportunities for habitat creation in Buckinghamshire. Jim Rouquette, Natural Capital Solutions (2020)

(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.

The Government produces national targets for priority habitats and priority species which are protected to some degree in law[3]. 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 Buckinghamshire's 80 waterbodies are in good ecological status and none of the chalk rivers.

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). [4]

For the purpose of developing the Local Nature Recovery Strategy 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 and pressures within each area. In addition, a series of six supporting baseline environmental maps can be found at the end of the document, in Appendix 1.



Map 1. The four area divisions and the National Character Areas

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

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

North Buckinghamshire

Geology: To the very north of the county is part of the **Yardley Whittlewood Ridge**[5]; 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**[6] with an underlying clay geology. The **Bedfordshire Greensand Ridge**[7] 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 **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**.

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.

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

Pressures and threats: High levels of future growth and associated increases in leisure and recreation, increasing demand for resources, particularly water, historic land drainage and disconnection of watercourses

[5] Natural England (2013): http://publications.naturalengland.org.uk/publication/6441192149483520; NCA profile available at the same link.
[6] Natural England (2014): http://publications.naturalengland.org.uk/publication/5091147672190976; NCA profile available at the same link.
[7] Natural England (2013): http://publications.naturalengland.org.uk/publication/6667269664931840; NCA profile available at the same link.

from their floodplain, land use change, development and infrastructure improvements, such as East West Rail.

Aylesbury Vale

Geology: The **Upper Thames Clay Vales**[8] comprises predominantly Jurassic and Cretaceous clays and encircles the **Midvale Ridge**[9] 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**.

[8] Natural England (2014); http://publications.naturalengland.org.uk/publication/5865554770395136; NCA profile available at the same link.
[9] Natural England (2013); http://publications.naturalengland.org.uk/publication/5431100; NCA profile available at the same link

Pressures and threats: High development pressure particularly around urban areas and relating to the Oxford-Cambridge Arc concept, High Speed Rail 2 and East West Rail. Land use changes and habitat fragmentation resulting from urban growth. Historic land drainage with impacts on watercourse ecology and floodplain connectivity.

Weston Turville Reservoir Photo credit: BBOWT/Jim Asher

Chilterns

Geology: The **Chilterns**[10] 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.

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[11] (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

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

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.

Where the land is farmed, ancient hedgerows and veteran trees can be found**. Traditional Orchards**, particularly cherry are 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**.


Bee orchid. Photo credit: BBOWT

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 **aquatic invertebrates**.

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 **Cirl Bunting** and **Yellowhammer**.

Pressures and threats: Poor management of woodlands, Ash die-back, invasive non-native species, reduction in livestock farming threatens meadow grasslands, intensification of arable farming, over abstraction, diffuse pollution and channel modification of chalk streams, lack of buffers between urban areas and watercourses and infrastructure projects including High Speed Rail 2.

Thames Valley

Geology: The **Thames Valley**[12] is dominated by London Clay which is overlain by river-lain sands and gravels over much of the area.

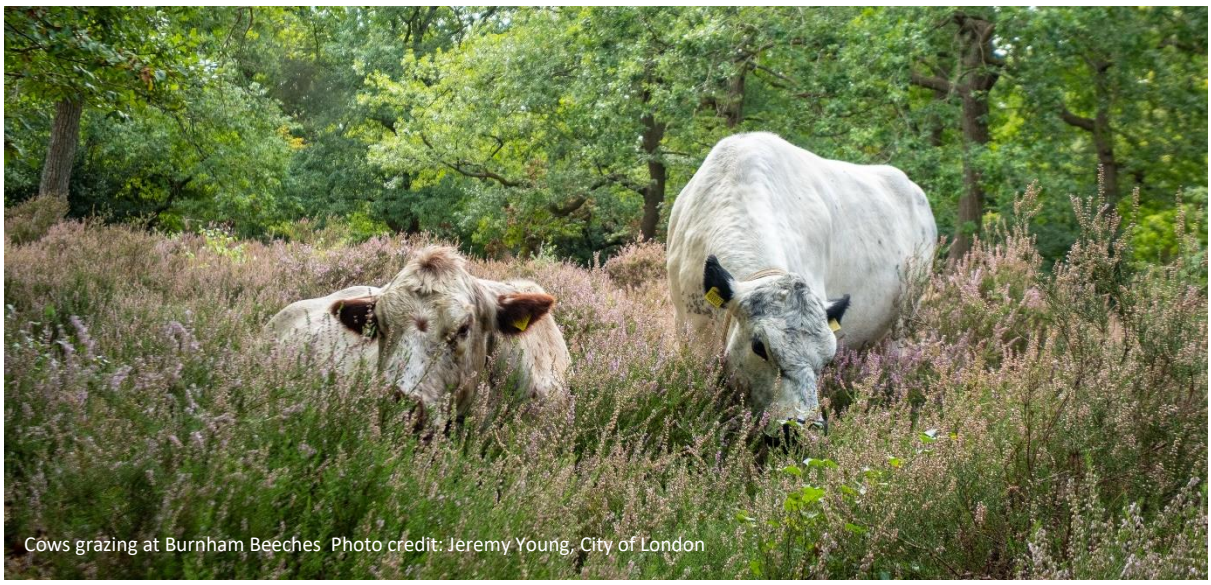
Landscape: Features of the landscape include the River Thames (along the southern Bucks border) and is tributaries, streams, lakes, canals and open waterbodies resulting from mineral extractions in the area. The Colne Valley Regional Park, in the south-east corner of Bucks, is a mosaic of farmland, woodland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

