The Thames floodplain near South Hinksey in January 2016

The Ock Catchment Water Environment Improvement Plan

A catchment plan for the River Ock and adjacent areas of the River Thames, which together comprise the Ock Catchment.

The Ock Catchment is hosted by the Freshwater Habitats Trust.

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About this document

This document is a working draft for comment and modification. We have reused information from existing sources as much as possible, and tried to stick to the key points. We welcome active editing and addition – please either write the draft in track changes or, if you are short of time, pass on your comments to Freshwater Habitats Trust who will edit the text for you. For this first draft we do not have the resources for a very glossy document so have focussed instead on simply getting the main points down that we think will make a practical difference.

1. Introduction

1.1 The River Ock Catchment Partnership

The River Ock Catchment Partnership is an informal grouping of organisations and individuals working to protect and improve the water environment in the River Ock catchment and adjacent areas of the River Thames around Oxford. The partnership has been established under the auspices of the Catchment Based Approach (CaBA), which is a community-led approach, given seed-corn funding by the Department for Environment, Food & Rural Affairs, which engages people and groups from across society to help improve our water environment.

More information about the Catchment-based Approach is available here: www.catchmentbasedapproach.org/catchment

The River Ock catchment partnership is one of roughly 100 partnerships covering England. Each partnership has a 'catchment host' which must be a non-governmental organisation that is a registered charity. The Ock Catchment partnership is hosted by **Freshwater Habitats Trust**.

Freshwater Habitats Trust works closely with a Steering Group, made up of several organisations, who together sets the direction of the work in the catchment agreed in this plan.

The following organisations have so far participated in the work and development of the Ock Catchment Partnership:

Abingdon Naturalists Society
BBOWT
Drayton Parish Council
Earth Trust
Earthwatch
East Hanney Parish Council
Forestry Commission
Friends of Lye Valley
Friends of Radley Lakes
Friends of the Trap Grounds
Hill End Camp
Letcombe Brook Project
Longworth Parish Council
Natural England
NFU
Ock Valley Flood Group
Oxford and District Anglers Association
Oxford City Council
Oxford Flood Alliance
Oxford Preservation Trust
Oxford University
Oxford Urban Wildlife Group
Oxfordshire County Council
RSPB
Sandford-on-Thames Parish Council
Steventon Parish Council
Thame Valley Fisheries Preservation Consultative
South Abingdon Flood Awareness Group
South Oxfordshire County Council
Thames Water
The Environment Agency
Vale of White Horse District Council
Wild Oxfordshire
Wild Trout Trust

In addition, a range of individuals and landowners have also helped as volunteers with projects and actions supported by the Catchment Partnership.

1.2 Aims of the Ock Catchment Water Improvement Plan

The Ock Catchment water environment improvement plan is intended to outline the aspirations and goals for improvement to the whole of the water environment in the Ock catchment and the adjacent area of the Thames. The water environment includes ponds, lakes, streams, rivers, ditches, fens, flushes, wet grasslands and groundwater: in other words, all freshwater. We have identified both objectives which have statutory backing and those which are desirable for the protection of freshwaters where there is evidence that they will be beneficial but which lack a specific legal mechanism to support their delivery.

Figure 1. The Ock Catchment

1.3 The Ock Catchment

The Ock Catchment is one of two 'Operational Catchments' within the larger 'Management Catchment known as Gloucestershire and the Vale.

The Ock Catchment is one of England's 20 best freshwater biodiversity hotspots. Although this is quite well-known to wildlife lovers, most residents and visitors would not know, probably because a lot of what makes the area's freshwater wildlife special is hard to easily see.

1.4 The Water Framework Directive

The Water Framework Directive is a European Directive which commits European Union member states to achieve 'Good (or higher) Ecological Status' of all freshwater bodies and marine waters up to 1 nautical mile from shore. It became law in 2003, following 10 years of development which was mostly undertaken in the UK, and gives the Environment Agency (EA) an opportunity to deliver a better water environment.

The WFD divides the country into six large River Basin Districts which are then for practical purposes further subdivided into the catchments of the larger rivers.

The WFD works to protect:

- Surface Freshwater (including lakes, streams and rivers),
- Groundwaters,
- Groundwater dependent ecosystems,
- Estuaries,
- Coastal waters (up to 1 nautical mile from the shore).

The WFD is technically concerned with *all* waters, irrespective of size or type. However in practice, many small waters (e.g. virtually all ponds and small lakes) have been excluded from the WFD because their importance was not understood when the WFD was mainly drafted. Freshwater Habitats Trust has taken a lead at a European level, with a range of partners, in arguing for the importance of the whole water network and we hope that the benefits of this approach can make the Ock water environment improvement plan a model for the best practice in protection of the water environment.

Meeting WFD Objectives

To meet WFD objectives all waterbodies need to meet Good or High Ecological Status by 2027. The Environment Agency classifies the status of waterbodies through several ecological criteria (algae, invertebrates, large water plants and fish) and by assessing the pressures and risks that could impact a waterbody.

The EA looks at 5 categories of potential pressures:

- Diffuse sources of pollution,
- Point sources of pollution,
- Alien species,
- Water abstraction and flow regulation,
- Physical or man-made alterations to waterbodies.

The Ock Catchment Partnership focuses on identifying the issues within the catchment and how they can be addressed and improved through the Catchment Based Approach (CaBA).

Nature conservation legislation that protects the water environment

Legislation and policy which is broadly classified as 'nature conservation' legislation also helps to prioritise how we protect the water environment. It is an objective of the Catchment-Based Approach that we try to integrate and apply this legislation alongside 'water law' to protect the freshwater environment.

Priorities include:

- Designated Sites (i.e. SSSIs),
- Protected Species (i.e. Wildlife and Countryside Act, Biodiversity Action Plan),
- Priority Habitats (i.e. ponds of high ecological value, headwaters, selected rivers and streams).

2. Shared Vision for the Ock Catchment

Our vision takes this into account – we must inspire all living, working and visiting the area to recognise its value. This knowledge, as well as laws, regulations and policies, is ultimately what protects the environment.

2.1. The Vision

Our vision for the River Ock water environment is that it will:

- Above all, that it will *stay special*!
- For the water environment to improve, becoming as unpolluted and structurally natural as possible.
- To improve and protect pivotal areas that will in turn protect the catchment's most special freshwater wildlife, and to create more of these areas.
- Not to lose any more of our precious water plants and animals, and to see more recovering.
- To work with farmers, land owners, councils, businesses and communities to manage their landscape to protect freshwater wildlife, while at the same time helping to slow the flow and reduce flood risk.
- To use flood schemes to make a *better* environment.
- That it will be able to continue meeting the needs of drinking water suppliers and businesses while finding innovative ways of reducing their impacted.
- To create a resilient water environment that will be better equipped to deal with issues such as climate change.
- To create a catchment that continues to provide an attractive place for the community to enjoy.

2.2 Goals

- Provide a clear understanding of the challenges affecting the Ock and Thames.
- Enthuse local communities, groups, businesses and organisations to enjoy and understand the water environment and involve them in decision-making and activities.
- Work out priorities for improvement – what needs doing, where and in what order.
- Deliver these improvements in a joined-up and cost effective way.
- Monitor the things we do to ensure they work effectively to improve the water environment and its resources.
- Share information, evidence, ideas and best practice.
- Demonstrate and test innovative ways to resolve challenges.

Water Violet. A rich natural plant and animal communities tells us we are not irrevocably damaging our world

2.3 Guiding Principles

- We will build out from clean areas – clean water is vital and rare in the Ock Catchment landscape and we should do everything we can to protect and extend it.
- We will find the best ponds, lakes, streams and sections of the main rivers. Once we've secured the best bits, work out from these areas.
- Where worthwhile we will restore waterbodies (by increasing abundance of existing species).
- We will ensure statutory sites (SSSIs, priority habitats) are protected and improving.
- We will prioritise in terms of freshwater biodiversity: ensure endangered freshwater species are no longer declining and, if possible, increasing.
- We will maximise the benefits from 'multiple objective' work (e.g. holding back floods on the land to greatest benefit for biodiversity and using Oxfordshire's outstanding research expertise to tackle environmental problems).
- We will be led by evidence (see below).

The evidence base

If we can't make the catchment that includes Oxford, the home of knowledge, the ultimate demonstration of the benefits of knowledge for protecting the environment, we should probably pack up.

Evidence will be at the heart of our strategy. We can't afford to waste time or money, and perhaps more importantly our collective energy, goodwill and time on the wrong things. This will create some uncomfortable choices, and may conflict legal priorities which may lag behind what we know.

- We will be led by data: create catchment model(s) to understand what we should be asking specifically of landowners in the way of land management to control flooding and improve water quality.
- We will use freshwater biodiversity as a key to monitor our success. Rich, natural plant and animal communities tell us we are not irrevocably damaging our world.

But we also need to show we care: knowledge alone is not enough, and can be an end in itself. We need to put knowledge to action – again something which the area has a pretty good track record in.

