# Ock Catchment Plan

## July 2023

## Ock Catchment Partnership

Freshwater Habitats Trust

# 1 Background

## 1.1 Ock Catchment

The Ock Catchment[1] is located within the upper reaches of Thames River Basin. As well as the physical catchment of the River Ock and its tributaries, it includes the River Thames as it flows through Oxford and Abingdon. It covers 490km2 and contains 13 water bodies (Figure 1).

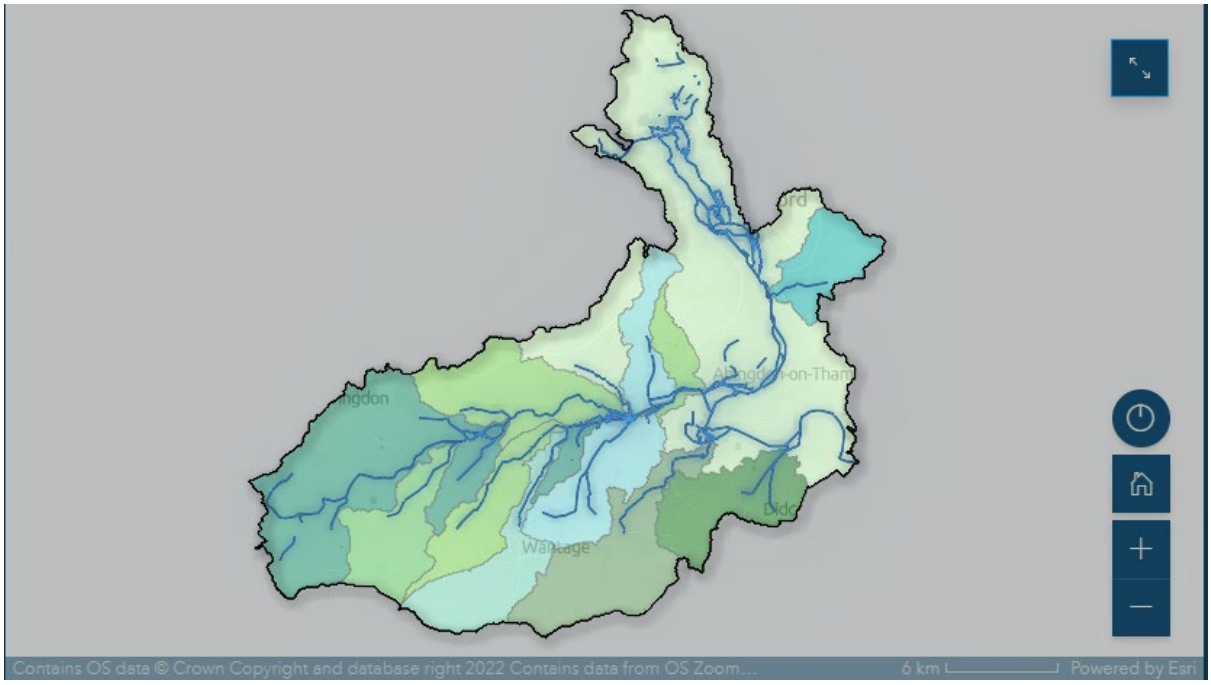


**Figure 1: The Ock Catchment and its Waterbody (sub) catchments (interactive version here)**

Whilst the catchment includes the rapidly expanding urban area of Oxford and its rural areas are intensively farmed, the catchment still remains particularly special for:

1. its freshwater wildlife, forming part of the Oxfordshire area Important Freshwater Landscape[2] including globally rare chalk streams, Floodplain Meadows and Alkaline Fens; and
2. hosting one of only two inland river sites in England and Wales designated as Bathing Water Status

## 1.2 What is the Ock Catchment Plan?

The Water Environment Regulations 2017 and the Environment Act 2021 require the protection and enhancement of our freshwater and terrestrial environment. This Catchment Plan sets out how relevant organisations, businesses and people will work together to improve the Ock's freshwater environment.

[1] An operational catchment defined by the Environment Agency and part of the Gloucestershire and the Vale Management Catchment

[2] There are just 24 such areas across England and Wales identified by Freshwater Habitats Trusts as being of exceptional importance for freshwater biodiversity.

### 1.2.1 What is it for?

The first Ock Catchment Plan was completed in 2018. This plan, updated in 2023, will facilitate partners to collaborate, secure funding and deliver projects meeting a range of freshwater related objectives including abundant biodiversity, clean water, resilience to flooding and climate destabilisation and secure water resources.

### 1.2.2 Who is it aimed at?

A wide range of activities impact on the Catchment and the freshwater environment is enjoyed by many people, so the Ock Catchment Plan is aimed at:

- Local Government (including Parish, Town, District and County Councils)
- Regulators e.g. the Environment Agency, Natural England, OFWAT, Forestry England
- Business including Water Companies and agriculture
- Landowners including farmers, farmer clusters and riparian landowners
- Developers
- Environmental sector Non-Governmental Organisations
- Funding bodies
- Community Groups
- Public
- Schools, Colleges and Universities
- Elected representatives
- Local Flood Groups
- Water body users; swimmers, anglers, kayakers, canoeists, walkers and many more

## 1.3 What is the Ock Catchment Partnership?

The Ock Catchment Partnership (OCP) is a group of relevant organisations and individuals working together using the Catchment Based Approach to plan and deliver activities and projects that:

- improve water quality;
- increase biodiversity by creating, restoring and enhancing freshwater habitats;
- reduce flood risks using Natural Flood Management; and
- protect water resources and promote sustainable use.

### 1.3.1 What is the Partnership's remit?

The OCP meets quarterly and is hosted by Freshwater Habitats Trust using a small grant from the Environment Agency, supplemented by specific support from Thames Water. Part of its remit is to collaboratively produce and update the Ock Catchment Plan, directing how the whole freshwater environment will be improved as required by UK legislation.

The OCP is bound by Terms of Reference and guiding principles to:

- Involve as wide a range of people and interests as possible to develop mutually beneficial plans for improving the Ock's freshwaters
- Work collaboratively, helping partners to make the most of resources and funding opportunities
- Be led by evidence, following good practice
- Develop and share knowledge both within and beyond the catchment

- Work at the landscape scale

### 1.3.2 Who are the members?

The OCP members include (Figure 2):

- Berks, Bucks and Oxon Wildlife Trust
- Centre for Ecology and Hydrology
- Centre for Sustainable Healthcare
- Cherwell District Council
- Chilterns AONB
- Community First Oxfordshire
- Drayton Parish Council
- Earthwatch
- Environment Agency
- Flood Network
- Freshwater Habitats Trust
- Friends of Radley Lakes
- Friends of Lye Valley
- Hill End Centre
- HT Farm Consulting
- Kingston Lisle and Fawler Parish Council
- Letcombe Brook Project
- Long Mead's Thames Valley Wildflower Meadow Restoration Project
- Natural England
- Nicholsons GB
- Ock Catchment Farmer Cluster
- Oxfordshire Amphibian and Reptile Group
- Oxford City Council
- Oxfordshire County Council
- Oxford Instruments
- Oxford Preservation Trust
- River Thame Conservation Trust
- Sandford Parish Council
- Shotover Wildlife
- South Oxfordshire District Council
- Steventon Parish Council
- Thames Water
- Thames Valley Environmental Record Centre
- Trust for Oxfordshire's Environment
- University of Oxford
- Vale of White Horse District Council
- Wild Oxfordshire
- Wilts & Berks Canal Trust
- Wolvercote Commoners'


**Figure 2: Members of the Ock Catchment Partnership**

# 2 Vision and Objectives

## 2.1 Vision

Working together to improve the entire freshwater environment of the Ock Catchment from its springs, fens, ponds and headwaters, along its tributaries and chalk streams to its floodplains and main rivers, so that it has more clean water, is more biodiverse, its communities experience reduced flooding, is resilient to climate destabilisation, provides water resources and is valued and used by local people.

**Figure 3: Visualisation of a freshwater landscape**

## 2.2 Objectives

- Reverse the decline in the Ock's **biodiversity** by increasing the diversity and abundance of native freshwater plants, invertebrates, amphibians, fish, mammals, reptiles and birds at landscape scale through:
    1. Restoring and creating the full range of freshwater and wetland habitats
    2. Protecting, extending and connecting clean water habitat
    3. Increasing distribution and resilience freshwater species of conservation concern populations
- Improve **water quality** so that wildlife can thrive and people can safely enjoy the Ock's bathing waters by working with partners to reduce pollution from agriculture, sewage, urban areas and roads
- Manage **flood risk** by supporting the delivery of Natural Flood Management (NFM) in the Ock's headwaters and Sustainable Urban Drainage schemes (SUDs)
- Enhance **resilience** of the Ock's freshwater environment to the **climate crisis** by restoring ecosystem functions at the landscape scale and maximising the carbon storage potential of natural carbon sinks

- Encourage sustainable **water resource** management and demand measures to meet water needs for drinking water, agriculture and business without damaging the freshwater environment
- Support the **community** to value, understand and enjoy the freshwater environment
- Collect **evidence,** capture best practice, share what works and what didn't.

# 3 Our Catchment

## 3.1 Characteristics of the Ock Catchment

The Catchment's water bodies are influenced predominantly by the varied geology, with permeable limestone and chalk in the headwaters and impermeable clay in low lying areas, the climate and of course human activity over millennia.

## 3.2 Habitat & Land Use

### 3.2.1 Freshwater Habitats of the Ock Catchment

A river catchment is the area of land where rain collects and drains off into a single river system. It is much more than just the main river and includes all waterbodies from headwaters, streams, expansive floodplains, ponds, fens, ditches and much more.

The main freshwater habitats found in the Ock Catchment include:

- **Main river.** The Thames and the Ock's larger rivers and streams host 22 species of fish including Eels, Stone Loach, Brown Trout and Bullhead. Unfortunately, many invertebrates and plants sensitive to pollution have been lost since the 1970s
- **Floodplain meadows.** The Thame's ancient floodplain meadows in and around Oxford host the UK's rarest floodplain meadow plant community - Great burnet/Meadow foxtail meadow (MG4). Highly biodiverse, this habitat has suffered huge losses with only 1200ha remaining in the UK.
- **Chalk streams.** Such as the Letcombe Brook are internationally rare habitats
- **Ponds & pond complexes.** Clean, still waters in the Ock can host a very high number of wetland plants and invertebrates. Around 2/3 of all freshwater species can be found in or around ponds.
- **Alkaline fens.** The Ock's Groundwater fed fens including Cothill Fen and the Lye Valley are an exceptionally rare habitat, with tufa forming springs, specialist plants and invertebrates
- **Springs & flushes.** Wet grasslands provide high wetland plant and invertebrate diversity in the Ock's headwaters, but are increasingly scarce due to very efficient land drainage
- **Ditches.** If supplied with clean water, ditches can support a surprisingly wide range of wetland plants and animals
- **Wet woodland.** Another rare habitat found at Cothill Fen, wet woodland hosts scarce and declining shade loving invertebrates

### 3.2.2 Location of Freshwater habitats

Figures 3-6 show the currently mapped water habitat in the catchment. It is worth noting that these maps are not exhaustive as many of the smaller waters have never been accurately mapped, especially the flushes, ditches, headwaters and temporary ponds.