[12] 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.

Key Habitats: There are many notable habitats across the area, including a**cid 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**.

Pressures and threats: Climate change deteriorating wetland habitats, development pressure including for new roads, airports and urban areas, land use changes; particularly increases in horse grazing and golf courses, fly-tipping.



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

Buckinghamshire's Natural Capital

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[13].

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.

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

[13] Roquette (2020) Mapping natural capital, ecosystem services and opportunities for habitat creation in Buckinghamshire. Report for Buckinghamshire Council.

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[14].

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 the coming years 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

River Chess at Latimer Photo credit: Allen Beechey

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

around Penn Wood, Naphill Common, Dropmore and Farnham Common have woodland on gentle slopes and have excellent water flow regulation capacity.

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 pressures.

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 leads to an increase in pests, invasive species and diseases which are adapted to the new conditions and a reduction in native species that can't 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.

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.

Poorly planned development can increase flood risk elsewhere or reduce water quality. It can also increase pollution and reduce people's access to nature.

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.

Land Management

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.

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.

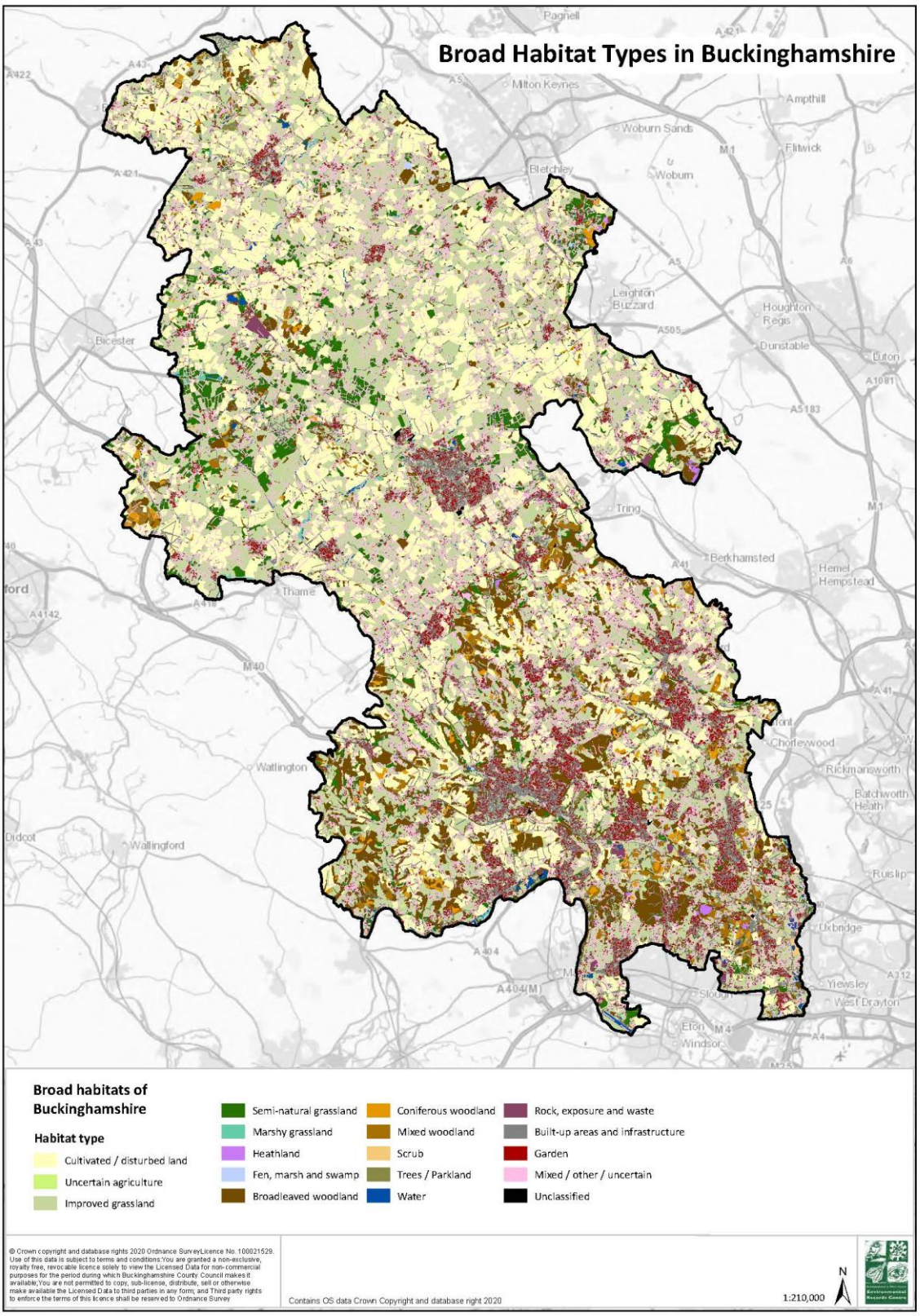
Waste, diffuse and point source pollution can have direct impacts on watercourses and connected habitats. These pressures include isolated incidents, agricultural runoff, soil erosion, poor water treatment and runoff from roads. Impacts include sedimentation of river gravels, eutrophication, reduction 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.