KS2 Students taking part in the Clean Water for Wildlife Survey

2.4 Working Together

We recognise that we will only achieve our vision by working in partnership with local communities, groups, businesses, organisations, authorities and individuals. Everyone involved in the partnership is already making a difference. Linking together will allow us to do so much more. We want to draw on as many ideas and as much support from local people as possible. By working together we can:

- Obtain involvement from as wide a range of people and interests as possible to develop and agree mutually beneficial plans to improve the freshwaters in the area.
- Develop and share good practice and consistent advice.
- Help organisations work together to make the most of scarce funds.
- Receive feedback and adjust our work accordingly.

How can you help?

Here are some ways in which you can help realise the vision:

- **Businesses** – could you sponsor projects or provide volunteer working parties to help us make practical improvements?
- **Land managers** – could you take advantage of our advice and partnership grants to help tackle diffuse pollution or create new clean water ponds?
- **Parish Councils** – could you encourage local people to get out and monitor the condition of the water environment and build their results into your Neighbourhood Plan?
- **Wildlife Trusts** – could you offer ideas for extending and linking wildlife sites to benefit wildlife?
- **Schools** – Can you encourage children to get involved in activities that will make a difference to the freshwater landscape? Run science projects developing innovative ways to save water, take part in citizen science surveys to monitor your local freshwater habitats or help raise a population of an endangered species. Run projects in art, poetry, prose or science which raise awareness of the natural environment.
- **Householders with septic tanks** – if you live out in the wilds, could you act on our 10-point Action Plan for managing septic tanks?

2.5 How we will improve the water environment

We believe there are three primary ways of delivering improvement to the water environment through organisations and individuals.

1) Statutory responsibility

Organisations such the Environment Agency, Anglian Water, Natural England and local authorities are required to deliver certain environmental standards as part of their work. These can be used as a cost effective way of bringing about positive changes to the health of the water environment. By working with these organisations the River Ock Catchment Partnership will ensure their works have a positive impact on the freshwater and seek to influence these to deliver maximum benefits.

2) Projects in action

Many partner organisations working in the catchment are already delivering and developing varied projects to improve the health of the water environment and associated wetlands.

3) Voluntary action

These can be undertaken together with activities and projects that are already happening as part of an organisation's working, or by any individual, community group or business. For example, the Friends of Lye Valley is working with Oxford City Council, Natural England and others to protect water dependent wetlands in Oxford. In Abingdon the Ock Valley Flood Group has been managing the river practically to reduce flood risk. Other opportunities for voluntary actions include promoting responsible water use by everyone, and proper maintenance of septic tanks. We hope that members of the partnership will be able to provide advice, expertise and mutual support to those wishing to set up their own projects and activities, or offer information about action to improve the health of the areas freshwaters.

2.6 Landscape working across the whole catchment

The challenges affecting the Ock and Thames arise through high nutrient and sediment inputs, low flow at times, and widespread alterations to the natural path and shape of watercourses (hydromorphology). Through changes in land management and land use over the centuries, the River has become disconnected from its historic floodplain in some places, so cannot flood in a natural way. Current approaches to conservation focus on working at a landscape scale and creating networks of well-connected habitats. In his report to the Government in 2010, "Making Space for Nature"[1], Professor Sir John Lawton stressed the need to link wildlife sites;

> *"There is compelling evidence that England's collection of wildlife sites are generally too small and too isolated, leading to declines in many of England's characteristic species. With climate change, the situation is likely to get worse. This is bad news for wildlife but also bad news for us, because the damage to nature also mean our natural environment is less able to provide the many services upon which we depend".*[1]

We now have an opportunity to use a landscape-scale approach to protect, maintain and enhance the 'natural capital' of the Ock and Thames catchment and the varied 'ecosystem services' which this 'natural capital' provides. We want to see an enhanced network of valuable habitats for wildlife, high-quality food production, reduced flood risk, secure supplies of drinking water, and, not least, a catchment which more people can visit and enjoy in diverse ways. We have initially focused on specific priority areas and target issues, with practical work being carried out in the River channel and on adjacent land. We have made good progress so far, with much more planned for the future. In order to fully restore the health of all the watercourses in the Valley, and to maintain the improvements we have already made, we are developing a long-term plan at a landscape scale to realise all the opportunities we are now beginning to identify to enhance the freshwater environment.

[1] [1] Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., & Wynne, G.R. (2010) Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra.

In developing a longer-term landscape plan for the catchment, we will look for appropriate sources of funding, and seek to influence what is already available to us. For example, there may be some opportunities for river restoration projects, including better linkage of rivers with historic flood meadows and studying their role in flood risk management. Promoting the uptake of Countryside Stewardship schemes on farms across the catchment would also have landscape benefits. Working with all the relevant interests we can prioritise areas where this work will provide the most benefits including flood risk reduction, environmental improvement and social gain. All proposals will need to take into account the interests of other land and water users in the catchment. The aim will be to proceed with support from our stakeholders at all times.

3. The Environment of the Ock Catchment

The Ock Catchment environment action plan considers all freshwaters, water dependent wetlands and species in the River Ock catchment. The water environment includes ponds, lakes, streams, rivers, ditches, fens, flushes, wet grasslands and groundwater: in other words, all freshwater. The water environment supplies us with many key resources, is a place where a surprisingly large proportion of the regions plants and animals live, including many species now endangered either globally, nationally or locally, and is both a source of, and a protection from, flooding.

There is no single map of all of the waterbodies that make up the water environment but Figure 2 is a reasonable approximation and shows the ponds, lakes, streams, rivers and ditches marked on Ordnance Survey maps. Figure 2 shows the water dependent wetlands, mainly wet grasslands and fens.

The Ock Catchment is situated on two major aquifers, The Thames Chalk and the Corralian, with minor areas of Lower Greensand and Upper Greensand.

3.1 The freshwater habitats of the Ock Catchment

What's so special about the Ock Catchment?

It's often assumed that there's nothing very special about the water environment of the Ock Catchment and although many people are aware of and love Oxford's meadows they probably don't realise quite how exceptional the area really is. The truth is that this is one of Britain's best freshwater landscapes – though it is badly bruised and battered.

Provisional mapping of freshwater hotspots in England indicates that the Oxford area, including the Ock catchment is one of the country's 'Top 20' freshwater landscapes.

It goes without saying that Oxford has one of the largest concentrations of high quality wetland habitats inside a city boundary anywhere in Britain. This is a huge challenge for planners, and ought to be celebrated that we have as much as we still do whilst a major city grows on this fragile natural environment.

A list of the protected species found in the catchment is given in Appendix 2.

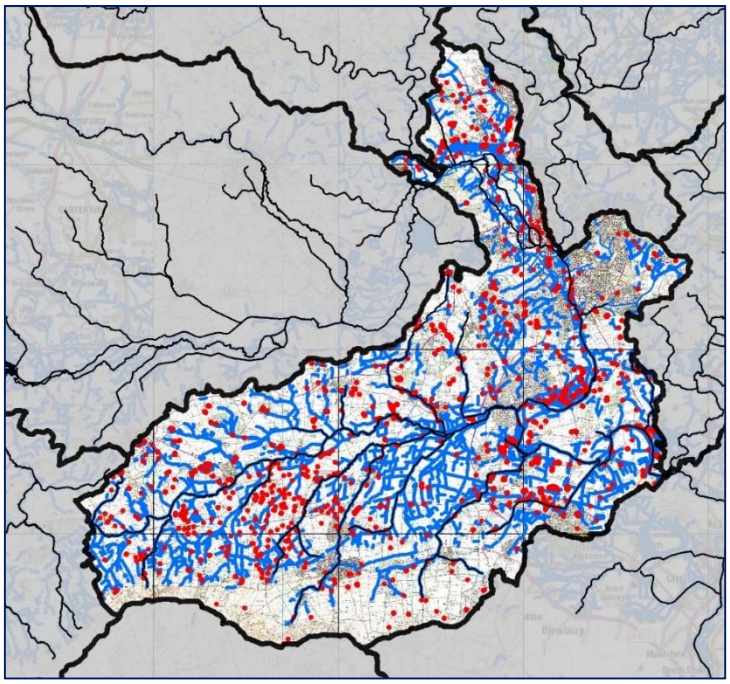


Figure 2. The water environment of the Ock and Oxford Thames catchment. Ditches, streams, rivers and lakes are shown in blue and, for clarity, ponds are shown in red and exaggerated in size. Water bodies shown in black are those listed and monitored under the Water Framework Directive which are required to reach High or Good ecological status. Although technically the Water Framework Directive requires all waterbodies (irrespective of type of size) to be in good condition monitoring is currently confined to the black rivers and streams.

Special water plants

Few people are aware of what kinds of water plants they should see in freshwater because virtually all of the sensitive species have now disappeared. They are only hanging on in carefully protected patches in a few reserves or uncultivated areas. As one of England great wetlands, the Upper Thames, including the Ock Catchment is still home to a host of these special plants

These plants include:

- **Water-Violet** – now listed in England's Red Data Book for plants.
- **Fen Pondweed** – living in clean water in fens, fen ditches and ponds in fen landscapes. The Ock catchment has the only populations in the whole of the Thames catchment.
- **Tassel Stonewewort**: a priority species in the UK Biodiversity Action Plan; once recorded in the catchment, but now found nearby on Otmoor. A candidate for reintroduction to the area.
- **Creeping Marshwort**: at its only location in England and specially protected by the Wildlife and Countryside Act.