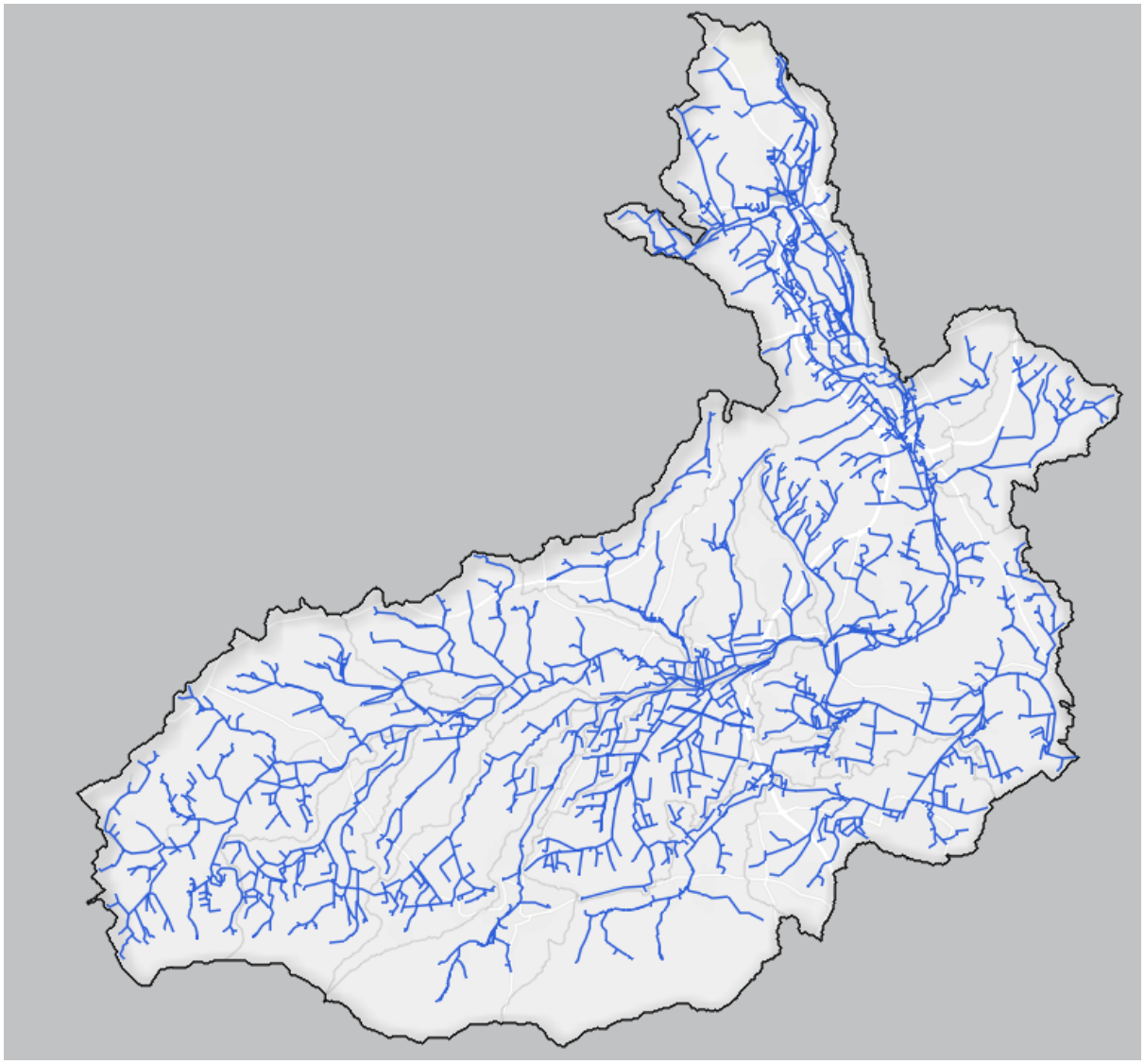

**Figure 4: Rivers and streams**

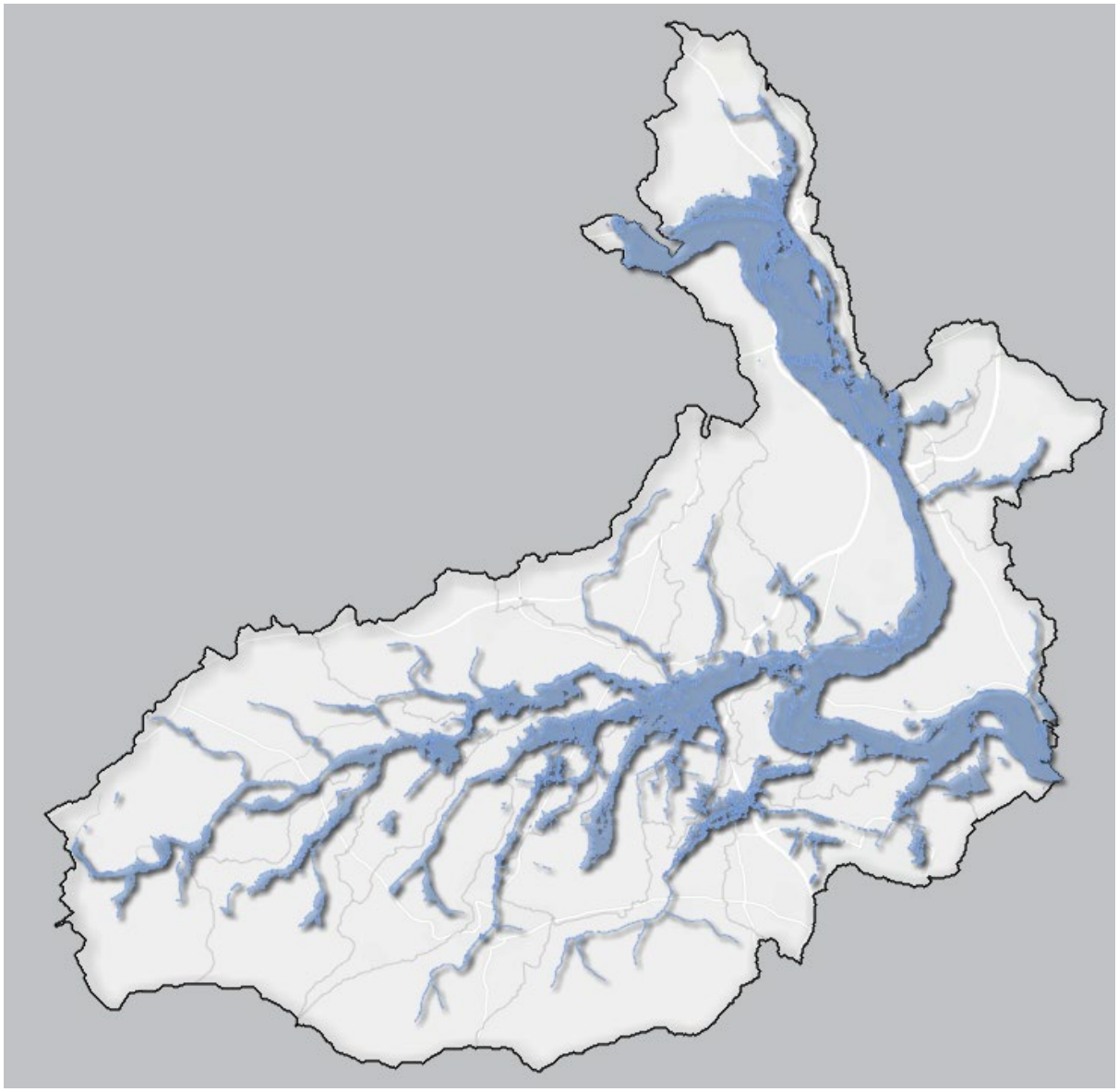

**Figure 5: Floodplain**

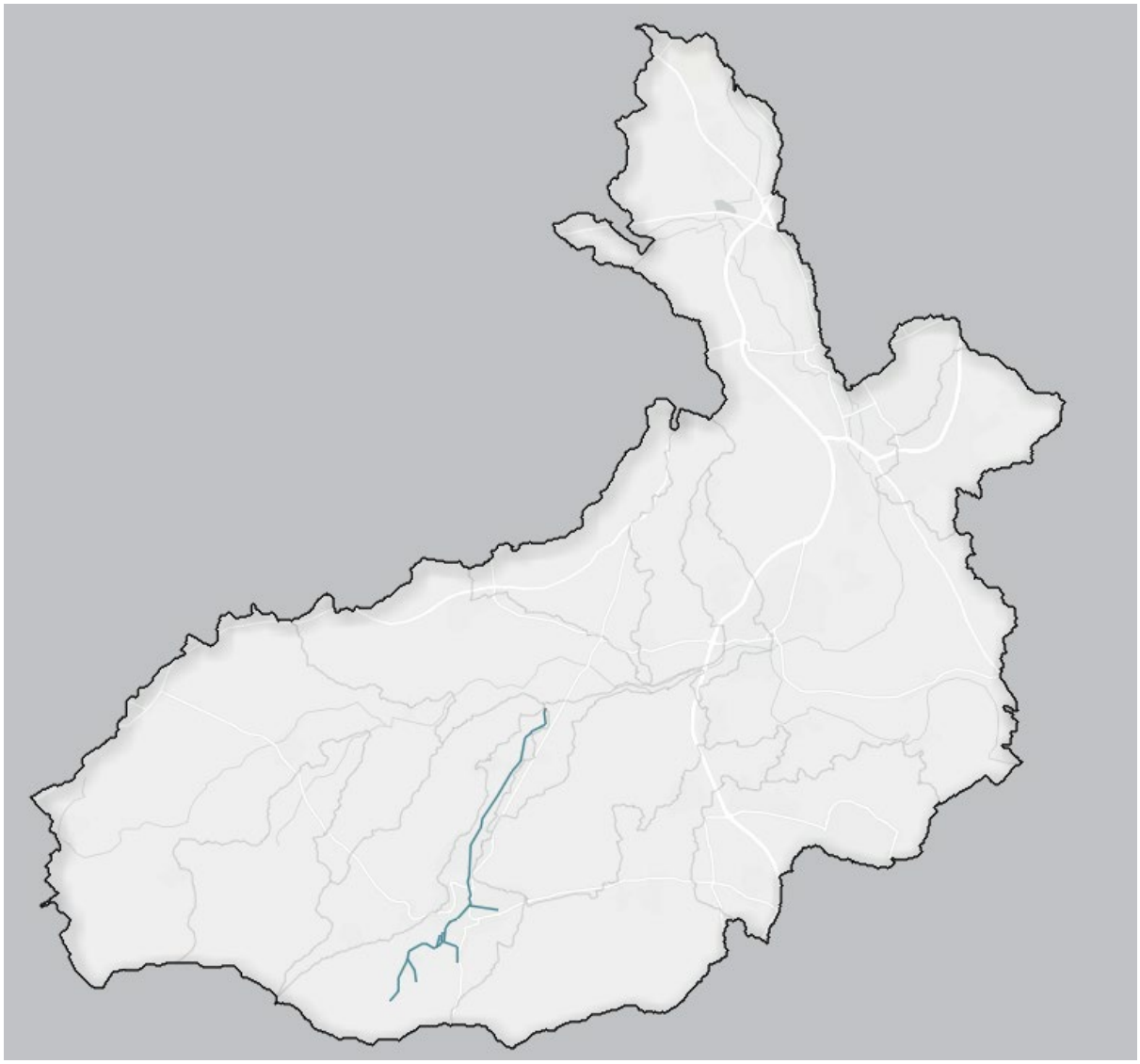

**Figure 6: Chalk stream**

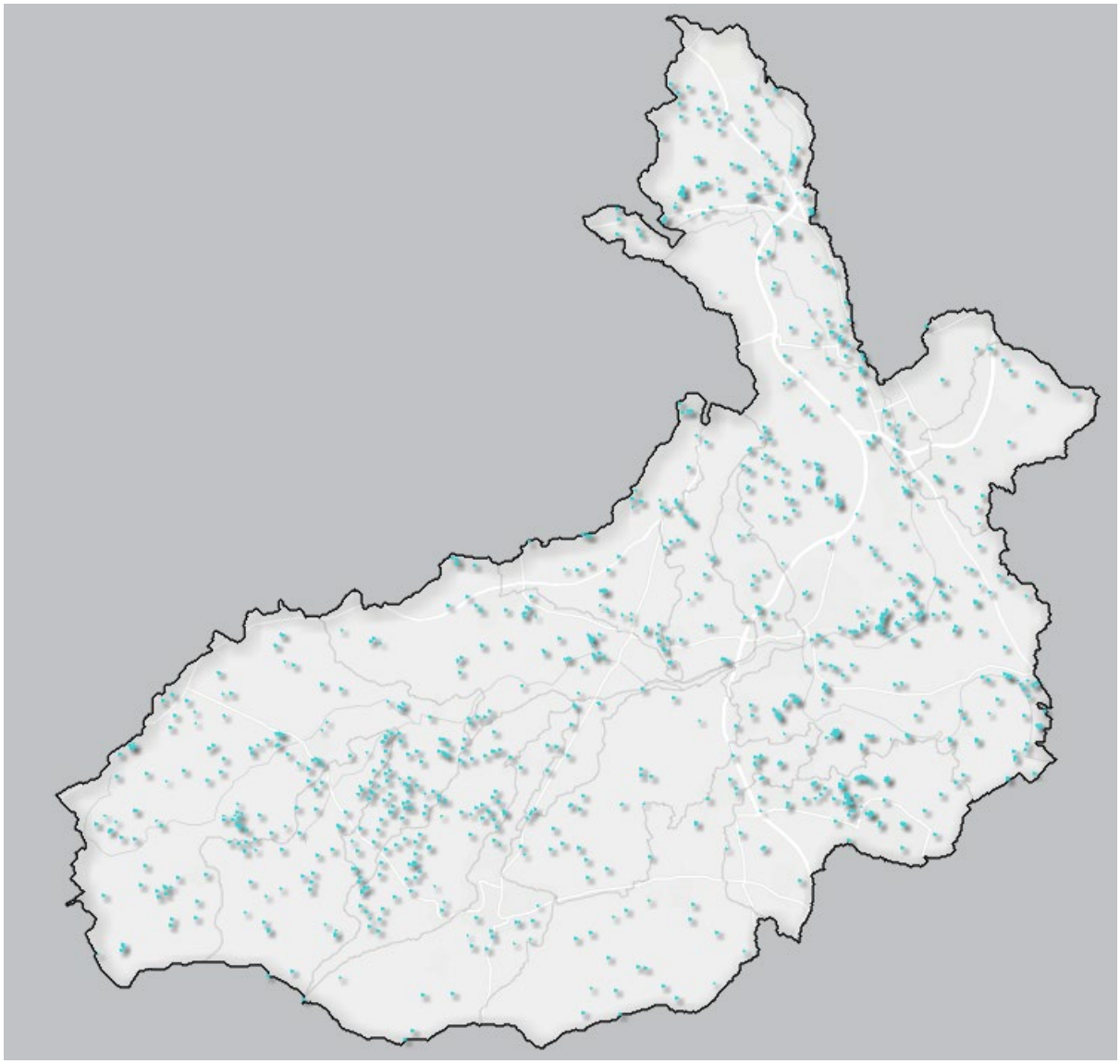

**Figure 7: Ponds**

### 3.2.3 Priority Freshwater Habitats

Priority habitats are those identified as most threatened and requiring conservation action under the UK Biodiversity Action Plan in 2012. The Ock's priority freshwater habitats are shown in Figure 8.