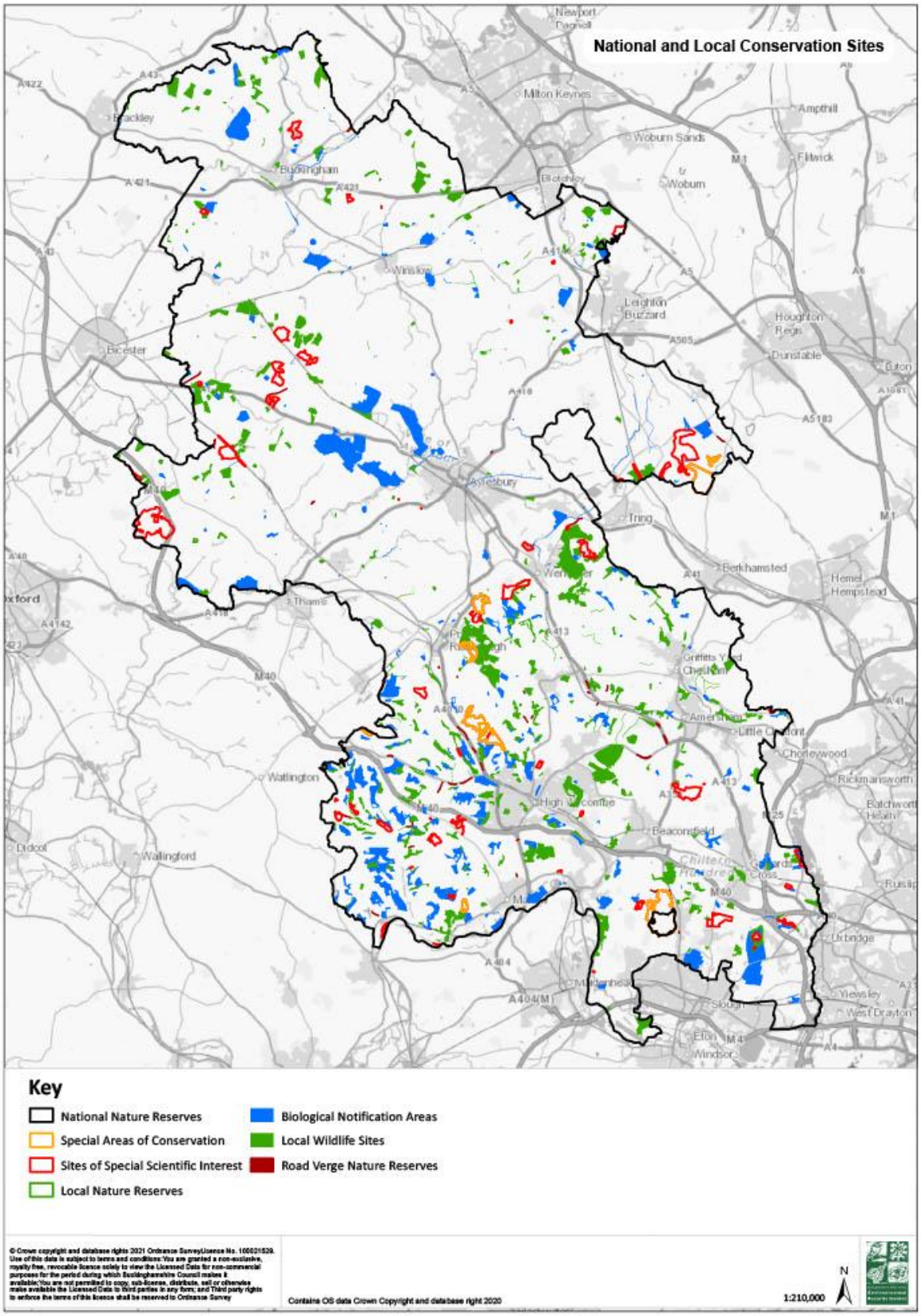
Non-Native Invasive Species

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.