Special freshwater animals

The Ock Catchment also has some special freshwater animals including:

- **Natterjack Toad**: now usually restricted to coastal dunes and heathland, it is one of the area's biggest surprises, kept safe in an inaccessible secret location. This is an animal that was common across southern England 100 years ago, and did occur on the Frilford heaths. Now it has been banished to the coast mainly as the rest of the countryside has become enriched, rank and ungrazed, and as much heathland has transformed into woodland. Now it only survives in those places where we replicate the key principles of old-fashioned farming: low inputs, acid soils and intensive grazing, something that modern commercial farming does not easily do.
- **Great Crested Newt**: we love to hate the great crested newt, but this spectacular amphibian still lives within the bounds of Oxford City. With a new approach being tried for its conservation hopefully everyone will once again be able to appreciate this creature and protect it. It should be a symbol, like other freshwater creatures, of the well-managed landscape.
- **Common Toad**: this animal is still fairly widespread in the catchment, but its populations are probably in trouble. This may be one of the casualties of climate change – it needs all the help we can give it.
- **Otters**: are the success story of the last 30 years and now have returned to the area but go largely un-noticed by most people living in the area.
- **Water Voles**: it's still not too difficult to see a water vole in the Ock catchment - hanging-on in unlikely circumstances, using small waters which some people would think of nothing more than drains. Despite the threats they are great survivors – and we could make them a known icon of the area.
- **Striped Mayfly**: we all know mayflies are sensitive, and the Thames in Oxfordshire and Berkshire has one of Britain's, most endangered, the striped mayfly. It's one of our biggest mayflies but like most invertebrates remains unknown to most people.
- **Club-tailed dragonfly**: a special species of big rivers it is famous for occurring in the Thames and our area is a stronghold.
- **Southern Damselfly**: Britain's most highly protected member of the Odonata. The Ock catchment supports the only population in the Thames catchment – miraculously hanging on under BBOWTs stewardship.
- **Pondweed Leafhopper**. This tiny beautiful blue animal is found only in a handful of Britain's highest quality ponds; remarkably it occurs just outside Abingdon.
- Probably several protected freshwater molluscs despite all the losses like the **depressed river mussel**, the tiny **fine-lined pea mussel**.

Recent losses

It's not all good news: native **white-clawed crayfish** are probably now gone, as they have from much of

southern England. So has the Glutinous Snail which in the UK is now found only in one lake in Wales. All of those listed above are finely balanced with tiny populations.

3.2 Where is the clean water in the Ock and Thames catchment?

Most places that have healthy freshwater communities – and also those which we can make use of most easily for drinking and supplying the water we need– have one thing in common: they are little affected by pollution.

In lowland England clean water is now rare and many of the problems we face are concerned with either protecting existing clean water or cleaning up polluted water. Of course, there are creatures that can tolerate polluted water but many plants and animals do not. Most people in the Ock and Thames catchment never experience the beauty, diversity and wonder of the wildlife associated with clean water.

All over the country we have a very detailed knowledge of pollutant levels in larger rivers and streams but other waterbodies go mostly unmonitored. In contrast, in the Ock catchment we have one of the first comprehensive snapshot views of the extent of water pollution in all kinds of freshwater habitat. In spring 2016, as part of the Heritage Lottery Fund supported 'Clean Water for Wildlife' project, volunteers and FHT staff did a catchment-wide survey of nutrient pollution levels using rapid, low-cost, test kits.

The kits measure the levels of nitrate and phosphate levels, which gives a good indication of the extent of pollution generally. If both these two pollutants are at natural background levels there is good chance that the water is generally clean.

The map (Figure 3) we produced showed a pattern which is probably generally true. There are a lot of polluted waters, but clean water can still be found, mainly in ponds, lakes and streams draining woodland.

We think this map is positive because it enables one to focus on what is good in the environment – what is clean, and worth redoubling efforts to protect and extend, rather than solely considering the rather depressing extent of pollution which can build up a sense of hopelessness.

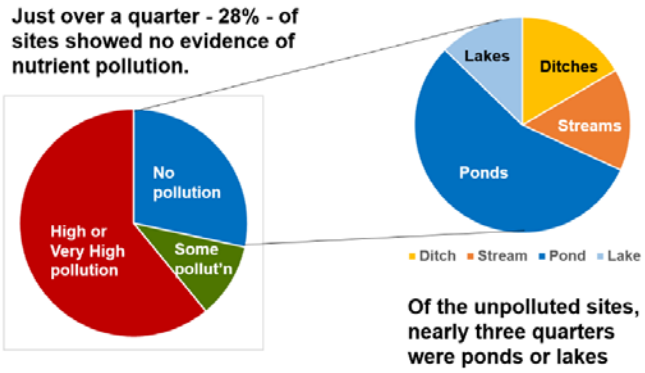


Figure 4. The proportion of different waterbody types in the Ock Catchment that were polluted by nutrients in spring 2016.

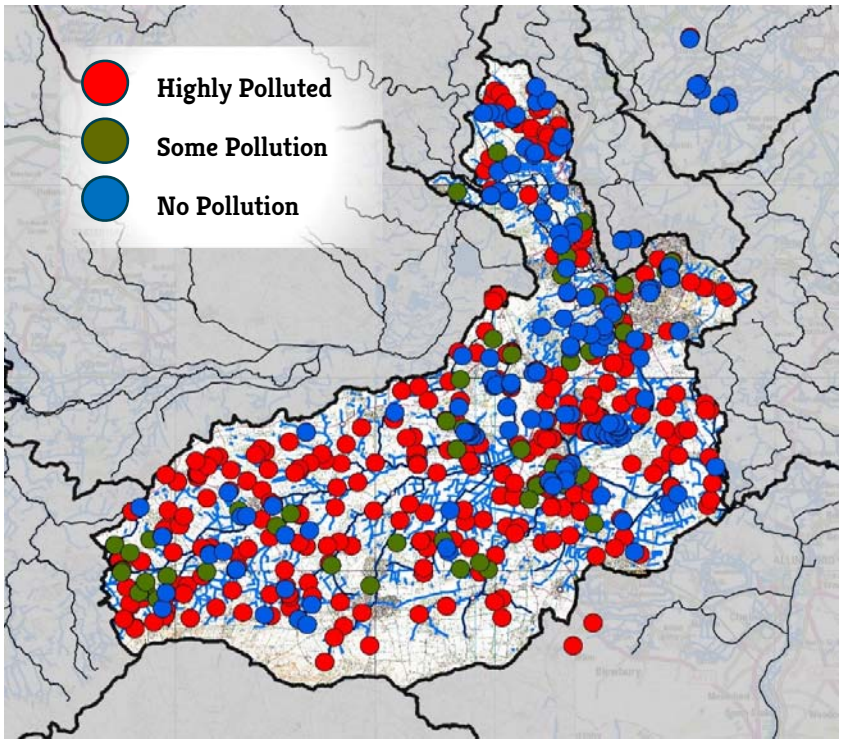


Figure 3. A snapshot of water pollution in the Ock and Thames catchment in spring 2016. This is one of the first ever whole catchment surveys of pollution in Britain and provides a view of which waters are clean and which mildly or seriously polluted. The survey is roughly evenly divided between ponds, lakes, streams, rivers and ditches. We also took samples in canals, and in the pools and springs of fen nature reserves. The survey was carried out by volunteers working on the HLF supported Clean Water for Wildlife survey creating a case study for the Ock Catchment Partnership.

3.3 Rivers and Streams in the Ock Catchment

The rivers and streams shown in Figure 5 (inset) must achieve Good or High status (outlined by the WFD) by 2027 at the latest. These waters are divided into 13 'waterbodies', the catchment of which are shown in the main part of Figure 5. The map leads to some simplifications which can make the true situation look worse than it really is.

In 2015, most of the waterbodies in the Ock/Thames catchment were at Moderate status and six at either Poor or Bad status, reflecting the extent of pollution and damage to the physical structure of rivers that has occurred over the centuries.

The Water Framework Directive map is inevitably an over-simplification and can make the true situation look both better and worse than it really is. One problem with the map is that it makes things look a bit worse than they really are: for example, there are clean headwater streams in Wytham Wood in the catchment of Waterbody 30334, the Thames, but because these are not monitored separately they do not show up on the catchment maps. Likewise because the only waterbodies monitored in this area in the WFD are streams and rivers, they do not take account of the existence of ponds or small lakes which are still in excellent condition and some, if classified using the methods of the Water Framework Directive would achieve High, or at least Good, status.

The opposite effect can also occur in that the map can give a misleadingly optimistic impression in that many smaller waters are probably more impacted than the map suggests; we know from other surveys that many ponds, headwaters and ditches are very badly damaged by pollution but these impacts are also not readily detected by WFD monitoring at present because these smaller waters are not monitored. At the time when the Water Framework Directive was set up it was argued that monitoring a lot of small waters would have been too costly. In fact, it is simple enough to devise representative monitoring programmes but those in charge of setting up the Directive were a little out of touch with the most up to date science so did not really understand the importance of the smaller waters. Fortunately, biologists now are well aware that these smaller waters are a vital part of the network, although plans and laws haven't always caught up with this.