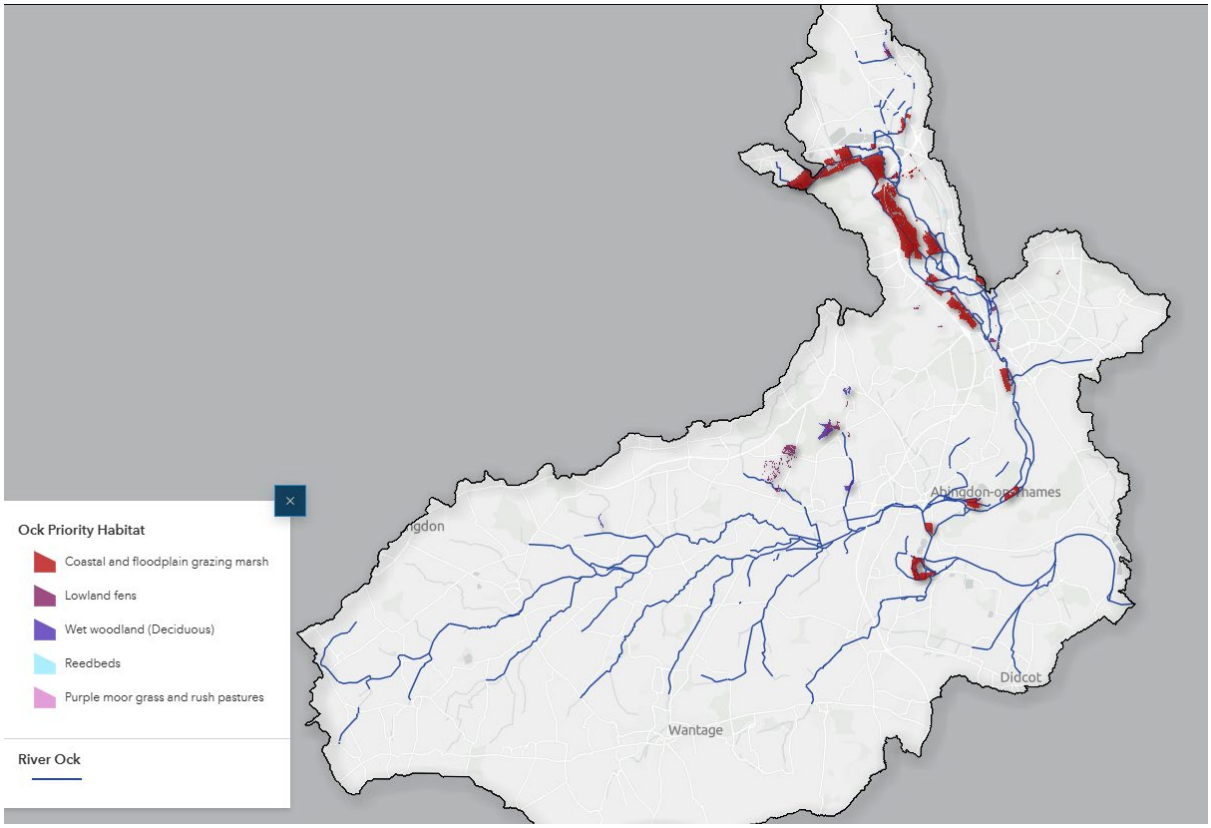


**Figure 8: Priority Habitat in the Ock**

### 3.2.4 Land use

Human activity, especially agriculture, industry and development have changed land use and extensively modified how water moves through the catchment and the wildlife it supports.

Land use has changed dramatically in the Ock catchment over the millennia, gradually reducing habitat size, variety and quality, as land was settled, farmed and drained. Before Roman times, as much as 25% of the British Isles is thought to have been covered by wetlands. But by the 1980s, wetlands covered only 5% of the UK landscape (Rackham, 1986). In the Ock, now only 2% of land is categorised as semi-natural habitat. Predominantly it is intensively managed for agriculture with 87% arable and 8% improved grassland or pasture (Figure 9). Urban areas and settlements account for the remaining 3% of land use. This has left little room for nature and in intensively managed landscapes such as the Ock we are seeing ongoing declines in species, as much as 1% decline per annum in wetland plant diversity (Williams, 2019).

The catchment contains several large towns including Oxford, Abingdon, Wantage and Didcot, all of which face considerable development pressure.

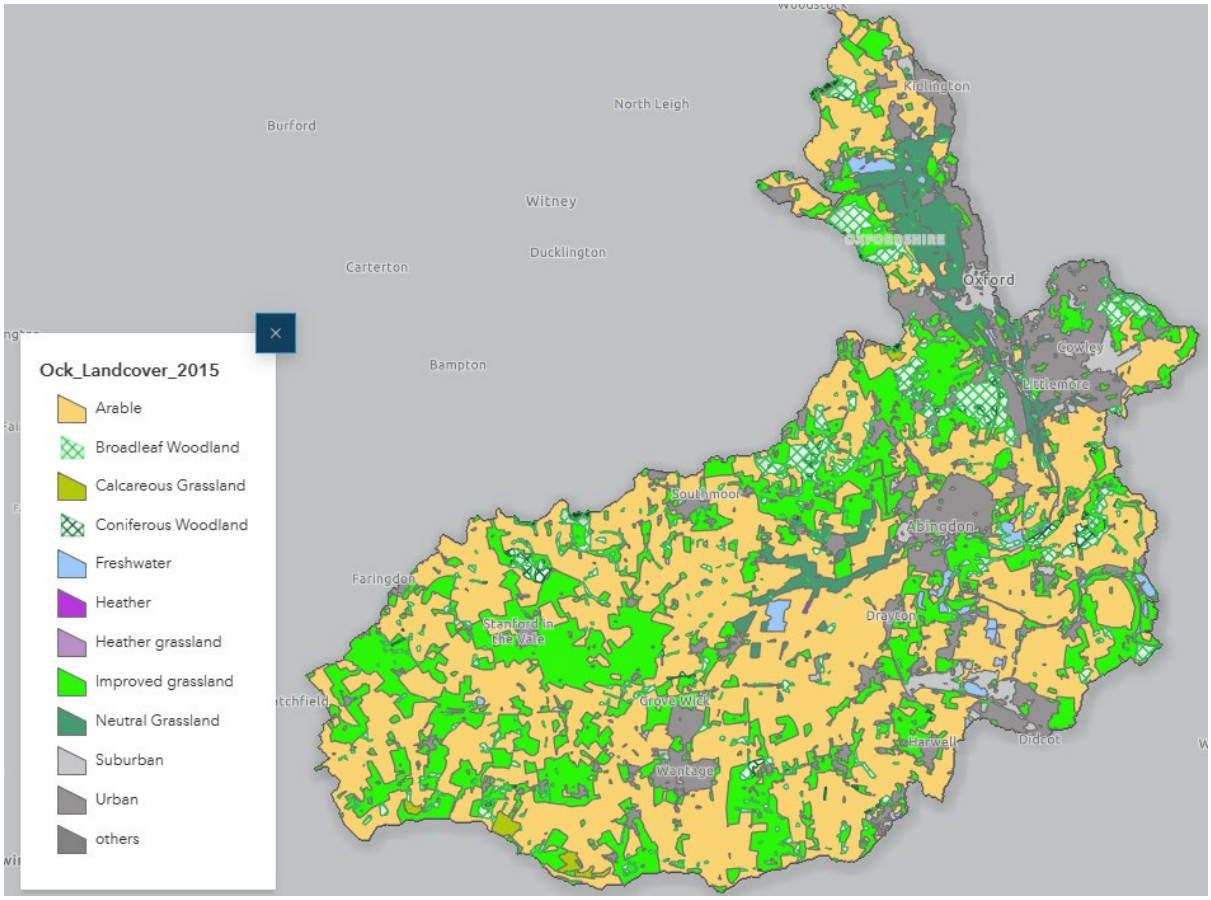


**Figure 9: Land use in the Ock, 2015**

### 3.2.5 Waterbody status - Water Framework Directive

None of the Ock's 13 waterbodies reach 'Good Ecological Status' and meet minimum acceptable standards as outlined in the Water Framework Directive (WFD). 46% are classified as poor and 54% as moderate (Figure 10).

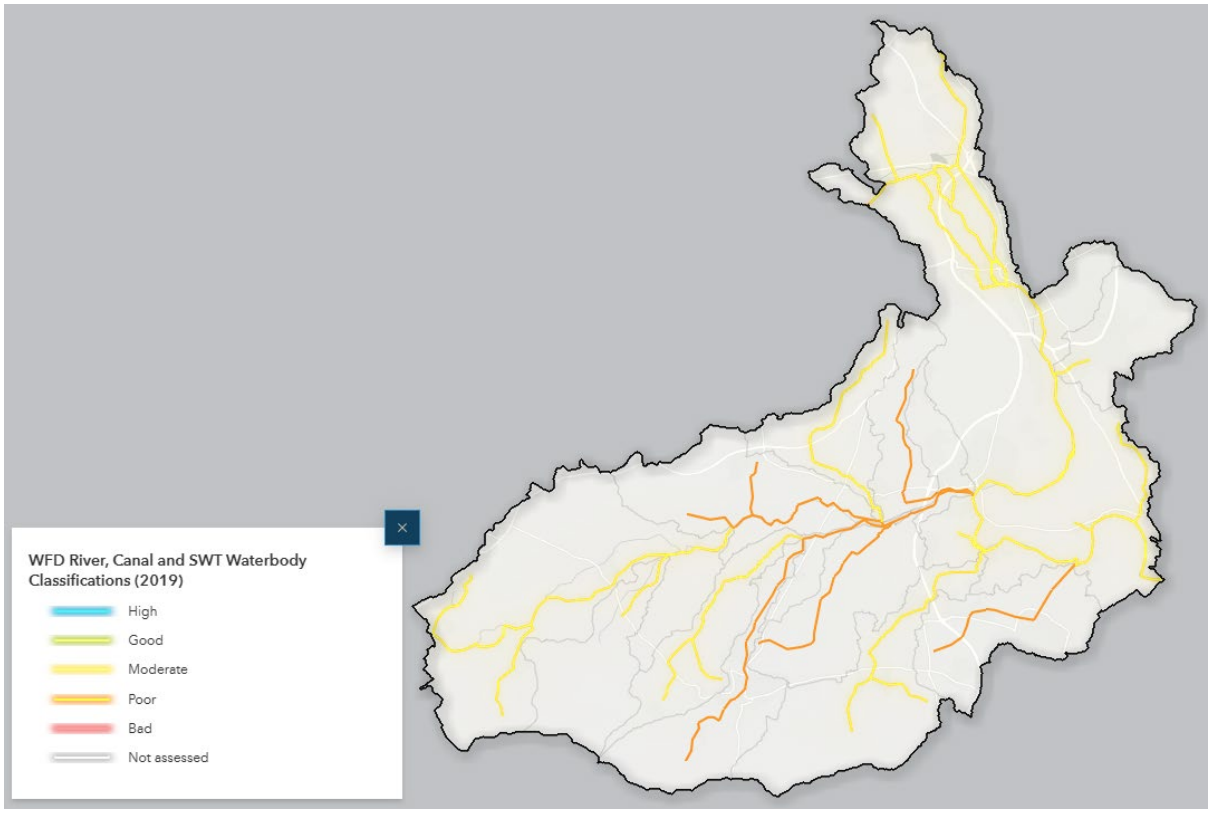


**Figure 10 Ecological status of the Ock's 13 waterbodies monitored under the WFD**

There are 5 ecological quality categories outlined in the WFD; high, good, moderate, poor and bad. 'Good Ecological Status' is the WFD default objective for all water bodies and is defined as a slight variation from undisturbed conditions. To define the ecological status the Environment Agency monitor:

- biological elements (including fish, macro-invertebrates, macrophytes and diatoms);
- supporting elements (made up of hydromorphology, ammonia, pH, phosphate, dissolved oxygen and 18 pollutants including some heavy metals and pesticides)

Each of these elements contributes to the overall ecological status. A lowest common denominator rule is applied to the elements, so the lowest scoring element denotes the overall status of the water body. For example, if a biological quality element was at moderate and other quality elements were at good, it would be assumed that the waterbody as a whole is at moderate status.

All waterbodies fail on chemical status, which is due to the presence of ubiquitous, persistent, bioaccumulative and toxic substances (uPBTs), including: polybrominated diphenyl ethers (PBDEs), Mercury, Polycyclic aromatic hydrocarbons (PAHs), Perfluorooctane sulfonate (PFOS) and polyfluoroalkyl substances (PFAS) which is being assessed for the first time. Prior to the inclusion of uPBTs in 2019, all water bodies passed for chemical status, except for the Letcombe Brook and Marcham Brook.

The Environment Agency's interactive map of water body status can be viewed here.

## 3.3 Freshwater biodiversity

The Ock still has charismatic and rare freshwater plants, animals & birds which have been lost or greatly reduced in number from other parts of lowland England.

### 3.3.1 Key Freshwater Animals of the Ock

**Natterjack Toad** *(Epidalea calamita).* Once common in heathland across southern England but now a very rare, protected species is found at a secret location in the Ock

**Common Toad** *(Bufo bufo)*. Fairly widespread in the catchment but suspected to be declining in abundance

**Great Crested Newt** *(Triturus cristatus).* Our biggest and most charismatic amphibian is well distributed throughout the Ock

**Otter** *(Lutra lutra)*. Successfully recolonising the Ock since their numbers plunged due to chemical pollution in the 1950s

**Water Vole** *(Arvicola amphibius)*. In steep decline nationally but indicative signs of recovery in the catchment with the Water Vole Recovery project finding evidence of numbers expanding on the main Ock and the Letcombe Brook north of Wantage.