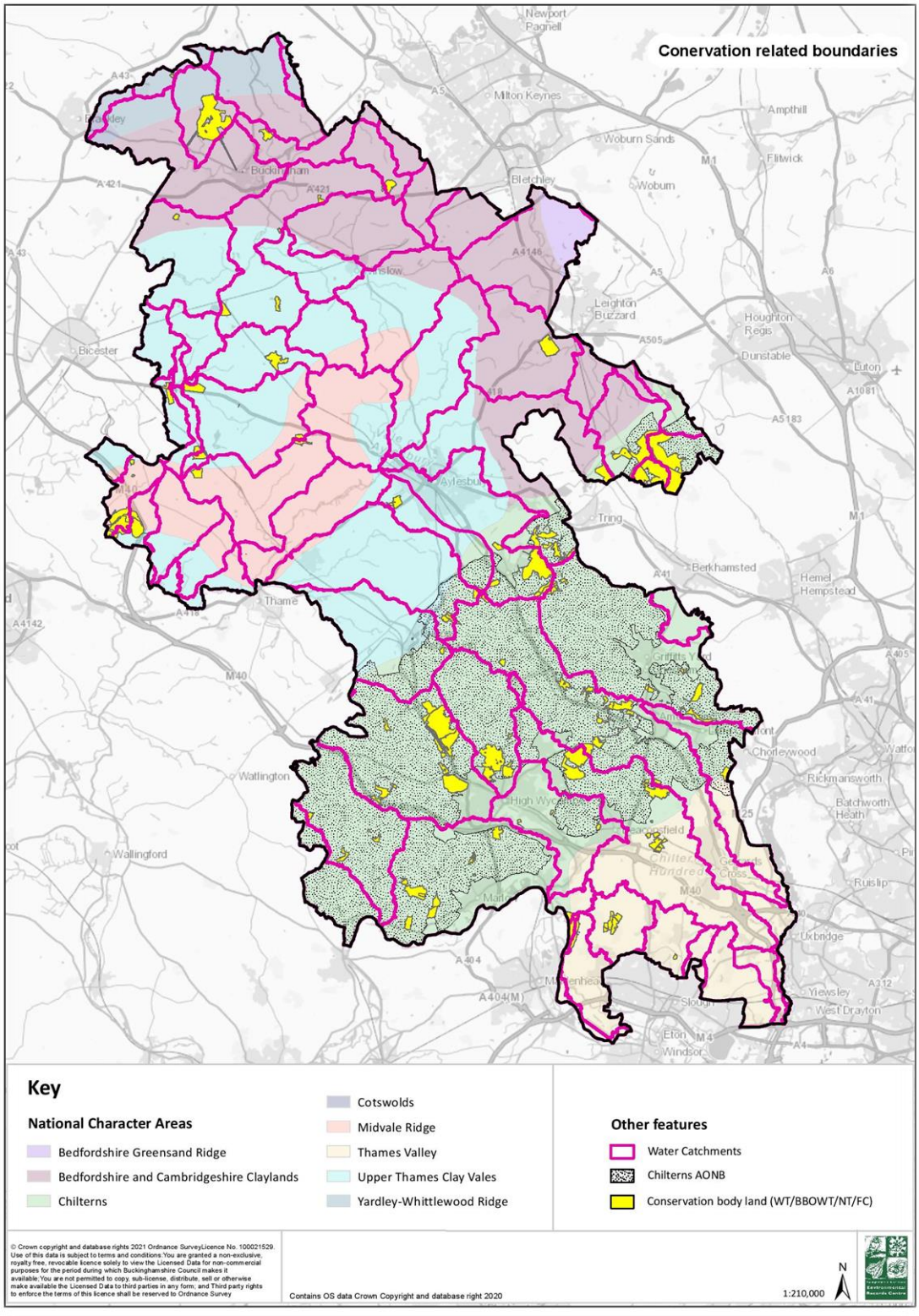
Appendix 1. Maps