Because the status of the individual Water Framework Directive waterbodies is a very important part of catchment management – and drives much of the work of the Environment Agency. For those interested to delve further into this information the maps and data are available in the Catchment Data Explorer produced by the Environment Agency, although beware that it is quite technical information: www.environment.data.gov.uk/catchment-planning/.

For more information on each river and stream monitored for the WFD please see Appendix 1.

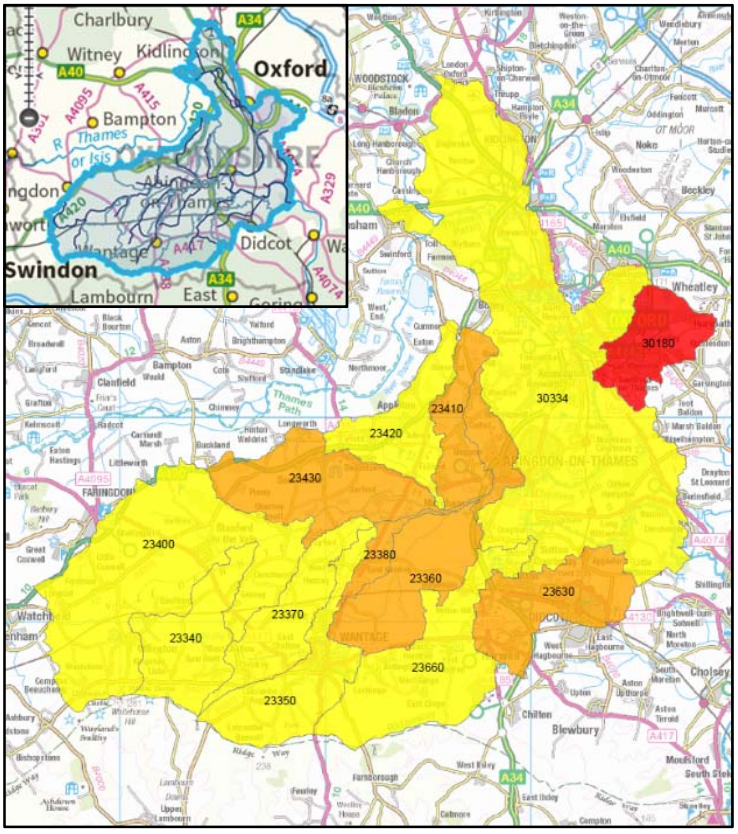


Figure 5. Waterbodies in the Ock and Thames catchment which must reach High or Good status by 2027.

3.4 Other freshwaters

It is only quite recently that people have defined the different types of freshwater, a process which began in research in the Upper Thames and has now been adopted more widely. The smaller waters, in particular, have been much less studied than larger rivers and lakes, and until recently nobody knew how important they were. Work in the headwaters of the Thames has played a major role in increasing understanding of the significance of small waters, particularly work done just outside the Ock catchment at Coleshill on the Oxfordshire / Wiltshire border. This was the first place anywhere in the world where the relative importance for freshwater wildlife of different kinds of freshwater habitats was investigated.

Headwaters, springs and flushes

Probably the least understood freshwater habitats in the catchment are the smallest headwater streams, springs and flushes.

Headwaters are a priority habitat under the UK Biodiversity Action Plan. At present, there is not enough survey information to know where most of these habitats are found, although it is likely that any headwater catchment with clean water, such as those in Wytham Woods or Bagley Woods, will be classified as priority habitats.

Most of the best examples will probably to be found on the edge of the Corrallian and Oxford Clay/Greensand formations. They are known to be important as tufa forming springs and the undamaged examples may be the type of internationally rare habitat known in the Habitats Directive as 'Petrifying springs with tufa formation (Cratoneurion)'.

Examples can be seen in such unlikely places as the suburban Dunstan Park in Headington (fractionally outside the catchment boundary but a known site for the priority southern yellow splinter cranefly (*Lipsothrix nervosa*), an aquatic species listed in the UK Biodiversity Action Plan), at Rivermeads in Oxford and in the Chilswell Valley.

Ponds and Lakes

The Ock catchment is one of the first places in the country to have had a comprehensive pond survey as a result of work done in the late 1980s in the Oxfordshire Pond Survey. This survey highlighted the poor condition of most ponds but was also the first list of important sites, and was an important early step in developing understanding of the importance of ponds.

A provisional list of the important ponds in the catchment is given in Appendix Table 1. There is no map of the most important ponds in the catchment, although Freshwater Habitats Trust (FHT) has a provisional list of the most important sites and is currently developing this information further.

Lakes are not well understood in the catchment although the Clean Water for Wildlife survey indicated that these areas are a hotspot for clean water so may be expected to support important freshwater communities. As far as possible, information being collated in the Important Freshwater Areas pilot project by FHT will be used to make a provisional list of important lakes in the final version of this plan.

Ditches

There is usually a greater length of ditches in any lowland farmed environment than any other linear freshwater habitats. In some areas ditches, although completely man-made, are an important refuge for endangered species. Examples include wet grasslands near the coast and sometimes inland areas like Otmoor with extensive wet grassland. Some of these are protected as Sites of Special Scientific Interest and Special Areas for Conservation. In the Ock catchment we have one small area of ditches which are designated as a Sites of Special Scientific Interest, at Wytham. In practice, all ditches have the potential to support valuable freshwater species, depending on the water quality and history of the sites. Because ditches are at the sharp end of pollution problems they are often significantly impacted.

Elsewhere all ditches support some freshwater plants and animals and sometimes species of conservation concern. Ditches may support as many species as smaller streams but, because they are man-made and small, have rarely been considered in freshwater management.

Again, as a result of work in the Upper Thames we have a better general understanding of the significance of ditches and their management

needs in the Ock and adjacent catchments than in other parts of the country.

We have very little information on the biota of ditches in the Ock catchment, although the Clean Water for Wildlife survey showed one of their clear characteristics: like ponds they are very variable from place to place, and because of this most are quite polluted.

Wetlands: fens, wet meadows and floodplain

The fens, wet grassland and floodplains of the catchment are well-known and most are protected as designated nature reserves or enjoy some other sympathetic management.

Despite this, all are also threatened by the way their surroundings are managed, mainly as a result of water pollution or the on-going risks of changes to their hydrology.

In practice the whole of the floodplain landscape supports potentially important freshwater habitats. Any waterbody inside the red area is potentially of above average richness and may have historic sediments with the propagules of plants and animals thought extinct in the area.

Groundwaters

Groundwaters are important for their role in water supply – they are a major source of drinking water in many parts of the country, including our catchment - and the maintenance of groundwater dependant freshwater wetlands which include some of the most important and fragile sites, such as the Cothill/Dry Sandford complex and the Lye Valley.

Shallow groundwater in gravels underlying floodplains feed all of the gravel pit lakes and ponds in the area, and new ponds created for wildlife conservation purposes in these gravels (such as at Pinkhill Meadow outside the catchment area at Farmoor) are often less polluted than ponds fed by surface runoff.

The two major aquifers in our project area, the Thames chalk and the Corrallian, are both seriously contaminated by elevated nitrogen levels.

Recent modelling work suggests that it will take a very long time for nitrogen levels to drop back to natural background levels.

Levels of nitrogen in aquifers are regulated to keep them below the concentrations required for drinking water. This has led to the adoption of Nitrate Vulnerable Zones across large parts of England, including our catchment, where land management practices intended to reduce nitrogen runoff are applied.

Despite widespread use nitrogen pollution remains a problem which is difficult to control.

4. Tackling the issues

4.1 What are the issues?

The main issues impacting the Ock freshwater environment are:

- Water pollution - (sediments, nutrients & pesticides),
- Invasive species,
- Water supply and low flow,
- Historic modification of waterways,
- New developments,
- A low level of public understanding and engagement.

4.2 Water Pollution

We know that sediment, nutrients and pesticides 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. Water entering the rivers affected by run-off from fields, roads, developed land or septic tanks is known as diffuse pollution. The sources of pollution are spread across the Ock landscape, so can be hard to determine, and initiatives to reduce their impacts need to cover land away from the rivers bank as well as next to it.

Nitrate

Nitrogen is essential for animals and plants and is widely applied as a fertiliser, as well as being released into the environment from burning fossil fuels and from sewage works. There are high levels of nitrate in many freshwaters in the Ock and Thames catchment, and most of the groundwater has very high levels of nitrate. Reducing nitrogen pollution is very difficult.

Thames Water and the Environment Agency are working to regulate concentrations of this pollutant.

At present, the Thames chalk aquifer has some of the highest nitrate levels in Britain with average concentrations in 2036 expected to be around 53 mg/L (the drinking water limit is 50 mg/L). It is predicted from modelling studies that levels will begin to decline in 2036.

The position in the Corrallian limestone is slightly worse. Concentrations are expected to peak in 2079 at a level of 79 mg/L and start to decline after this.