**Striped Mayfly** *(Ephemera lineata).* One of our largest mayflies, endangered but still found on the Thames in Oxfordshire

**Club-tailed dragonfly** *(Gomphus vulgatissimus)*. A special species of large rivers found on the Thames in the Ock

**Southern Damselfly** *(Coenagrion mercuriale).* Highly protected, the Ock supports the only population in the Thames catchment

**Pondweed Leafhopper** *(Macrosteles cyane). T*his tiny beautiful blue animal is found only in a handful of Britain's highest quality ponds, including the Ock

**Curlew** *(Numenius arquata)*. The Ock still retains breeding Curlew in small numbers – the haunting call of this wader is now uncommon with a 63% decline in the UK breeding population since 1970.

**Brown Trout** *(Salmo trutta)*. Surveys have shown that diversity and numbers of fish in the Ock have declined dramatically.

**Bullhead** *(Cottus gobio)*. These small fish are only found on the bottom of fast, stony rivers and streams, feeding on invertebrates, such as mayfly and caddisfly larvae, and the eggs of other fish.

### 3.3.2 Key Freshwater Plant Species

The Ock Catchment is still home to a host of these special plants:

**Water Violet** *(Hottonia palustris)*. Needs clean, unpolluted water and is now listed in England's Red Data Book for plants.

**Fen Pondweed** *(Potamogeton coloratus).* Requires clean, shallow water in fens, ditches and ponds. The Ock is its last stronghold in the whole of the Thames catchment.

**Creeping Marshwort** *(Helosciadium repens)*. An exceptionally rare protected species with the Ock hosting the only natural population on Port Meadow in the whole of England

### 3.3.4 Ecological data

Information about the plants, fish and invertebrates of the Ock's rivers and streams collected by the Environment Agency can be found on their Ecology & Fish Data Explorer whilst the Riverfly Partnership holds data on mayfly and other river invertebrates in the Ock

## 3.4 Conservation Priority Areas

### 3.4.1 Protected sites

The Ock has 3 water-dependent Special Area of Conservation (SACs) and 15 water-dependent Site of Special Scientific Interest (SSSIs) It also includes part of the North Wessex Downs Area of Outstanding Natural Beauty (Figure 11)

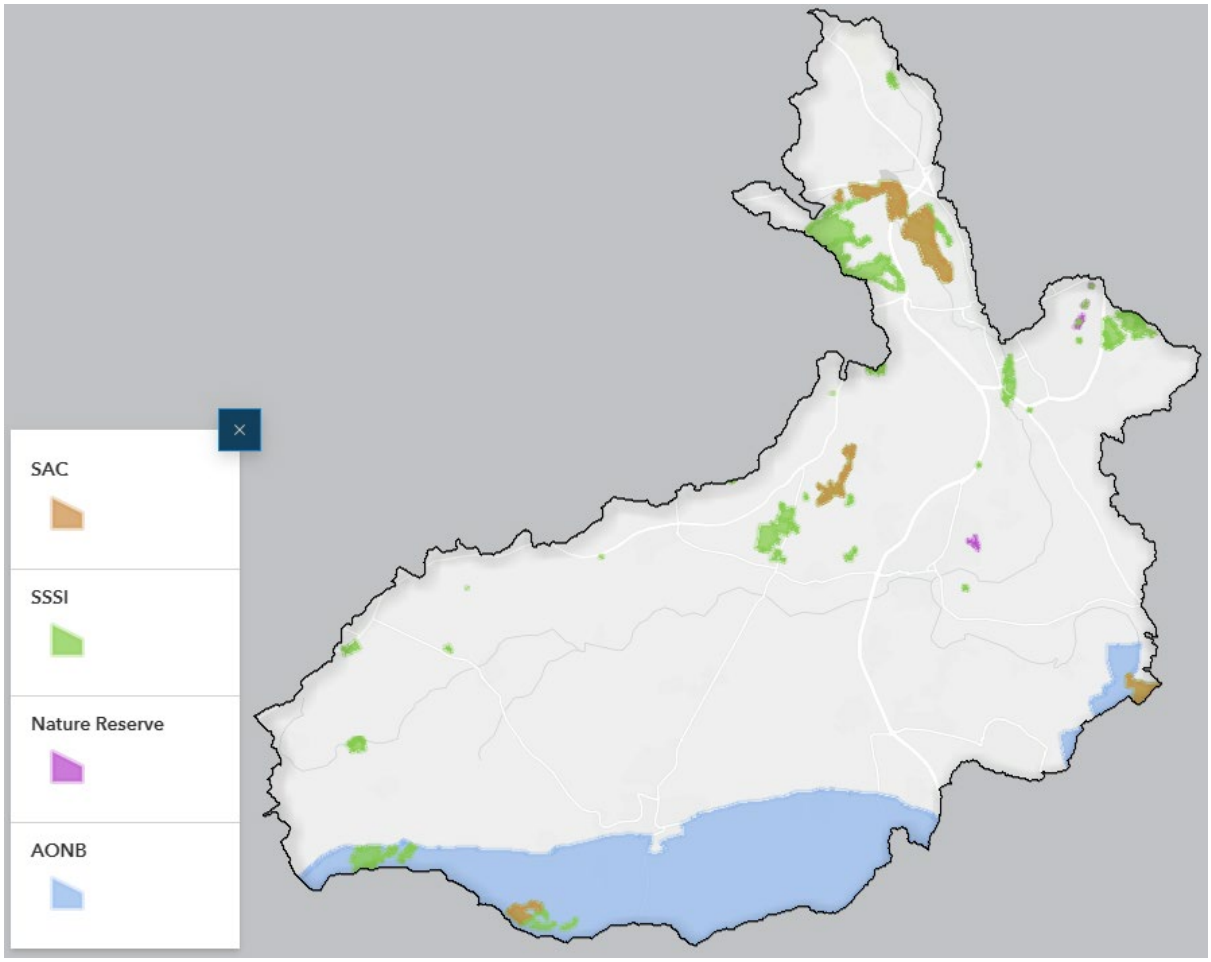


**Figure 11: Location of water dependent protected sites**

### 3.4.2 Oxfordshire Important Freshwater Areas

To underpin conservation action, Freshwater Habitats Trust undertook analysis to identify the Important Freshwater Areas (IFAs) of Oxfordshire County. These IFAs are locations of

regional importance for freshwater biodiversity where protection, restoration and expansion should be prioritised to stem the decline in freshwater biodiversity. IFAs typically comprise groups of important freshwater habitats or wetlands, or areas with significant concentrations of freshwater Species of Conservation Concern (SOCCs).

Figure 12 shows seven areas identified as Important Freshwater Areas at the catchment scale in the Ock Catchment (these are called 'catchment IFAs'). Two areas were classified as potential Important Freshwater Areas (pIFAs), these are location with more limited data where further survey and investigations might elevate them to full IFA status in due course

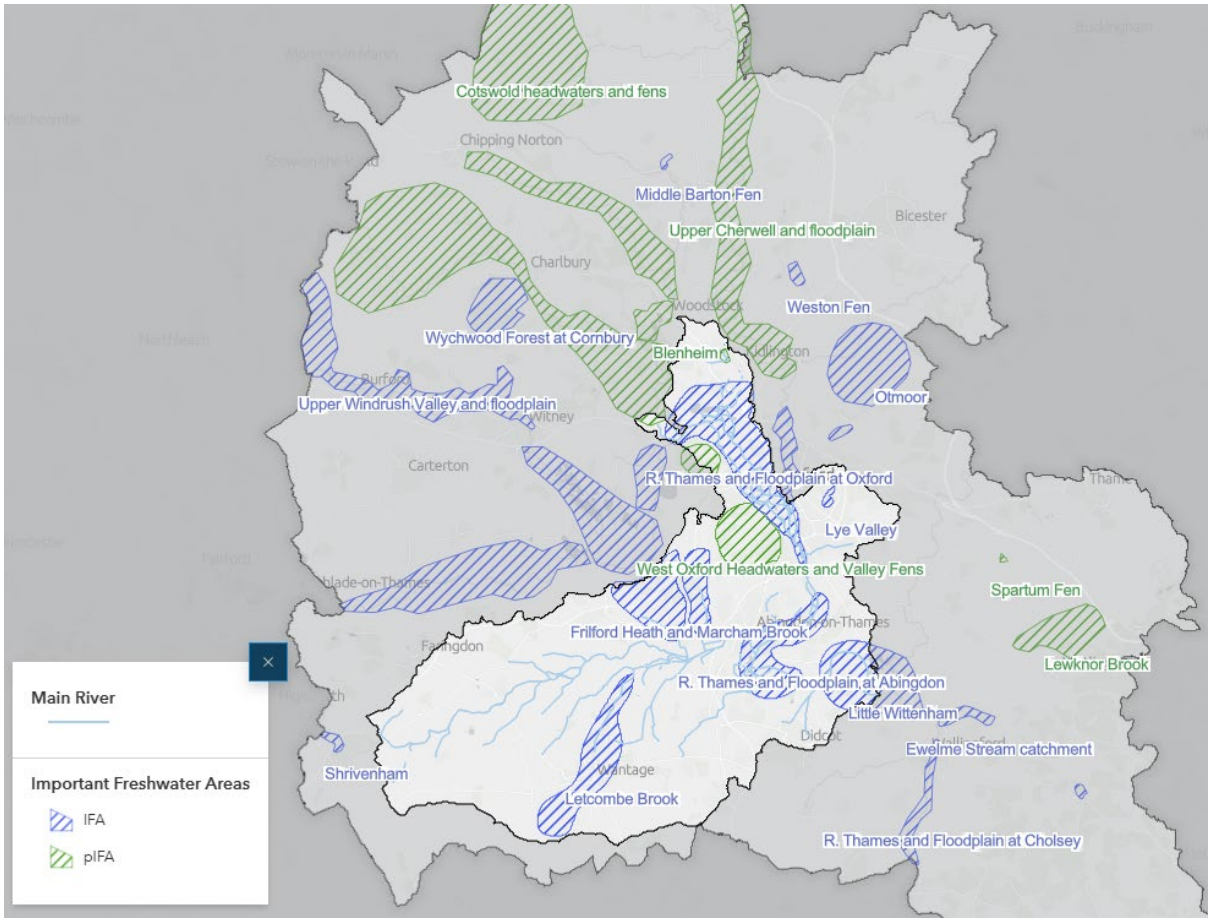


**Figure 12: Important Freshwater Areas within the Ock and wider Oxfordshire**

### 3.4.3 Oxfordshire Nature Recovery Network

The Government's Environment Act (2021) will introduce new duties to support better spatial planning for nature through the creation of Local Nature Recovery Strategies (LNRSs). The intention is that the whole of England will be covered by LNRSs. Each will include a statement of biodiversity priorities for the area covered by the strategy and a local habitat map that identifies opportunities for recovering or enhancing biodiversity.

All of the Ock's floodplains and Important Freshwater Areas are part of the proposed Nature Recovery Network 'core' or 'recovery' zones (Figure 13).

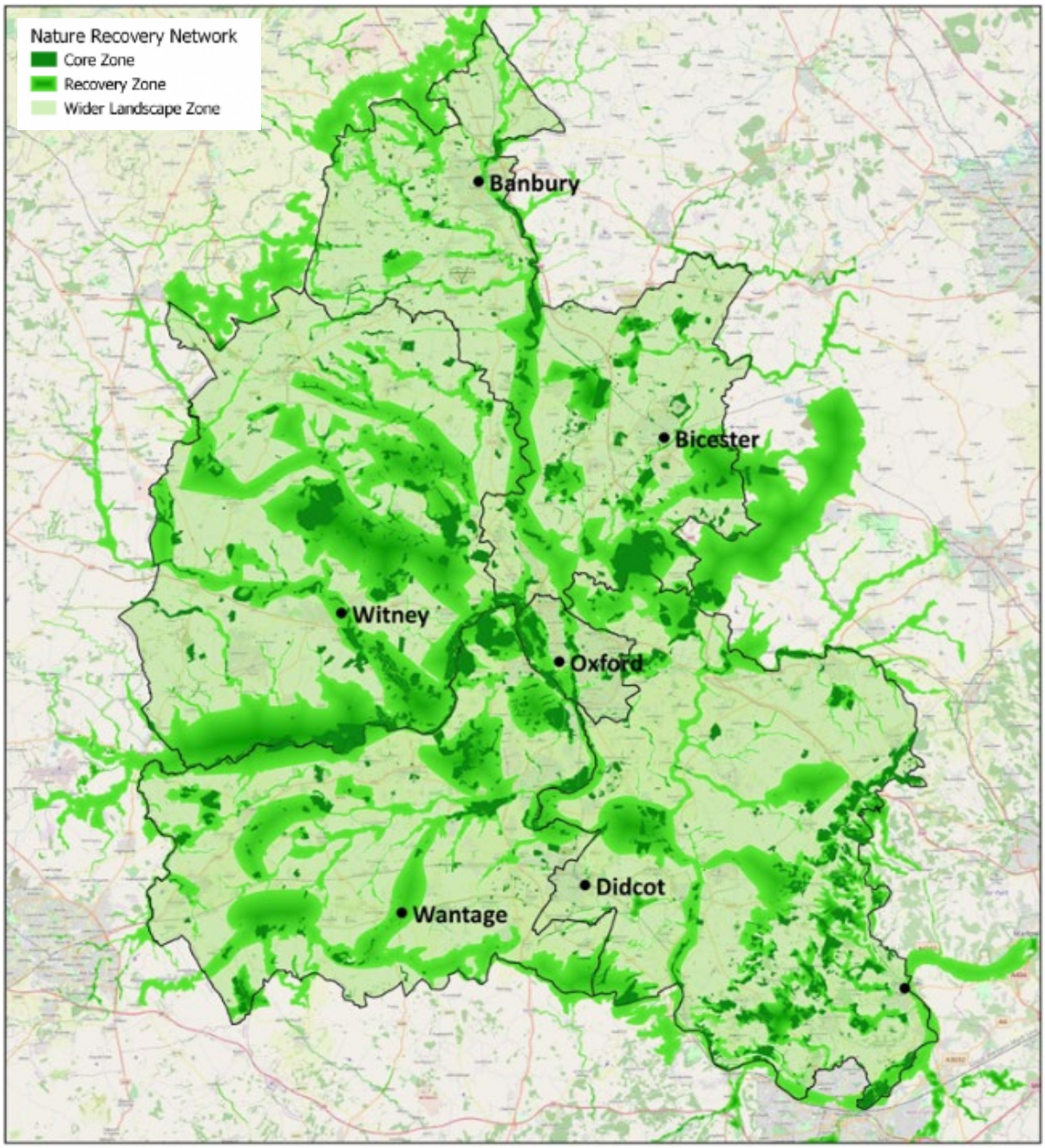


**Figure 13: Oxfordshire's draft Nature Recovery Network**

## 3.5 Water Quality

### 3.5.1 Rivers and Streams

Monitoring by the Environment Agency in 2019 found the Ock's rivers and streams to be generally good for Ammonia and Dissolved Oxygen, but only 2 water bodies are free from phosphate pollution (Figures 14, 15 and 16). Nitrate is not monitored by the Environment Agency but monitoring by the Freshwater Habitats Trust and EarthWatch Waterblitz with

quick test kits finds nitrate pollution at consistently high levels. The surface waters for the entire Catchment are designated a Nitrate Vulnerable Zone and a Safeguard Zone at risk from the pesticides Metaldehyde, Carbetamide and Propyzamide.