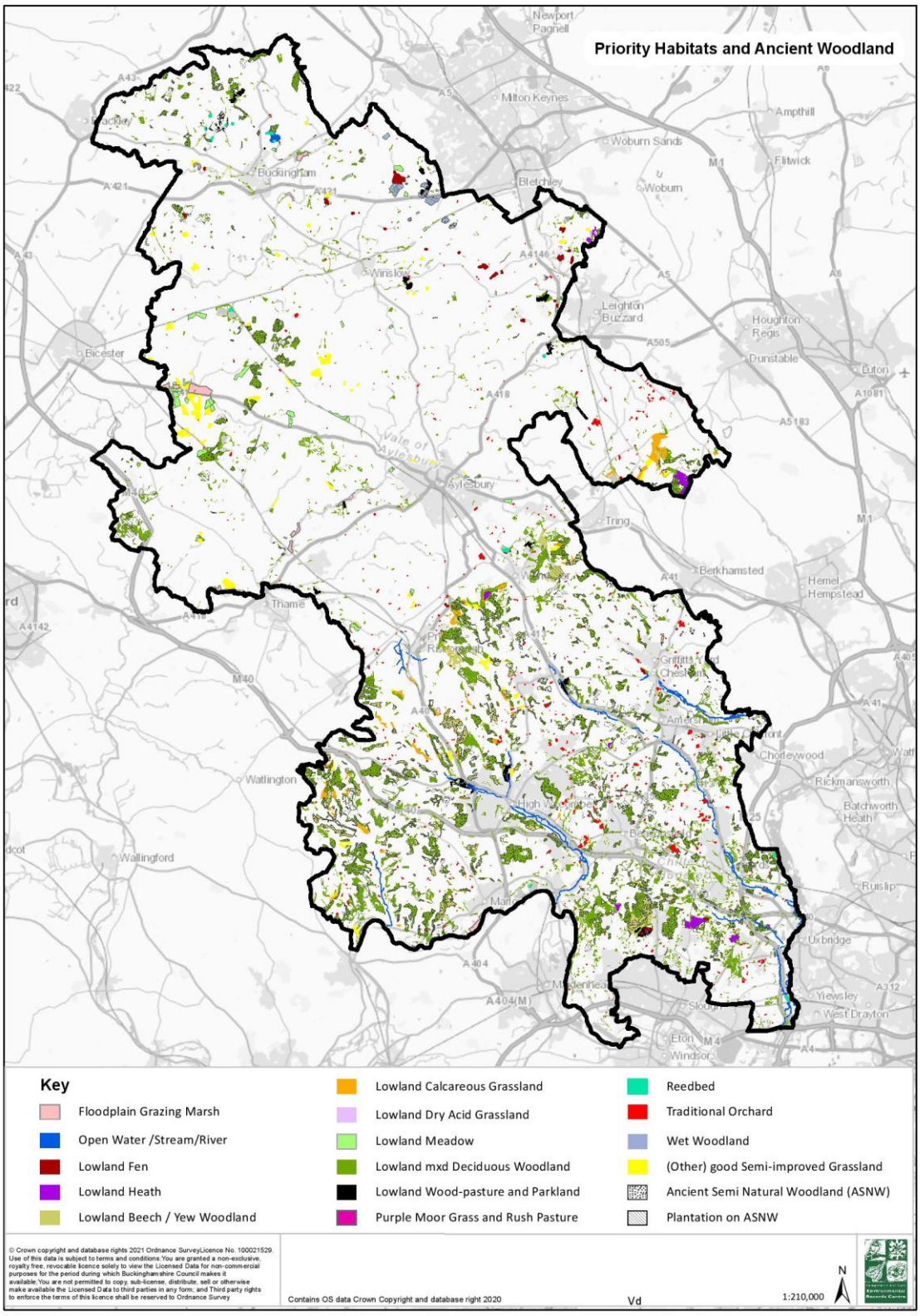
Map 1. Broad Habitat Types in Buckinghamshire