It should be noted that natural waters in this area would have a nitrate concentration of around 4mg/L.

Pesticides

Pesticides can have extremely detrimental impacts on the health of the river, terrestrial species and human health. Drinking water standards also have very low tolerance limits for pesticides and parts of the Ock and Thames catchment lie within a defined Drinking Water Safeguard Zone. It is vital to ensure that pesticides are targeted effectively on pests and diseases, and that their levels in drinking water and the wider environment are minimised. One pesticide of current concern is metaldehyde. This is used in slug pellets and cannot readily be removed when treating drinking water. Alternatives are available, but may pose different risks to the environment. Other pesticides may also pose a risk for freshwater plants and animals.

Sediments

Sediment is the term used for small particles of soil and other material that enter the water. Sources include run-off from roads, eroding river banks, soil that is washed over the land after heavy rainfall, and livestock trampling river banks. Sediment clogs up river gravels, reducing invertebrate habitat, fish spawning sites and the viability of fish eggs. It also increases flood risk by clogging water courses, and reduces the water storage capacity of reservoirs.

Once in the water, the fine sediments are very hard to remove. As they settle on the river bed, they may release chemicals (e.g. phosphate and pesticides from farming, or oil from roads) into the water over many years. New techniques are being developed in the catchment to reduce the amount of sediment reaching the river. We are also using walkover surveys to find out which sites are most affected. Anglers and walkers can provide this valuable information to us.

How effective is land management in controlling pollution?

Estimates of the effectiveness of measures to control diffuse pollution are worrying. For example, in the Hampshire Avon catchment, models indicate

that current land management measures reduce the amount phosphorus running into freshwaters by 10%, sediment by 7% and nitrate by 4%. The theoretical maxima if all technically feasible measures were installed are, respectively, 47%, 66% and 22%. So even in the most optimistic scenarios there would remain substantial pollutant losses (Zhang et al. 2012).

A similar situation is predicted on the R. Wensum in Norfolk, another area where recent intensive studies have been made. Here mitigation measures could reduce nitrate losses by up to 20% and phosphorus by up to 17%. In both examples, reduced loads do not necessarily lead to reduced concentrations which, in freshwaters, are critical in determining pollutant impacts (Taylor et al., 2016).

Of course, this doesn't mean we shouldn't try, but we may need to carefully focus work to make a real difference to freshwaters, although there may be benefits to marine ecosystems of simply reducing the amount of diffuse pollution entering the oceans.

Protecting or creating clean water

It can be depressing and demoralizing to realise the full extent of water pollution and feel powerless to tackle the issues. Often a better approach is to think about the clean water, and how we can make more of it.

This is most easily done by:

- Creating ponds and lakes offline from the main surface water supplies.
- Making sure that streams draining non-intensively managed land (e.g. woodland) are well protected and any remaining pollution inputs as far as possible removed.
- Stopping major point source pollution from sewage works.
- More experimentally, trying to reduce diffuse pollution from farmland and urban areas.

There is an enormous amount of effort and expenditure in trying to stop diffuse pollution and many techniques that show promise but few have so far really been shown to solve the problem.

The partnership is currently trying to commission modelling studies to find out where most effect can be had in terms of measures to reduce diffuse pollution.

Farm by farm analysis of pollutant levels is now practical with quick test kits. Figure 6 shows one such farm survey in the catchment which indicates how clean water could probably be created on almost every farm – but this is likely to be easiest in off-line water bodies or those with small non-intensively managed catchment.

Cleaning up pollution

The Environment Agency is the main body responsible for regulating pollution and reducing it to the levels specified by the Water Framework Directive, at least in those waterbodies covered by the Directive.

The Catchment Partnership will build on the intensive research and demonstration work being undertaken by FHT and Game & Wildlife Conservation Trust in the East Midlands through the Water Friendly Farming Project (see: www.freshwaterhabitats.org.uk/research/water-friendly-farming/). The Partnership will bring proven techniques from the project to the Oxfordshire Landscape, treating those techniques which not yet fully proven as experimental, and work with farming community to develop a Water Friendly Farming: Ock Pilot Project.

To further Water Framework Directive objectives we will select one or two smaller catchments to engage with intensively to attempt to reduce diffuse pollution.

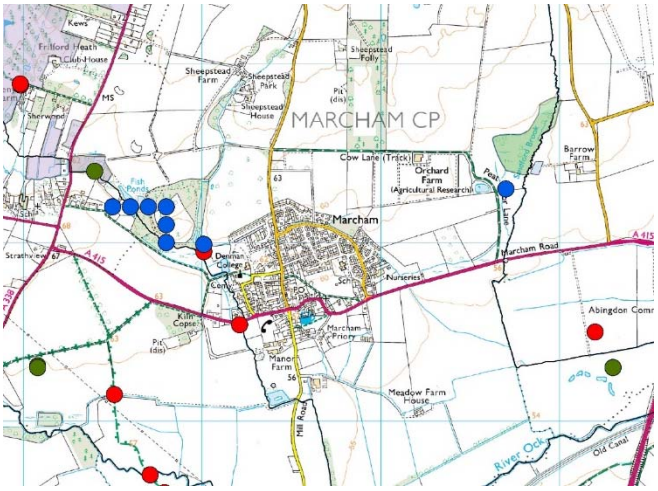


Figure 6. The most water friendly farms in the project catchment support a surprising number of unpolluted waterbodies. At one farm in the Marcham area there is a pronounced concentration of clean ponds and wetlands of considerable wildlife value.

We will also discuss with Thames Water the potential for removing phosphorus at one of the smaller rural sewage treatment works which currently are major pollutant sources in the Ock catchment. We expect this work will be led by the Environment Agency.

4.2 Flooding

Both of the major towns in the project area, Oxford and Abingdon, have suffered major floods in recent years.

The Environment Agency is currently designing, with a range of local stakeholders, flood alleviation schemes to reduce the risk of flooding both areas.

The projects are currently underway and details of the schemes are well-known to most members of the catchment partnership.

There are likely to be good opportunities to test the effectiveness of Natural Flood Management techniques in these projects. We are carrying out such tests on the Abingdon flood scheme at present, and plan to build on the experience of the Water Friendly Farming project to test this approach further in the Ock catchment, particularly in order to further explore the potential for gaining multiple benefits: for flooding, for water quality and for biodiversity.

The first concrete evidence of land management projects providing ecological benefits has now been obtained from the Water Friendly Farming project in Leicestershire which has shown unequivocally that, at a catchment scale, clean water pond creation has successfully increased the variety of wetland plants across a 20 km^2 landscape.

This work also shows that small semi-permeable dams have the potential to reduce flood peaks in a 1:100 year event by 8%, and by more in less extreme events (Figure 7).

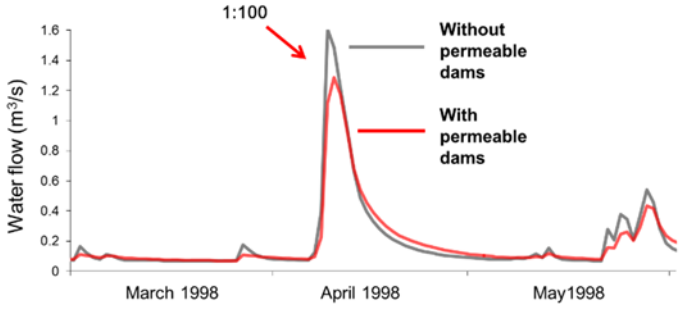


Figure 7. Effect of introducing permeable dams on 1:100 year floods in Eye Brook catchment of the Water Friendly Farming project.

4.3 Water supply and low flow

Water is a key element for life, and both surface and ground water provide a crucial resource for people and the natural environment. The quantity and dynamics of water flow and water levels are also important to support all the flora and fauna that live in and around watercourses.

The Environment Agency is responsible for managing water resources to ensure that there is enough water available for people and businesses while protecting the needs of the natural environment. The Environment Agency knows where water is available in the Ock and Thames catchment and where current rates of abstraction need to be reduced where appropriate.

Abstraction affects rivers and streams, and sometimes groundwater fed wetlands. Monitoring the ecology of these habitats, especially at times of low river flow or drought, allows the Environment Agency to work with licence holders to reduce their potential impact on the environment.

> ***Abstraction***
>
> *This is the process where water is taken, temporarily or permanently, from surface water or groundwater for a number of uses including industry, irrigation or for drinking water. Above a defined threshold, the amount that can be abstracted is controlled by the Environment Agency using an abstraction license.*

4.4 Historical Modification

Freshwater habitats, particularly the river and stream network, have experienced substantial modification as a result of damming, realignment and enlargement, mainly for milling and land-drainage purposes.

This has led to a range of problems for freshwater animals, especially fish, which cannot now access freely the whole of the waterway network that would naturally be available.

The Environment Agency is developing a series of projects to encourage fish movements in the

waterways which local community action can also help to facilitate and bring forward.