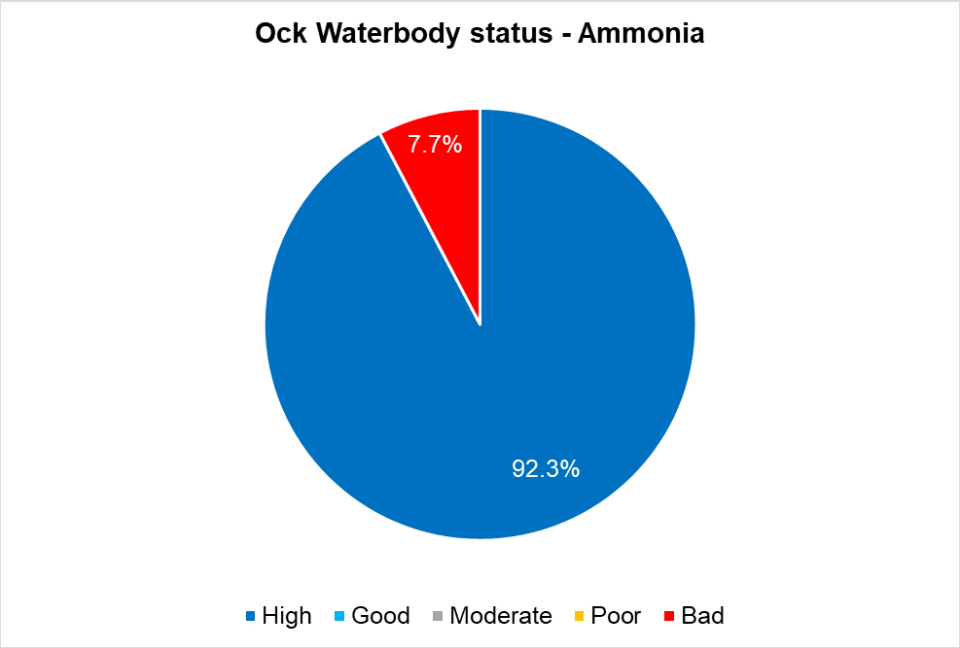


**Figure 14: Proportion of waterbodies by ammonia status**

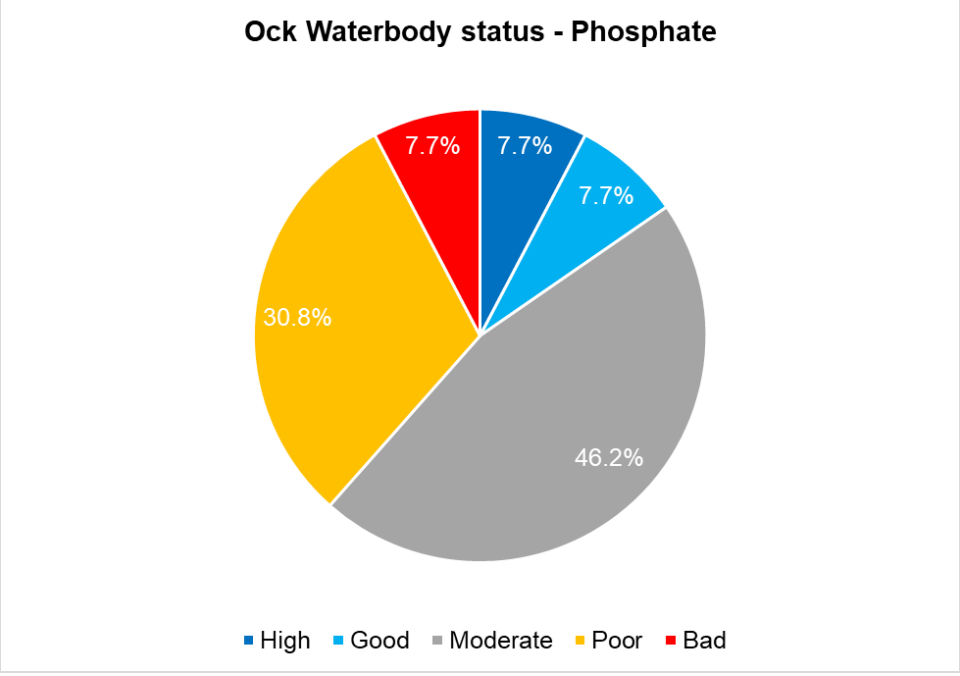


**Figure 15: Proportion of waterbodies by Phosphate status**

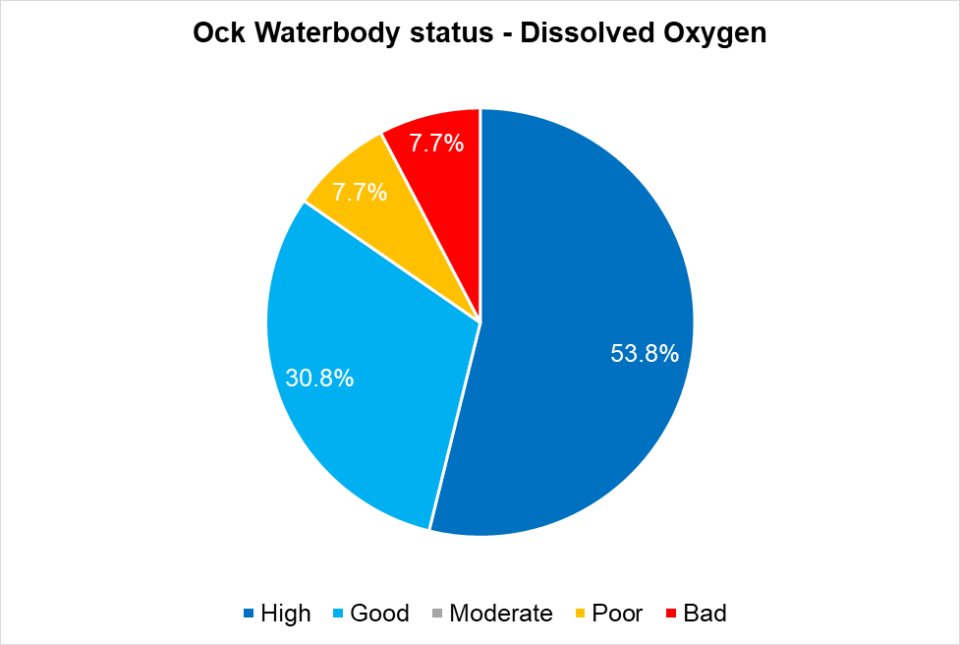


**Figure 16: Proportion of waterbodies by Dissolved Oxygen status**

### 3.5.2 Small water bodies and still waters

The 2018 Water Blitz project sampled water quality at 635 sites in the Ock's headwaters, springs, streams, fens and ponds. The majority were polluted, with only 31% found to be clean i.e. free of nitrate and phosphate pollution. Clean water was found in the headwater springs, fens, ponds and small wooded catchments.

### 3.5.3 Groundwater

The Ock's main limestone and chalk aquifers are contaminated by high levels of nitrate and designated as a Nitrate Vulnerable Zone, whilst the Wantage area is also a safeguard zone for Groundwater due to Nitrate pollution.

However, small pockets of clean ground water can be found where aquifers drain from areas with few or no inputs.

### 3.5.4 Bathing Waters

Following a comprehensive programme of Citizen Science water quality monitoring and sustained campaigning by the Oxford Rivers Project, the River Thames at Port Meadow in Cuttleslowe was designated as an inland river bathing site in 2022 (Figure 17). Unfortunately 4 of the 20 statutory samples taken during 2022 breached the threshold for harmful bacteria and the bathing water is currently classified as poor quality.

**Figure 17: Swimming in the Thames at Port Meadow**

## 3.6 Hydrology

Hydrological data such as rainfall, river flows and groundwater can be found at the Environment Agency's Hydrology Data Explorer

## 3.7 Flood risk

Parts of Oxford and Abingdon have suffered from destructive surface water flooding in recent years, in some cases not helped where development has occurred in the floodplain. In exceptionally wet years, groundwater flooding has adversely affected Wantage and Letcombe Bassett.

Figure 18 shows the locations at risk of flooding from rivers in the Ock; substantial areas are at high risk, especially the Thames floodplain and the Ock around Marcham and Abingdon which are in Flood Zone 3 defined as land having a 1% or greater annual probability of river flooding.

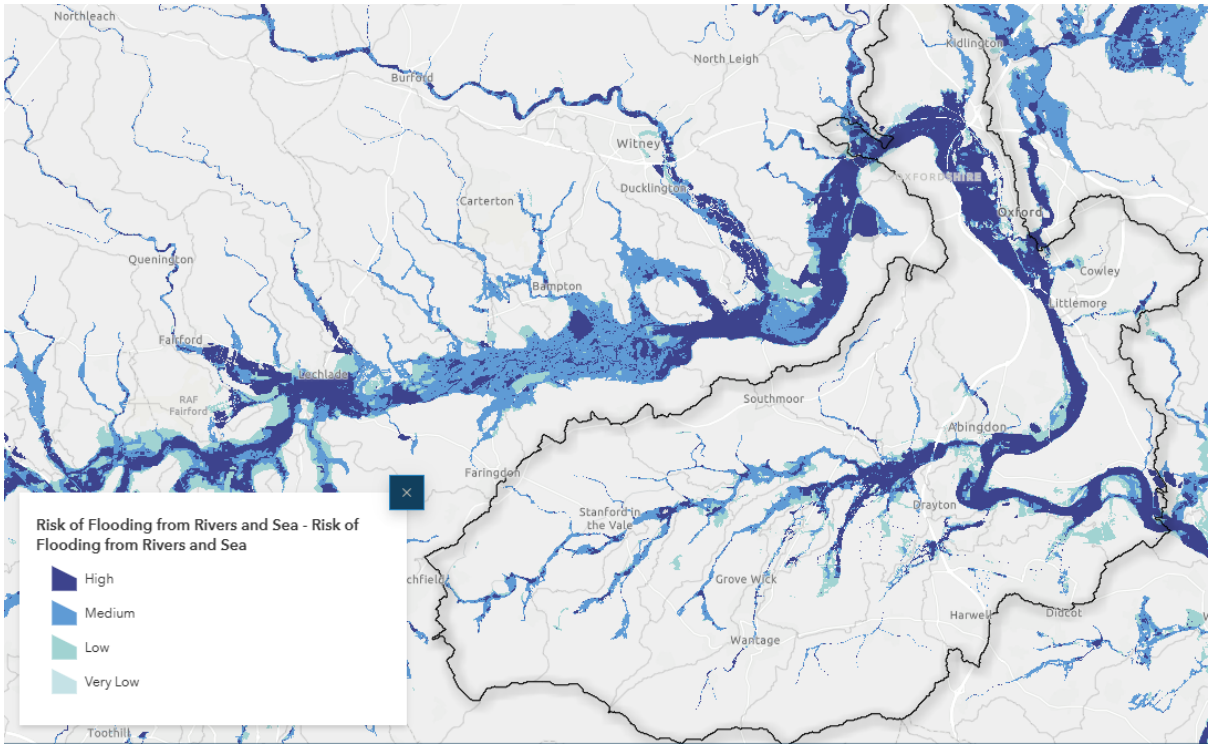


**Figure 18: land at risk of flooding from rivers and sea in the Ock catchment**

## 3.8 Water resources

The Ock has two major groundwater resources, the chalk/limestone aquifers bodies of the Vale of White Horse Chalk and the Shrivenham Corallian Water Body). There is currently no groundwater abstraction by Thames Water in the Ock; abstraction of 4.5 million l/day at Childrey Warren Water Treatment Works ceased in 2020.