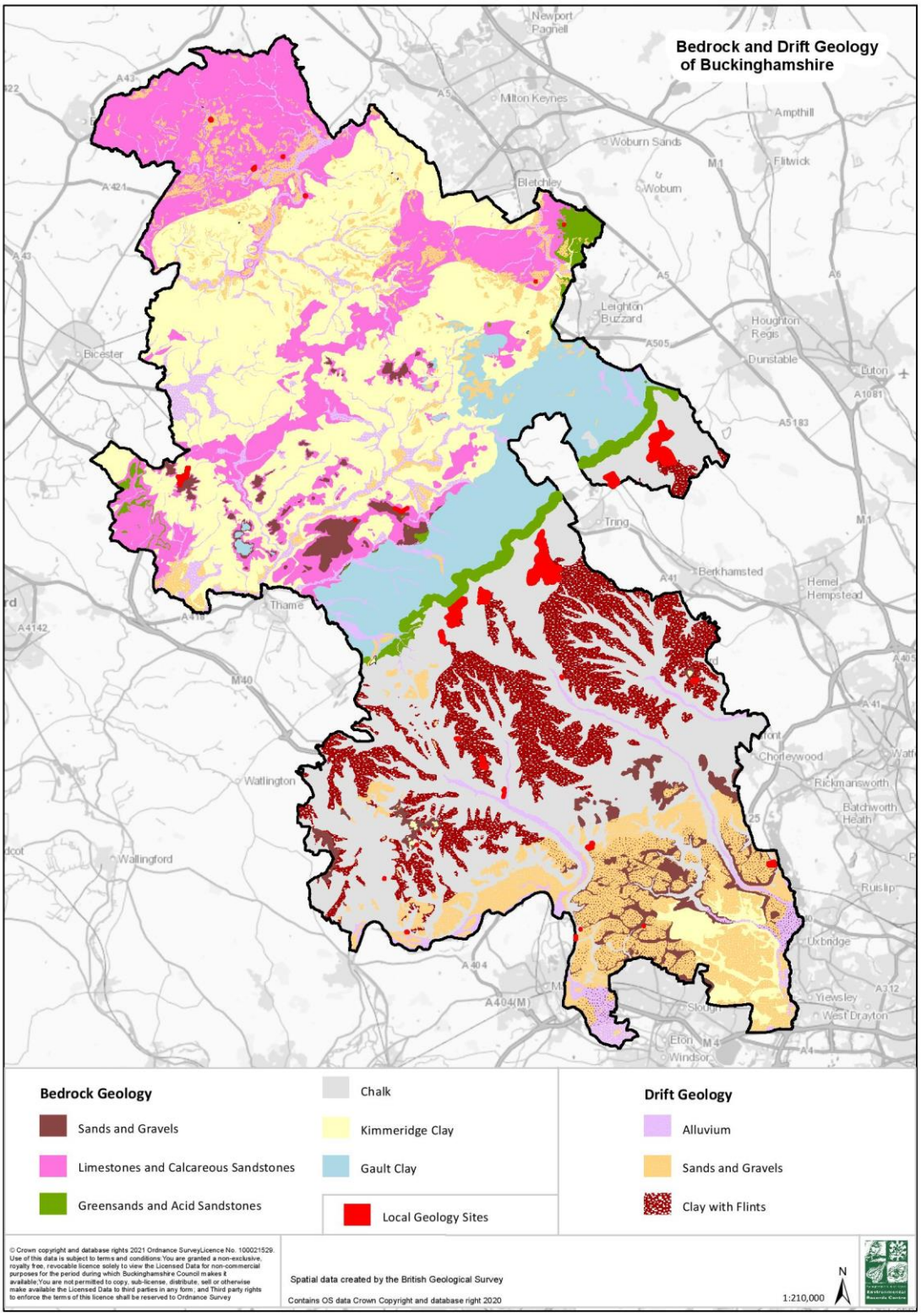
Map 2. Designated Sites for Nature Conservation