There are also substantial opportunities for restoring floodplain structure and function which, when combined with the restoration of clean water on the floodplain can make a very substantial improvement to the water environment. Projects on the Thames upstream and downstream of the catchment (respectively the Pinkhill Meadow complex adjacent to Farmoor Reservoir and the River of Life project at Shellingford) provide good models of ways in which floodplains can be enhanced. Pinkhill Meadow is one of the most intensively evaluated floodplain pond restoration/creation schemes in Europe and as well as being an excellent wildlife site has provided many valuable lessons to both support the principles of clean water floodplain pond creation and learn valuable lessons allowing the improvement of new designs.

Other freshwater habitats are less affected by the precise physical structure.

4.6 Public understanding and engagement

Most people have limited daily experience of freshwater – and increasing this understanding is an important goal for many organisation.

Within the project area we would be pleased to list any activities currently being undertaken to increase public understanding of freshwater ecosystems and the need to protect them.

Examples of groups are undertaking public engagement and practical work on freshwaters in the project area includes:

- BBOWT on wetland nature reserves such as the Lye Valley and Chilswell Valley.
- Freshwater Habitats Trust: Clean Water for Wildlife Survey.
- Friends of Lye Vallley.
- Letcombe Brook Group.
- Oxford Flood Alliance.

5. Summary of projects in progress and proposed

5.1 Introduction

The following pages set out what we are doing now and what we plan to do to tackle the challenges identified within the Ock catchment and to ensure that, in time, waterbodies reach High or Good Ecological Status. Some of the projects listed are aspirational and while we have partners willing to undertake them, more investigation is needed to arrange funding or bring other partners on board to help deliver them.

It is important that we continue to monitor and appraise our projects to ensure that they are having all the positive impacts which we think they will, and to determine if they are producing any added benefits. This action plan will act as our baseline to monitor our progress.

We know that this is not the full picture of activities taking place in the Ock catchment. We will continue to collate information on other initiatives, and to identify partners who we can support (or who can help us) to make improvements. This will help to ensure that activities take place across the whole of the Valley, and that we link partners with other organisations and individuals who can help each other deliver their work. The issues facing the Ock are all interlinked and we know that projects undertaken to improve water quality will also have positive benefits for habitat quality and vice versa.

5.2 Partnership action principles: practical work to improve the water environment

Freshwaters are exposed to many threats and controlling them all is difficult. To do so will take a coordinated action within sub-catchments using the following approach:

1. Identify and protect the best

- Analyse existing datasets and collate information from published and unpublished sources.
- Collect additional information if the habitats we know to be important are not currently monitored e.g. ponds, small lakes, headwater streams.
- Monitor parameters we perceive to be causing a problem if they are not currently monitored.
- Identify smaller units than currently used by the Water Framework Directive, for example headwater streams achieving high status compared with downstream stretches of the same waterbody which are currently classified as Moderate under WFD criteria.

2. Build out from the best areas to strengthen important populations and encourage species dispersal, which is essential for biological recovery.

- Use a strategic coordinated approach in the management of river catchments rather than ad hoc work over a large area.
- Use both management / restoration of habitats and creation of new habitats to sustain and build populations of freshwater plants and animals

3. Recreate the scarcest of all resources – clean water

- Reduce pollution from pipe sources, such as Waste Water Treatment Works and diffuse pollution from agricultural and urban areas.
- Where it is not possible to reduce pollution below the levels needed for a healthy freshwater environment, create new clean water habitats to put back clean water in the landscape.

5.3 Outcomes

The outcomes of the vision and goals for the catchment are that we:

- Achieve Water Framework Directive standards to achieve Good status or above in all waterbodies by 2027 i.e. in 10 year time.
- At least freshwater SSSIs and SACs are in good condition.
- We have stopped and reversed the decline of freshwater wildlife.

- Priority freshwater habitats and species are in favourable condition.
- We have good knowledge of the condition of the water environment so that we can tell whether it is getting better or worse in condition.
- There is enough water for public and business use.
- There is a thriving agricultural and forestry sector in the area contributing to the sustainability of the water environment.
- Towns are protected from flooding.
- We have helped the natural environment to resist the negative impacts of climate change.

5.4 Action Plan

Project	Location	Partners	Outline and Aims	Timescales	WFD target	Cost	Outcome	Status
Reducing groundwater pollution at Lye Valley Fens	Oxford	Friends of Lye Valley, Thames Water, BBOWT, Environment Agency, Natural England	Reduce nitrate and phosphate pollution of Lye Valley SSSI fens	5 years	n/a	Not known	In progress	Under development
Cothill Fen SAC: Reducing ground and surface water pollution	Cothill	Friends of Cothill Reserves, BBOWT, Freshwater Habitats Trust, Natural England	Reduce diffuse surface and groundwater pollution of the fens	Initial 1 year, but long term work needed	n/a	Not known	n/a	In progress
Water Friendly Farming: Ock Pilot Project	Catchment of the R. Ock	Freshwater Habitats Trust, University of York, Game & Wildlife Conservation Trust, water companies, Environment Agency	To implement and evaluate the effects of land management measures for controlling pollution, enhancing freshwater biodiversity and reducing diffuse pollution	2018 onwards	Various	To be defined	In preparation; limited feasibility and costing work undertaken	Under development
Citizen flood groups:	East Hanney Charney Bassett, Ock Valley, Oxford	Local citizens, Environment Agency, District and Parish Councils	To reduce local flood risk by clearing blockages from river and stream channels; campaigning for flood alleviation projects	5 years	n/a	Not known	In progress	Under development

Project	Location	Partners	Outline and Aims	Timescales	WFD target	Cost	Outcome	Status
Clean Water for Wildlife Survey		Citizen science project with multiple partners	Assessing extent of nutrient pollution in the Ock catchment	Follow-up survey planned	n/a	Not known	-	Under development
Flagship Ponds Project	National, including Ock	BBOWT, Earth Trust, Natural England	Project to protect Flagship ponds on the Ock catchment	Current project	n/a	£10,000. c.85% of funding available.	-	In progress
PondNet project	National, including Ock		Create a national monitoring programme for ponds	Phase 1: 2015-2017			-	In progress
Thames Water for Wildlife project	Thames catchment, including Ock	Citizen science project with multiple partners	Assessing the extent of nutrient pollution in the Thames catchment	Completion in 2017	Waters must reach Good or High status, including for phosphorus	Funds available		In progress
OxfordFlood Alleviation Scheme	Oxford	Wide range of local stakeholders	To reduce extent and frequency of flooding in Oxford and enhance environment and provide other public benefits	5 years	n/a			In progress
Abingdon Flood Alleviation Scheme	Abingdon			5 years	n/a	Not known		Under development

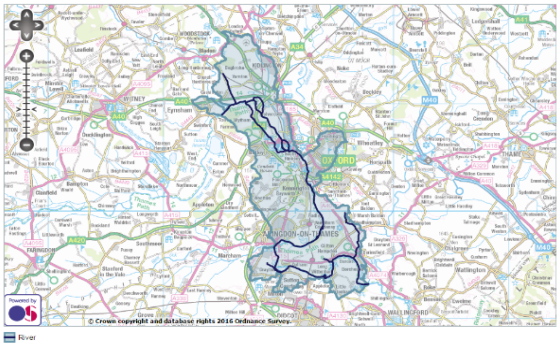
Project	Location	Partners	Outline and Aims	Timescales	WFD target	Cost	Outcome	Status
Sandford Brook habitat management project	Dry Sandford area	Environment Agency and local stakeholders	Improve physical habitat of the Sandford Brook	2017 onwards	Contributes to achieving Good status in the Sandford Brook	In preparation		In preparation
Planning developments WFD/FCRM benefits tied in e.g. Grove.	Grove	Environment Agency, local planning authorities	To improve water environment in the Grove area	Ongoing	Contributes to achieving Good status in various waterbodies	In preparation		In preparation
Thames Water funded habitat improvements	Wantage AMP/NEP (Letcombe Brook),				Contributes to achieving Good status in the Letcombe Brook	In preparation		In preparation
Thames Water funded habitat improvements	Oxford watercourses project	Environment Agency, fisheries groups	To improve the physical environment of river channels in the Oxford area	2017 onwards	Contributes to achieving Good status in the Thames watercourse	In preparation		In preparation
Thames Water water quality improvements – – Ock metaldehyde	Throughout Ock catchment	Thames Water, Earth	To reduce costs of drinking water treatment by	2016-18	n/a	Fully funded by Thames Water		In progress

substituition project.			reducing losses of metaldehyde					

Project	Location	Partners	Outline and Aims	Timescales	WFD target	Cost	Outcome	Status
Habitat protection and improvements								
Cothill Fen Improvement Programme for England's Natura 2000 Sites	Cothill	BBOWT, Natural England, Environment Agency, FHT		Continuing to 2020		Not yet fully costed	Not complete	Ongoing

Appendix 1. Status of WFD waterbodies in the R. Ock catchment

Thames (Evenlode to Thame)



Id: GB106039030334 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 445741 **Northing:** 211361 **NGR:** SP4574111361

Upstream water bodies

Show 10 entries Search:

Name
Cherwell (Ray to Thames) and Woodeaton Brook
Evenlode (Glyme to Thames)
Ginge Brook and Mill Brook
Moor Ditch and Ladygrove Ditch
Northfield Brook (Source to Thames) at Sandford
Ock and tributaries (Land Brook confluence to Thames)
Thames (Leach to Evenlode)