Figure 19 shows the location of water abstraction licences in the Ock, a mixture of surface water (from rivers) and groundwater (from boreholes).

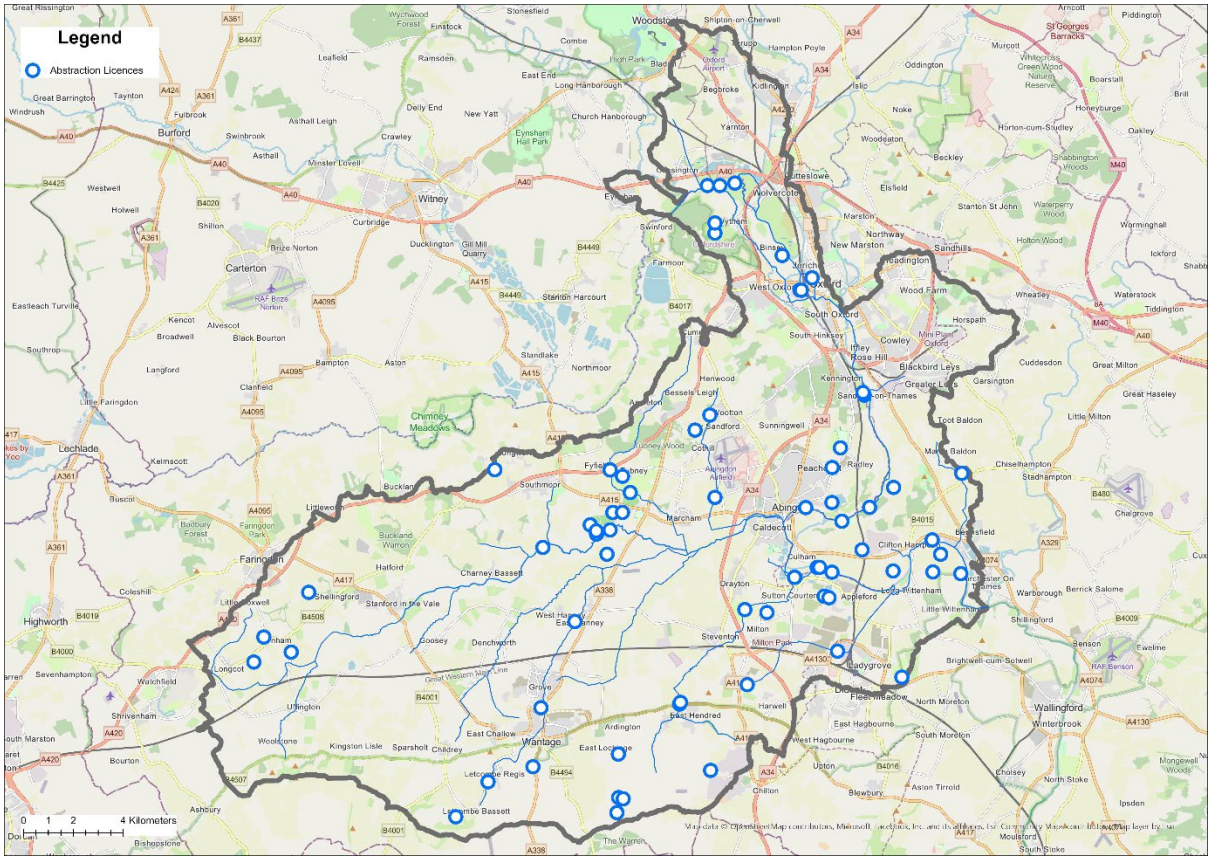


**Figure 19: location of water abstraction licences in the Ock**

The greatest volume of water abstracted within the Ock catchment is used for generating electricity, then public water supply (3.1%) and a water transfer to support flows on the Letcombe Brook (0.5%) (Figure 20). Agriculture, industrial and private water supplies account for less than 0.1%.

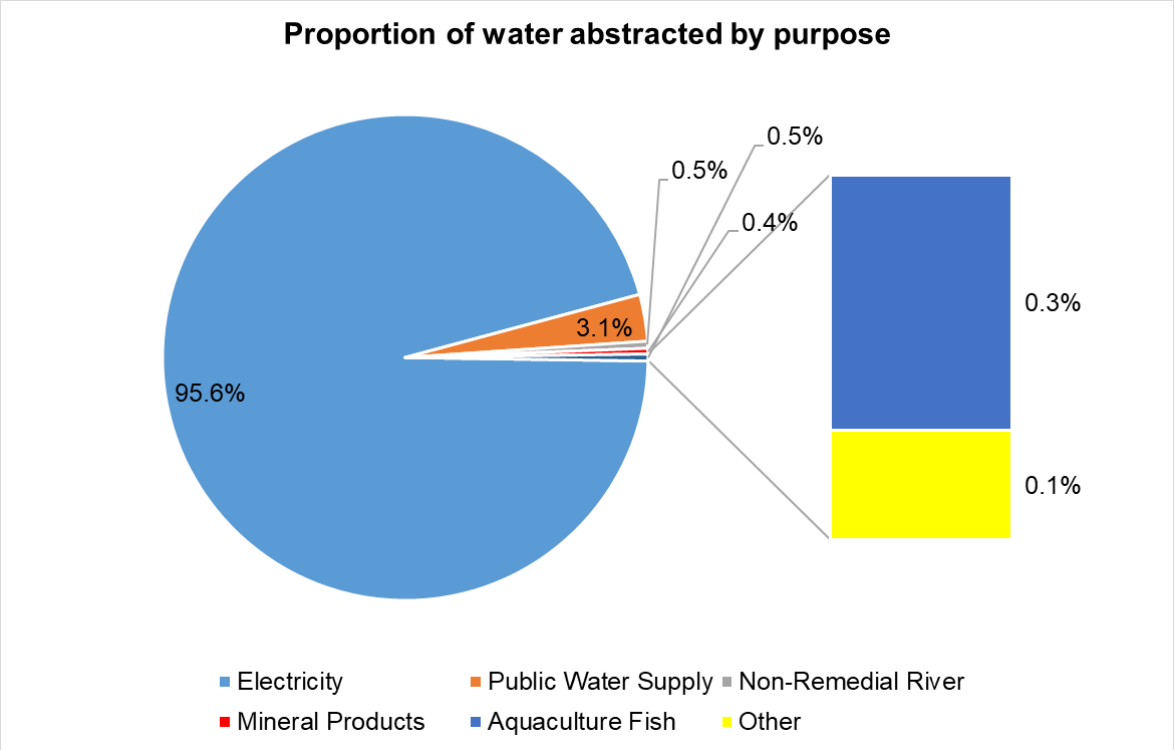


**Figure 20: Proportion of water abstraction licences by sector**

# 4 Tackling the issues

The Ock's freshwater biodiversity, people, water quality, water resources and flooding are harmfully affected by multiple, interrelated issues visualised in Figure 21

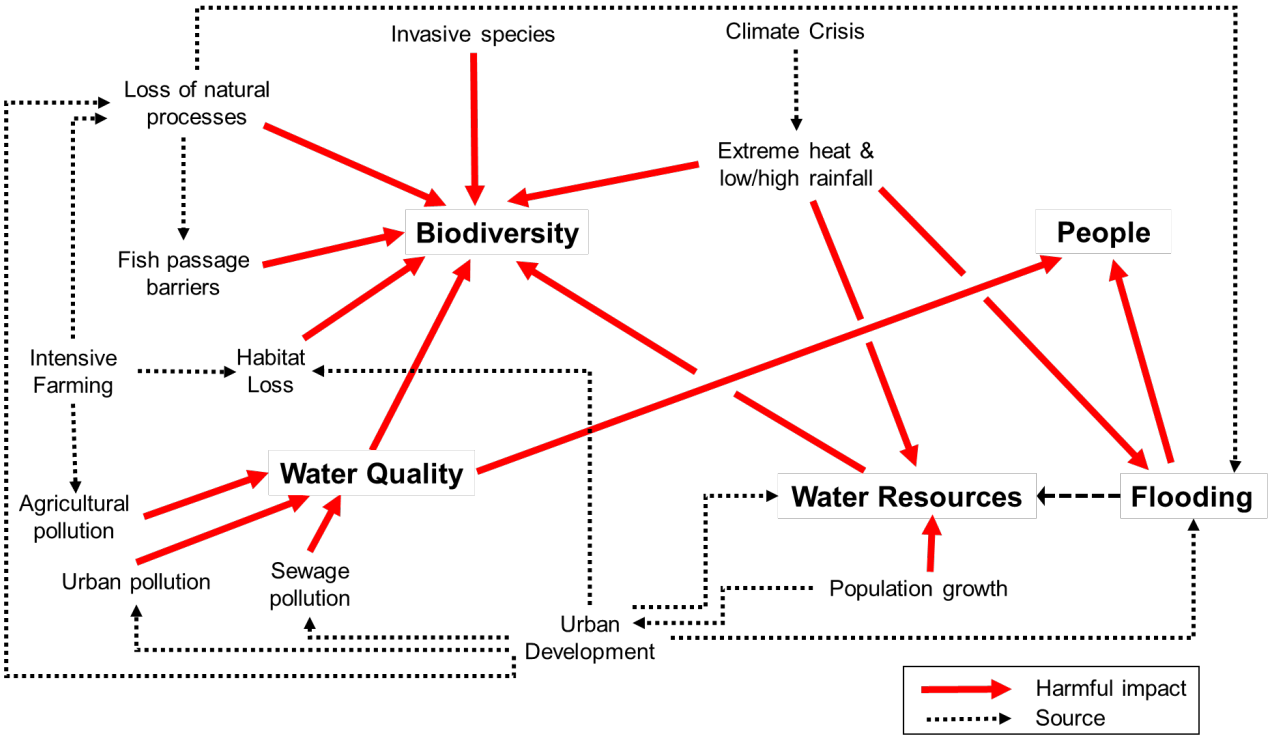


**Figure 21: Issues affecting the freshwater environment in the Ock**

## 4.1 Biodiversity loss

The Ock's freshwater biodiversity is in decline. The abundance of protected species like Curlew, Water Vole, Common Toad and Eels is reducing across the area and many once common wetland plants are disappearing including Greater Water Parnsip, Water Violet and Marsh Stitchwort. Key drivers are:

- poor water quality, eliminating organisms that cannot tolerate pollution
- habitat loss due to infrastructure, development and agriculture
- Efficient land drainage for agriculture, removing water dependent ecosystems
- Historical modification of rivers by disconnection from their floodplains, dredging, straightening, damming and enlargement has impacted on fish, aquatic invertebrates, plants and emergent vegetation.
- Invasive, non-native species displace, outcompete or predate naturally occurring plants and animals
- Poor management of riparian corridors, resulting in too much shade and bank destabilisation
- Human disturbance and uncontrolled dogs in and around river corridors, affecting breeding viability of water voles.

### 4.1.1 Solutions – Building the Freshwater Network

Freshwater biodiversity can be rebuilt though FHT's Freshwater Network concept, endorsed by the OCP which aims to:

- protect the best existing freshwater biodiversity of the area from further damage
- building out from these best areas and connecting fragmented populations of freshwater species by restoring landscape connectivity
- develop projects which address degradation of water quality and hydrology to restore natural processes across the catchment.

This can be achieved through the following measures:

- **Clean water pond creation.**
  Supporting over two-thirds of freshwater species, creating clean new ponds is one of the simplest and most effective ways to protect freshwater wildlife. An example includes pond creation at Wantage Sewage Treatment works, providing clean water habitat and breeding ponds for Great Created Newt.
- **Floodplain wetland mosaic creation**. Complexes of varied water habitats coming together to make a large wetland mosaic. An example includes Manor Farm (Garford) comprised of a series of pools of varied size and depth fed by different clean groundwater and rain water sources, not connected to the polluted river network.
- **Floodplain Meadow restoration.** These incredibly biodiverse habitats have suffered huge losses since the 1950s but are rich in scarce wetland plants and invertebrates, store large amounts of carbon in the soil, store floodwater and trap sediment. An example is Long Mead's Thames Valley Wildflower Meadow Restoration Project just outside the Ock in Eynsham aims to use green hay to re-introduce lost species and put in place the correct meadow cutting and grazing regime. We will look to roll out similar projects in the Ock by reverting arable or permanent pasture in the floodplain back to meadows.
- **Fen restoration.** The Ock hosts the third largest concentration of the nationally rare Alkaline Fen habitat in the UK, with 97% lost since the 1950s. With volunteer power, the Hinksey Heights Alkaline Fen project has been restoring the incredible species richness of Alkaline Fen on the edge of Oxford since 2018. Cutting and raking dominant reed to open up light and re-introducing lost species such as Marsh Lousewort, an ecosystem engineer which parasitizes reed, have seen the return of characteristic fen plants such as Marsh Valerian, Marsh Arrowgrass, Bog Pimpernel, Twayblade and rare mosses.
- **Backwater habitat creation.** Creating new areas of shallow backwaters, important as fish nurseries and refuge areas from pollution events, to diversify the habitat of the Ock's streams and rivers.
- **Riparian habitat restoration.** Re-naturalising watercourses by working with farmers to improve riparian bankside habitat by pollarding, making more open areas for emergent vegetation, and to support water voles.

## 4.2 Barriers to fish passage

Man-made structures such as weirs and slucies block the passage of fish in the catchment, preventing movement of migratory species such as Brown Trout, and isolating fish in sections of river, leaving them vulnerable to a pollution or low flow incident.