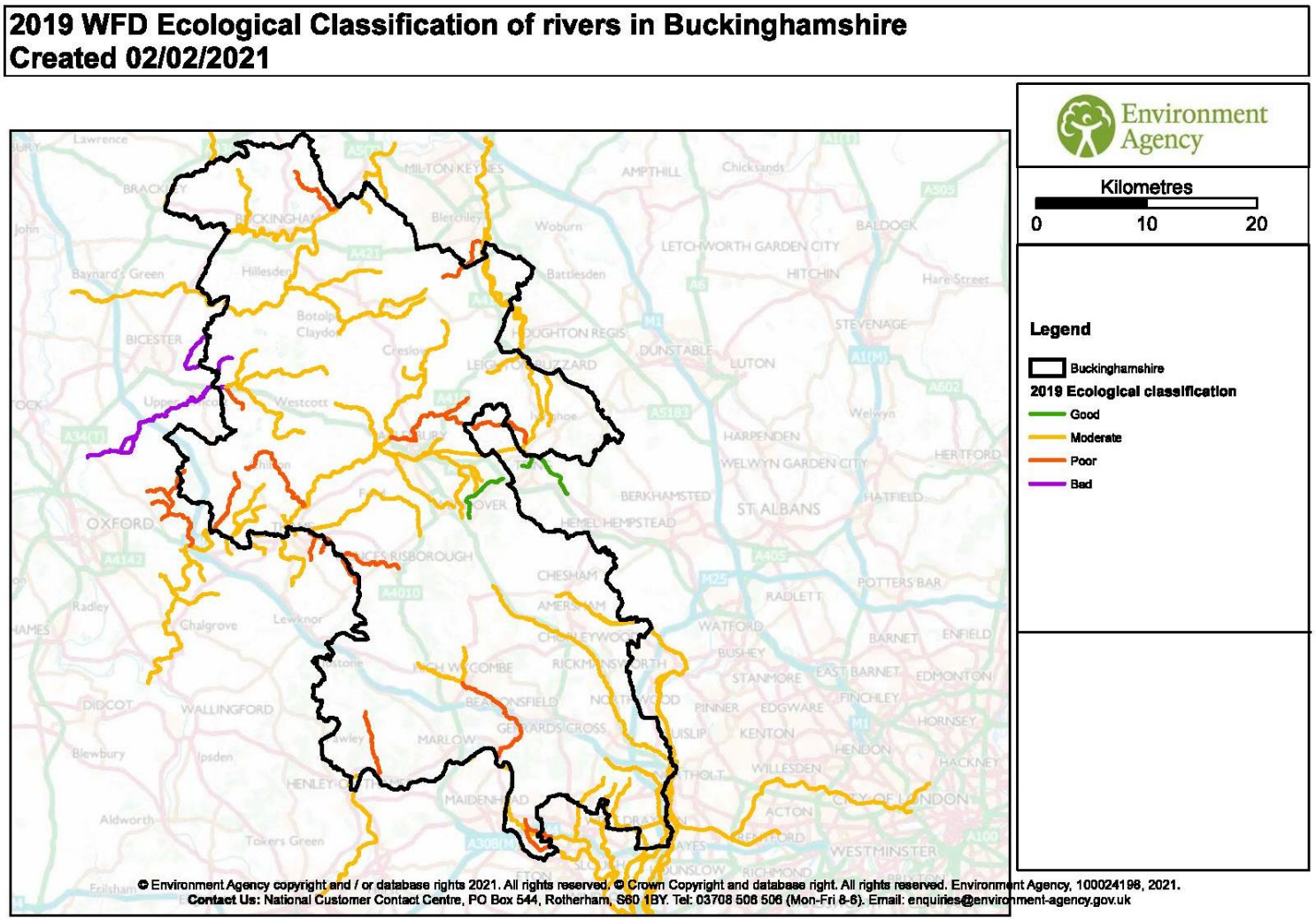
Map 3. Conservation Related Boundaries



Map 4. Priority Habitats and Ancient Woodland



Map 5. Bedrock and Drift Geology



Map 6. Water Framework Directive Classification of Rivers in Buckinghamshire