Showing 1 to 7 of 7 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Thames Wallingford to Caversham

Showing 1 to 1 of 1 entries Previous Next

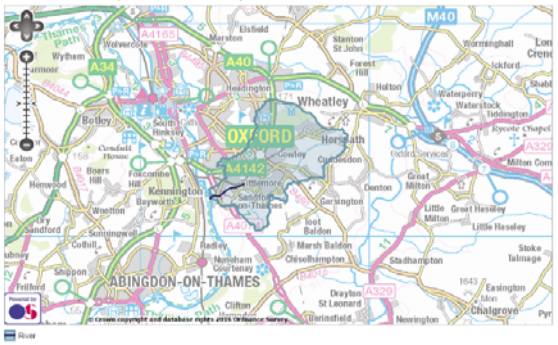
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Poor	Moderate	Moderate by 2015
Ecological	Poor	Moderate	Moderate by 2015
Chemical	Good	Fail	Good by 2027

Download results: CSV format
Linked Data API: Thames (Evenlode to Thame)

Northfield Brook (Source to Thames) at Sandford



Id: GB106039030180 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 453717 **Northing:** 202133 **NGR:** SP5371702133

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Thames (Evenlode to Thame)

Showing 1 to 1 of 1 entries Previous Next

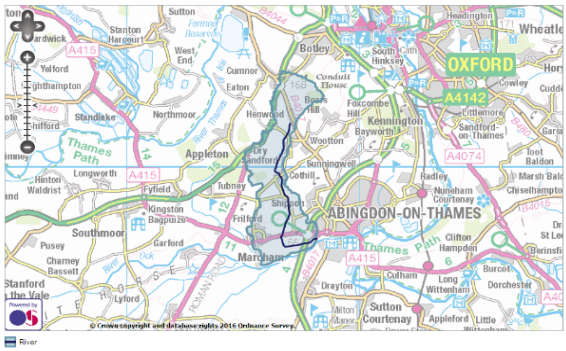
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Bad	Poor by 2027
Ecological	Moderate	Bad	Poor by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Northfield Brook (Source to Thames) at Sandford

Sandford Brook (source to Ock)



Id: GB106039023410 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 449936 **Northing:** 198504 **NGR:** SU4693698504

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Ock and tributaries (Land Brook confluence to Thames)

Showing 1 to 1 of 1 entries Previous Next

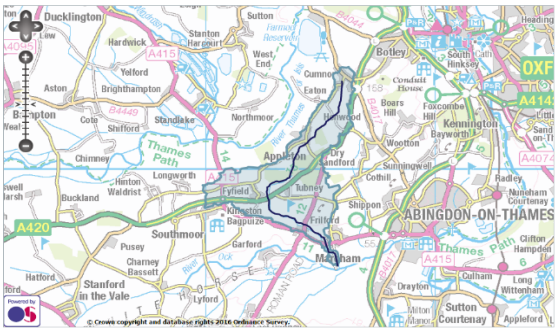
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	Good by 2027
Ecological	Moderate	Poor	Good by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Sandford Brook (source to Ock)

Frilford and Marcham Brook



Id: GB106039023420 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 443274 **Northing:** 199411 **NGR:** SU4327499411

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Ock and tributaries (Land Brook confluence to Thames)

Showing 1 to 1 of 1 entries Previous Next

Water body classification

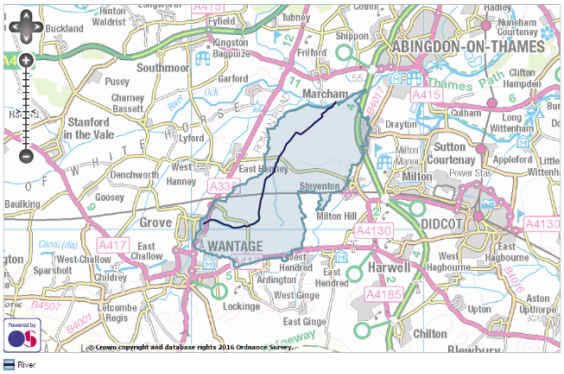
Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate	Moderate by 2015
Ecological	Moderate	Moderate	Moderate by 2015
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Frilford and Marcham Brook

Appendix 1 (a) Catchments and current Water Framework Directive status of the sub-catchments of the Ock/Thames catchment: (i) Thames (Evenlode confluence to Thame confluence), (ii) Northfield Brook at Sandford, (iii) Sandford Brook (source to Ock) and (iv) Frilford and Marcham Brook.

Cow Common Brook and Portobello Ditch



Id: GB106039023360 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 443411 **Northing:** 192347 **NGR:** SU4341192347

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Ock and tributaries (Land Brook confluence to Thames)

Showing 1 to 1 of 1 entries Previous Next

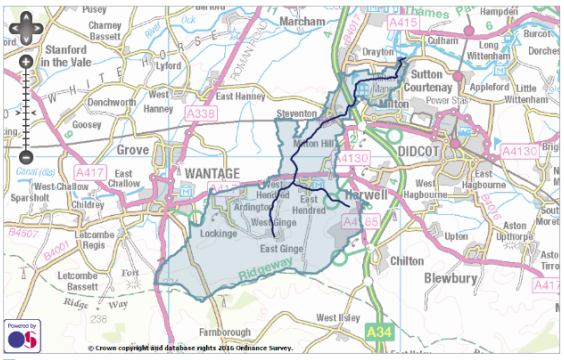
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	Good by 2027
Ecological	Moderate	Poor	Good by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Cow Common Brook and Portobello Ditch

Ginge Brook and Mill Brook



Id: GB106039023660 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 446641 **Northing:** 188618 **NGR:** SU4664188618

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Thames (Evenlode to Thame)

Showing 1 to 1 of 1 entries Previous Next

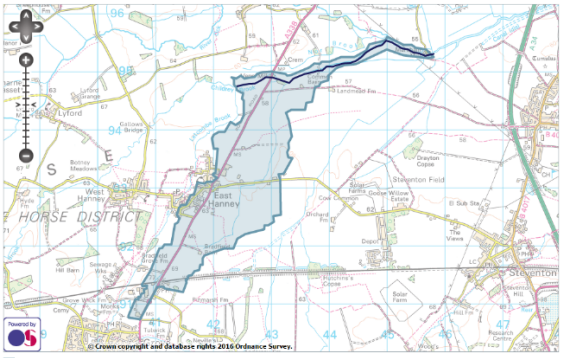
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Good	Moderate	Moderate by 2015
Ecological	Good	Moderate	Moderate by 2015
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Ginge Brook and Mill Brook

Childrey Brook and Norbrook at Common Barn



Id: GB106039023380 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 444241 **Northing:** 195147 **NGR:** SU4424195147

Upstream water bodies

Show 10 entries Search:

Name
Childrey and Woodhill Brooks
Letcombe Brook

Showing 1 to 2 of 2 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Ock and tributaries (Land Brook confluence to Thames)

Showing 1 to 1 of 1 entries Previous Next

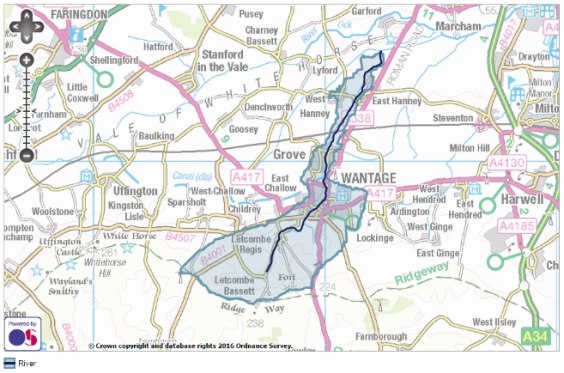
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	Poor by 2015
Ecological	Moderate	Poor	Poor by 2015
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Childrey Brook and Norbrook at Common Barn

Letcombe Brook



Id: GB106039023350 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 440029 **Northing:** 189949 **NGR:** SU4002989949

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Childrey Brook and Norbrook at Common Barn

Showing 1 to 1 of 1 entries Previous Next

Water body classification

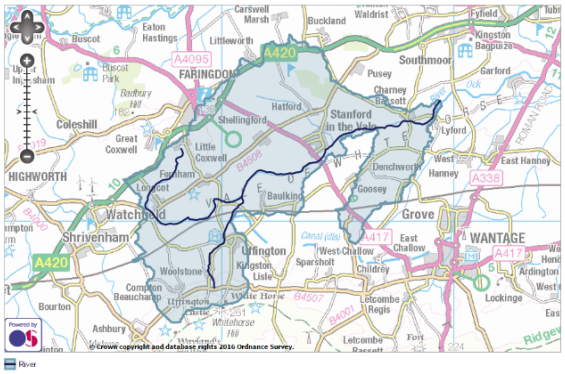
Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Good	Moderate	Good by 2027
Ecological	Good	Moderate	Good by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Letcombe Brook

Appendix 1 (b) Catchments and current Water Framework Directive status of the sub-catchments of the Ock/Thames catchment: (i) Cow Common Brook and Portobello Ditch, (ii) Ginge Brook and Mill Brook, (iii) Childrey Brook and Nor Brook at Common Barn and (iv) Letcombe Brook.