### 4.2.1 Solutions: How the Partnership will tackle barriers to fish passage

- **Removing weirs and other barriers.** This is always the best option to ensure free movement of fish along watercourse.

- **Installing fish passes.** Where it isn't possible to remove weirs and barriers to fish passage.
- **'Daylighting' water courses.** Opening up culverts and underground sections of watercourses to natural light, as many fish will not move through sections of complete darkness.

## 4.3 Invasive species

Invasive, non-native species cause serious problems to biodiversity in the Ock

- **American Mink** escaped from fur farms in the 1960s and have devastated Water Voles, whose main defence against predators is escaping to their burrows, which unfortunately mink are small enough to enter and predate them.
- **New Zealand Pygmy weed** forms extensive thick surface mats on ponds, killing aquatic plants and their dependent invertebrates by preventing light from penetrating the water surface
- **American Sigal Crayfish** escaped from aquaculture and has caused the loss of the native White-clawed crayfish from the Ock through spreading crayfish plague
- **Himalayan Balsam** is a tall, robust alien plant which outcompetes and shades out other riparian and wetland flora, spreading rapidly along watercourses by copious production of seeds which are explosively propelled away from the parent plant

### 4.3.1 Solutions: How the Partnership will tackle the impact of invasive species

- **Invasive Species Control.** Eradication of invasive non-native species (INNS) where feasible. For most INNS this isn't achievable without considerable catchment wide effort. For some, there is no known effective eradication method. Eradication methods could include balsam pulling, mink trapping or, for plants like New Zealand Pygmy Weed, infilling of ponds (plus the creation of a new pond nearby to replace the lost feature).
- **Bio-security.** Reducing the accidental movement of invasive species by humans by raising awareness of biosecurity protocols with users of the water environment, such as anglers and recorders. Check, Clean, Dry!

## 4.4 Pollution

We know that pollutants (including nitrate, phosphate, sediment and microplastics) are having a severe impact on water quality in the Ock and Thames. All living organisms can be affected, from mammals and fish down to plants and microorganisms.

### 4.4.1 Agricultural Pollution

Diffuse pollution from agriculture in the Ock's ground and surface waters is a major problem for biodiversity and drinking water. This includes **sediment** (from eroded soils washed off the land), **nitrate** and **phosphate** sourced from slurry, fertilisers and manure (applied to boost the growth of arable crops and pasture for silage and grazing), **herbicides** (used to remove unwanted plants) and **pesticides** (used to minimise damage to arable crops).

### 4.4.2 Solutions: How the Partnership will encourage 'Water Friendly Farming'

Through the Ock Catchment Farmer Cluster encourage Water Friendly Farming which aims to reduce water pollution from agriculture by blocking the pathways to water including:

- **Integrated Pest Management** to reduce pesticide inputs
- **Soil and nutrient management** techniques to reduce run-off, for example: growing sacrificial cover crops during the winter, low till farming (little or no ploughing) and lower or zero nutrient inputs (fertilisers)
- **Slurry Storage** to prevent slurry from leaching into the watercourse
- **Wide buffers** on river banks and field margins, to reduce sediments and phosphate leaching into the watercourse.
- **Settlement ponds and bunded ditches** to trap sediment before it enters the watercourse
- **Watercourse fencing** To manage livestock access to watercourses. Grazing is a natural process and very beneficial to regulating plant communities. However high stocking densities can cause excessive poaching and sediment release into watercourses. Where stocking densities are high grazing pressure is best managed by fencing with access gates that enable livestock access for parts of the year, but not all.
- **Regenerative agriculture** to increase the soil organic matter content to better retain nutrients from leaching

### 4.4.3 Sewage pollution

Point source pollution into the Ock's river network from Sewage Treatment Works (STW) storm discharge overflows is a major problem for river wildlife and people. There are 14 storm discharge overflows in Ock, which can be viewed online in real-time status at the Thames Water Event Duration Monitoring platform (Figure 22)

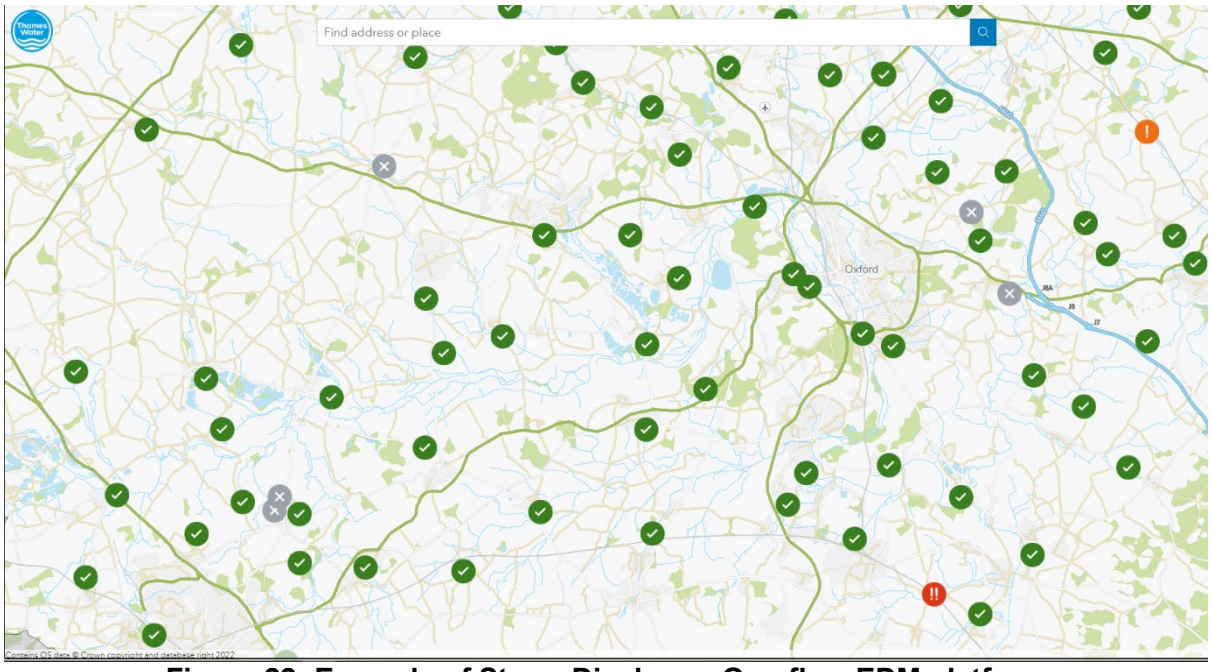


**Figure 22: Example of Storm Discharge Overflow EDM platform**

In major storm events, STWs cannot cope with the volume of water and raw sewage is discharged directly into the river, which can cause mass fish kills through sudden reduction in oxygen. Invertebrate and plant diversity and abundance drop and people cannot swim in or use the river network for recreation. Leaking septic tanks can also be a significant source of pollution in rural areas.

### 4.4.4 Solutions: How the Partnership will tackle sewage pollution

- **Co-operating with water companies.** Working with Thames Water whilst holding them to account as a critical friend. Pushing for accelerated investment to increase capacity at STWs to hold back storm water and reducing groundwater infiltration into the foul water drainage network.
- **Green Infrastructure.** Supporting Thames Water to roll-out softer, green infrastructure measures including Sustainable Urban Drainage Systems (SUDS) such as raingardens, swales and removing hard, impermeable surfaces to enable increased natural infiltration into the ground. This reduces the risk of storm water overwhelming combined sewers and pouring into the river network; older waste water networks still have surface water from rainfall shared in one single pipe with sewage
- **Locating and correcting misconnections.** These are instances where foul water has been incorrectly connected into the surface water drainage network so it bypasses sewage treatment and goes straight into the river. It can be a significant source of localised pollution
- **Tightening regulations on private sewage systems.** Lobbying Government to tightening the regulation, inspection and maintenance of private sewage systems (that are not connected to the public sewer network)
- **Responsible usage of septic tanks.** Encouraging septic tank owners to correctly use and maintain their Septic Tanks according to the guidance developed for the New Forest (Figure 23).

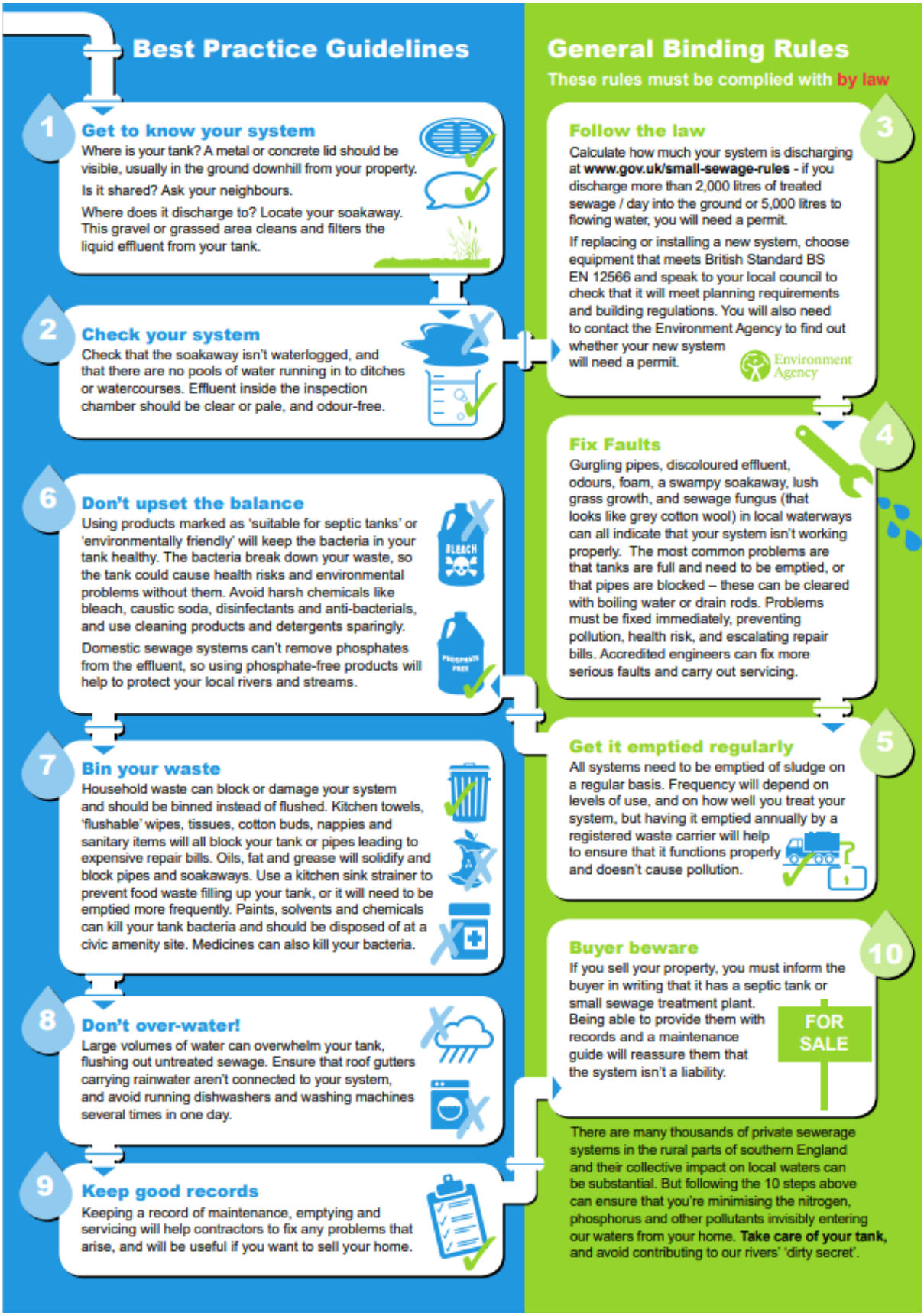


**Figure 23: Guidance on responsible sceptic tank usage and maintenance**

Freshwater Habitats Trust

### 4.4.5 Urban, roads & other pollution

Surface water run-off from urban areas, highways, industry are sources of harmful chemical, microplastic and sediment pollution to the Ock's watercourses. Flea and tick treatments applied to pet dogs contain neo-nicotinoid's, bee and insect killing chemicals so harmful they have been banned from agriculture. These enter the watercourse when dogs swim in ponds and rivers, resulting in persistent, long-term damage to freshwater invertebrate abundance.

### 4.4.1 Solutions: How the Partnership will tackle urban pollution

- **Sustainable Urban Drainage Systems (SUDS)** Ensuring that SUDS are designed to filter and trap pollution from urban surface water runoff as well as reduce flood risk
- **Bring 'Water environment building' into planning decision-making** Ensuring pollution to watercourses is effectively incorporated into the planning process when new urban buildings and highways infrastructure are proposed
- **Raising awareness of the value of our water environment** Raising awareness of the damage to freshwater biodiversity caused by neo-nicotinoid based flea and tick treatments, and encouraging pet owners to keep their animals out of the water, or to try alternative, less harmful control measures.
- **Highways Drainage** Regular cleaning of sumps on the highways drainage network and safe disposal of sediments

## 4.5 Flooding

The Ock's low-lying areas are experiencing worsening flooding in recent years due to:

- very efficient agricultural drainage in the Ock's headwaters which pushes the water rapidly off the land and reducing infiltration into the ground
- loss of wetlands which would naturally have buffered the extent of flooding
- Straightening, dredging and the embankment of watercourses that has sped up flows and reduced storage capacity in the floodplain
- increasingly extreme weather events due to the climate crisis, with rapid flips from serious, chronic drought to heavy and persistent rainfall events

### 4.5.1 Solutions: How the Partnership aims to tackle the impacts of flooding

- **Natural Flood Management (NFM).** Working with nature on the catchment scale to slow the flow, holding water back in sensible places during storm events, to reduce flood risk to homes, businesses and infrastructure. NFM features can include:

    - Leaky dams
    - Temporary water storage areas -
    - Interception ponds
    - Increasing channel roughness
    - Re-introducing natural processes – such as reconnecting floodplains and "ecosystem engineer" Beavers.

- **Bring 'Water environment building' into planning decision-making**

Ensuring flood risk is effectively incorporated into the planning process when new urban buildings and highways infrastructure are proposed.

## 4.6 Lack of natural processes

Together, development pressure, historical modifications and the climate crisis are all accelerating the loss of natural hydrological process. Apart from a handful of headwater streams and fens, the Ock's watercourses no longer have natural hydrology and are disconnected from their floodplains. The water table is now artificially lowered, the land drier, increasing the **flashiness** of rivers and leaving them less able to buffer flows in the face of extreme weather. Remaining quality wetland habitats are fragmented and disconnected, disrupting the natural dispersal mechanisms of plants and invertebrates so they become isolated populations, vulnerable to local extinction.

Examples of natural processes that have been compromised:

- Species dispersal mechanisms
- Watercourse hydrology
- Natural flood management
- Carbon sequestration and storage

### 4.6.1 Solutions: How the Partnership aims to reduce the loss of natural processes

**Natural Floodplains.** Restoring natural process by reconnecting floodplains with their watercourses at the landscape scale, combined with more naturalistic grazing processes will help to buffer against development and the climate crisis

**Wetland Carbon sequestration.** The Ock's fens, flushes, floodplain meadows and wet woodland are natural stores of carbon in their peat and soils. The partners will protect and increase these carbon stores by:

- Mapping existing locations and quantifying carbon reserves
- Assessing their carbon flux status and taking steps to ensure they are not emitting carbon e.g. by rewetting dry, oxidised peat
- Identifying where existing wetland carbon stores could be expanded and locations for the creation of new wetland carbon storage in the form of fen and floodplain meadow restoration and rewetting agricultural land

**Re-naturalising watercourses.** Reversing historic modifications and restoring natural processes along watercourses. This could be through techniques by Stage 0 – infilling artificially incised, straightened watercourses so the water table is raised to the floodplain. Paleochannels (the original watercourse) are reactivated and the waterbody is free to move dynamically over the floodplain.

**Species re-introductions.** Substituting for the lack of connectivity and loss of natural dispersal mechanisms by re-introducing species to areas where they have been lost. Wetland plants, water vole and some fish species are ideal candidates in the Ock.

## 4.6 Unsustainable Development

Between 2011 and 2021 population has grown by 14.8% and 6.7% in the Vale of the White Horse and Oxford respectively. The latest estimates are for 24% growth in the Vale of the White Horse from 133,700 in 2018 to 166,000 in 2028, putting increasing pressure on the Ock's freshwater habitats and water resources as demand for housing and associated infrastructure grows. The scale and pace of development in the Ock has seen physical loss of habitat including Curlew breeding grounds, increased flood risk from replacement of

permeable surfaces with hard standing, whilst the increased population has exacerbated the lack of Sewage Treatment Works capacity and demand for water resources.

**Solutions: How the Partnership will reduce the impacts of development**

**Provide best practice advice to the local planning authorities regarding development and the water environment,** in particular ensuring increased pressures on flood risk, ground water, and water resources demands are considered from the begining.

## 4.7 Worsening climate crisis

As the climate crisis grows, extreme weather events are becoming more frequent in the Ock, amplifying other existing problems. Drought and heatwaves are compounding low flows and heating shallow waterbodies, with the Letcombe Brook Project measuring an increase from 12C at source to 20C at East Hanney in the 2022 heatwave. This may affect dissolved oxygen levels, stressing fish and other aquatic wildlife. More frequent intense rainfall events are worsening flash flooding, accelerating the loss of soil from intensive farming and the run-off into the watercourse.

### 4.7.1 Solutions: How the Partnership will reduce the impacts of Climate Change

**Encourage better water resource management.** Reducing mains water leakage and encouraging efficient, responsible water use across all sectors of demand including business and industry as well as domestic consumers.

**Protect and enhance existing carbon stores in freshwater habitats.** Habitats such as fens, peatland and wetland can contain significant carbon stores

**Increase resilience of freshwater species populations through habitat creation, restoration and improved connectivity.** Creation of freshwater habitats that provide carbon sequestration benefits, such as ponds and fens

## 4.8. Attitudes & Resourcing

Although there is strong awareness across society of the harmful consequences of sewage in the river network and a growing demand for change, there is little recognition of the:

- severe damage to freshwater lifer caused by agricultural pollution
- shifting baseline syndrome; fixed views about what rivers and floodplains should look like based on an ecologically impoverished present and an unwillingness to change
- perception that all waterways should be kept free of material and dredged, rather than allowing natural processes to occur in suitable headwater locations, for example the accumulation of large woody debris in channels
- disconnect between water consumption and adverse ecological impacts

### 4.8.1 Solutions: How the Partnership will aim to raise awareness across business, industry, agriculture and the public

**Engagement & public events.** With partners, raising awareness of the issues and solutions to the Ock's freshwater problems through events and information

**Ock Catchment Farmer Cluster.** Working with farmers to tackle adverse impacts of farming on freshwater life, flooding and water consumption

**Community led projects.** Encouraging the creation of more community led schemes to help people improve their local freshwater, such as the highly effective Letcombe Brook Project

**GroWet.** Engaging people in freshwater issues and enable them to participate in nature necovery through the GroWet project, which is propagating rare wetland plant species at home and re-introducing them to areas where they have been lost.

**Citizen Science.** Allow people to see for themselves the issues by undertaking Citizen Science including riverfly monitoring, outfall safaris to find misconnections and water quality testing in their local area such as the Oxford Rivers Project.

**Volunteering.** As a partnership, promote existing and generate new opportunities for people to get directly involved in tackling the Ock's freshwater issues through nature conservation activities, plasticblitz and Curlew Recovery

### 4.8.2 Resources

The Ock Catchment suffers from a lack of funding for the solutions needed to tackle the problems affecting its freshwater environment. There is insufficient funding for habitat creation and restoration, engagement and monitoring. This makes it difficult to progress solutions and without funds to gather ecological baseline data, objectively assessing success is problematic.

### 4.8.1 Solutions: How the Partnership will aim to address this

**Novel funding streams.** Potential to fund measures in the freshwater environment to provide ecosystem services such as biodiversity, flood risk reduction and carbon storage:

- The new Environmental Land Management Scheme (ELMS), replacing basic payments to farmers with ecosystem service payments
- Biodiversity Net Gain, placing a legal requirement on developers to deliver a minimum of 10% biodiversity uplift
- Water Restoration Fund, where funds from water company fines and penalties is available to support projects such as re-meandering rivers and restoring habitats
- Great Crested Newt District Licencing, creating 8-10 new mitigation ponds for every existing pond destroyed by development
- Potential private sector funding around carbon credits, water stewardship and Corporate Social Responsibility

**Existing baseline data.** Build on existing Environment Agency data on large waterbodies for invertebrates and develop more extensive use of modern remote measurement techniques and crowd sourcing third-party data.

**Citizen Science.** Exploiting opportunities to expand the use of citizen science to support low resolution data at large scale.

# 5. Our work

## 5.1 Our commitments

To achieve the aims and objectives this Catchment Plan, the OCP partners commit to:

1. Create and restore more freshwater habitats including floodplain wetland mosaics, clean water ponds, chalk streams and Alkaline Fens

2. Deliver water friendly farming through the Ock Catchment Farmer Cluster to reduce diffuse pollution

3. Push for rapid investment in STW upgrades around Oxford and support the roll-out of SUDS and solving misconnections

4. Collectively respond to major consultations and provide input to Land use planning decisions on STW and relevant issues relating to the freshwater environment

5. Tackle flood risk by implementing NFM in the Ock's headwaters to temporarily store and slow the flow of flood water

6. Maximise the opportunity of wetlands & other freshwater habitats to remove carbon dioxide from the atmosphere and mitigate climate destabilisation by ensuring existing ones are functioning as carbon sinks and creating new wetlands

7. Improve the resilience of the highways drainage network to extreme weather by identifying areas most at risk and pressurising the highways authority to upgrade, adequately maintain them and install more areas for temporary flood storage

8. Encouraging sustainable water resource management such as water saving at the community level and working with business

9. Enabling the local community to learn about and get involved in protecting their freshwater environment by supporting the expansion of community-led volunteering initiatives and providing further citizen science opportunities

10. Act as hubs to upskill stakeholders and volunteers to facilitate and signpost to training opportunities

11. Wherever possible include the collection of baseline data to enable before and after assessments of project interventions

12. Create and maintain a Project Tracking log detailing all projects delivered / being delivered or where funding has been confirmed for delivery since July 2022. If you are working on a project in Ock you can submit details here.

13. Create and maintain a Project Pipeline of aspirational schemes, so that funding opportunities can be proactively sought as they arise. To submit ideas for a future project for the Project Pipeline, please contact Abows@freshwaterhabitats.org.uk.

14. Educating water & riparian users in good practice measures to minimise the risk of accidentally spreading invasive species around

## 5.2 Projects

The OCP has been working across the Ock to tackle the loss of freshwater biodiversity, restore natural processes and reduce flood risk. Some examples are detailed below.

**Ock Catchment Farmer Cluster**
In September 2022 the Ock Catchment Farmer Cluster was launched at New House Farm, Southmoor with the ambitious goal to....*"create a leading demonstration landscape showcasing the most effective and innovative measures for protecting the freshwater and terrestrial environment and delivering related ecosystem services within the Ock"*

The cluster is facilitated by FHT and led by farmers for farmers. As of July 2023 it has 17 members covering nearly 4,000 ha and its members are actively engaged in improving the freshwater environment.

**Restorating the Boars Hill Alkaline Fen complex**
FHT lead restoration of the Alkaline Fens on the Boars Hill escarpment at Chilswell Valley, Hinksey Heights and Raleigh Park. These are fed by calcareous springs which create a unique, highly biodiverse but also nationally threatened lowland fen habitat. Natural processes have been restored by re-wetting peat, resuming grazing and re-introducing lost wetland plants including Marsh Lousewort (an ecosystem engineer that parasitizes invasive common reed).

**Letcombe Brook Chalk stream**
The Letcombe Brook Project have been restoring one of the Ock's two chalk streams since 2003, removing blockages to fish passage, improving the riparian habitat, restoring flow, reducing flood risk and proactively encouraging the local community to participate in its work

**Species recovery - Curlew**
As part of the wider Upper Thames Curlew Recovery Project managed by Wild Oxfordshire, FHT have been co-ordinating volunteers to survey for and attempt to find and protect curlew nests in the Ock, using electric fencing to reduce egg predation of this iconic but declining protected species.

**Ock Arable Project**
Environment Agency funding has enabled the adverse impacts of farming in the Ock to be addressed by creating new freshwater habitats and implementing low cost NFM measures. These reduce flood risk through rewetting peat and tackle diffuse pollution by using the natural process of denitrification to remove nitrate from the water.

## 5.3 Resources & Data Library

**Catchment Based Approach**
Discover and explore dozens of datasets and applications that are helping organisations to deliver integrated catchment management for the benefit of future generations.
https://data.catchmentbasedapproach.org/

**Research & Policy News – Freshwater Habitats Trust**
Get a regular update on freshwater conservation research and policy news.
https://freshwaterhabitats.org.uk/research/research-policy-news/

**Ock Catchment Farmer Cluster**

**Ock Catchment Partnership**
https://freshwaterhabitats.org.uk/projects/catchment-projects/river-ock-catchment-project/

# 6. Get Involved

There are a number of ways people can get directly involved in protecting and improving the Ock's freshwater wildlife and keeping our rivers safe for swimming:

## 6.1 Practical conservation activities

- Fen restoration – join the active volunteer community restoring Oxford's rare Alkaline fens by scything, raking, making dams and removing willow scrub at Hinksey Heights (FHT), Chilswell Valley, Friends of Lye Valley and Friends of Raleigh Park.
- Letcombe Brook Project - join this local community project safeguarding and enhancing this amazing chalk stream
- GroWet - support the return of lost rare wetland plants to the landscape by growing them on at home
- Curlew Project – help our most iconic wetland wader keep breeding in the Ock
- Plastic Blitz - keep our rivers clean and reduce microplastic entering the ocean by removing plastic from the Ock's rivers

## 6.2 Citizen Science

- Riverfly Partnership – get involved in monitoring caddis flies and mayflies, indicators of water quality, in your local stream
- Oxford Rivers Project – support people to swim in clean water by monitoring the Bathing water at Cutteslowe
- ZSL Outfall Safari – reduce untreated wastewater entering our rivers by finding misconnections

## 6.3 Project Aspirations

Do you represent a community organisation and have an idea for a project which will help us meet the Catchment Plan objectives for our freshwater environment? If so we would like to hear from you; please contact us at info@freshwaterhabitats.org.uk or Abows@freshwaterhabitats.org.uk.

If we consider the project meets the Catchment Plan objectives, represents value for money and would be feasible to deliver if funding was available, we will add to our list of aspirational projects. We will aim to use this project pipeline as a basis for seeking funding from relevant partners for future delivery.