Ock (to Cherbury Brook)



Id: GB106039023400 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 434517 **Northing:** 193127 **NGR:** SU3451793127

Upstream water bodies

Show 10 entries Search:

Name
Stutfield Brook (source to Ock)

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Ock and tributaries (Land Brook confluence to Thames)

Showing 1 to 1 of 1 entries Previous Next

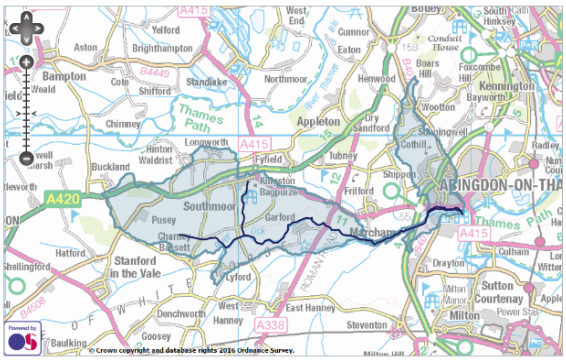
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate	Good by 2027
Ecological	Moderate	Moderate	Good by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Ock (to Cherbury Brook)

Ock and tributaries (Land Brook confluence to Thames)



Id: GB106039023430 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 449820 **Northing:** 196695 **NGR:** SU4962096695

Upstream water bodies

Show 10 entries Search:

Name
Childrey Brook and Norbrook at Common Barn
Cow Common Brook and Portobello Ditch
Filford and Marcham Brook
Ock (to Cherbury Brook)
Sandford Brook (source to Ock)

Showing 1 to 5 of 5 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Thames (Evenlode to Thame)

Showing 1 to 1 of 1 entries Previous Next

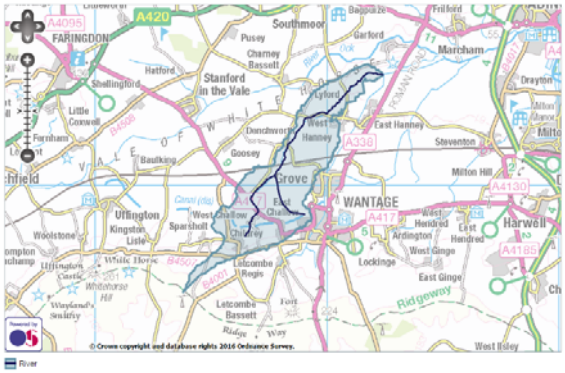
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Poor	Moderate by 2027
Ecological	Moderate	Poor	Moderate by 2027
Chemical	Good	Good	Good by 2015

Download results: CSV format
Linked Data API: Ock and tributaries (Land Brook confluence to Thames)

Childrey and Woodhill Brooks



Id: GB106039023370 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 439669 **Northing:** 193115 **NGR:** SU3966993115

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Childrey Brook and Norbrook at Common Barn

Showing 1 to 1 of 1 entries Previous Next

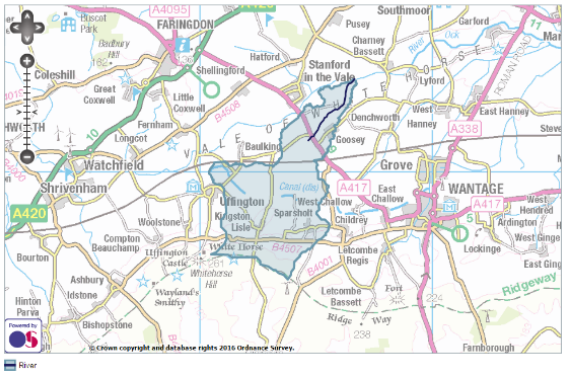
Water body classification

Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate	Good by 2027
Ecological	Moderate	Moderate	Good by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Childrey and Woodhill Brooks

Stutfield Brook (source to Ock)



Id: GB106039023340 **Type:** River **Hydromorphological designation:** not designated artificial or heavily modified
Easting: 435677 **Northing:** 192595 **NGR:** SU3567792595

Upstream water bodies

Show 10 entries Search:

Name
No results

Showing 1 to 1 of 1 entries Previous Next

Downstream water bodies

Show 10 entries Search:

Name
Ock (to Cherbury Brook)

Showing 1 to 1 of 1 entries Previous Next

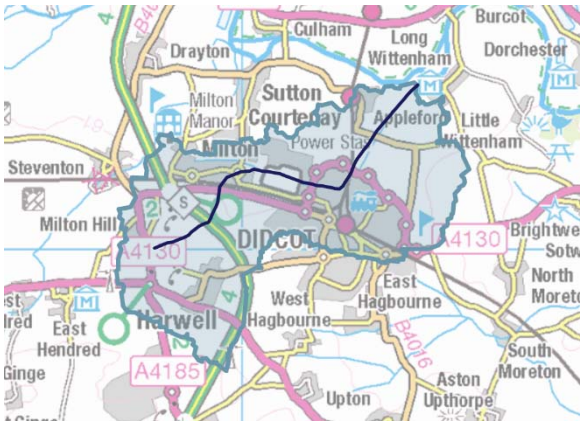
Water body classification

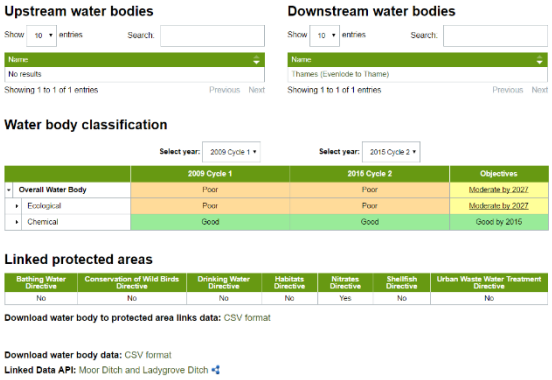
Select year: 2009 Cycle 1 Select year: 2015 Cycle 2

	2009 Cycle 1	2015 Cycle 2	Objectives
Overall Water Body	Good	Moderate	Good by 2027
Ecological	Good	Moderate	Good by 2027
Chemical	Does not require assessment	Good	Good by 2015

Download results: CSV format
Linked Data API: Stutfield Brook (source to Ock)

Appendix 1 (c) Catchments and current Water Framework Directive status of the sub-catchments of the Ock/Thames catchment: (i) Ock to Cherbury Brook, (ii) Ock and tributaries (Land Brook confluence to Thames), (iii) Childrey and Woodhill Brooks (iv) Stutfield Brook (source to Ock).





Appendix 1. (d) Catchments and current Water Framework Directive status of the sub-catchments of the Ock/Thames catchment: (i) Ock to Cherbury Brook.

Appendix Table 1. Priority ponds in the Ock and Thames catchment

Priority ponds fulfil the following criteria as defined in the Natural Environment and Rural Communities Act 2007.

Kennington Pit

Ponds at Little Wittenham

Ponds at Dry Sandford Pit

Ponds at Cothill Fen

Pondweed Leafhopper Pond near Abingdon

Floodplain ponds and pools at Radley (Water-violet and other species)

Great Crested Newt ponds at various locations e.g. Sutton Courtenay, Wotton, around Grove, Brasenose Wood and Shotover Country Park, Wytham Woods (all such ponds are automatically priority habitats)

Ponds at Chandlings School (Common Toad breeding site)

Ponds at Stratfield Brake

New ponds at Boars Hill

Dukes Lock, near Kidlington (water plants, including Common Bladderwort)

Ponds in Lye Valley, Oxford

Ponds at Whitecross (near Abingdon)

Ponds on Wolvercote Common

Appendix 2. Designated plant and animal species dependent on freshwaters or water dependent habitats in the Oxford and Abingdon Flood Risk Management Scheme area

UK Biodiversity Action Plan Priority species present in the project area				
Priority species with restricted national distributions				
	Ponds/ lakes	**Rivers/ streams**	**Ditches**	**Water-dependent habitats**
Tubular water-dropwort [BAP] (*Oenanthe fistulosa*)	✓	✓	✓	✓
Marsh stitchwort [BAP] (*Stellaria palustris*)	✓	-	✓	-
Creeping marshwort [BAP] (*Apium repens*)	-	-	-	✓
Greater water-parsnip [BAP] (*Sium latifolium*)	✓	✓	✓	✓
Flat-sedge [BAP] (*Blysmus compressus*)	-	-	-	✓
Small fleabane [BAP] (*Pulicaria vulgaris*)	✓	-	-	✓
Pondweed Leafhopper [BAP] (*Erotettix cyane,* in the Abingdon area)	✓	-	-	-
Thames ram's-horn snail [BAP] (*Gyraulus acronicus*)	-	May occur	-	-
Fine-lined pea mussel [BAP] (*Pisidium tenuilineatum*)	Rarely	✓	-	-
Depressed river mussel [BAP] (*Pseudanodonta complanata*)	-	✓	-	-
Natterjack Toad [BAP] (*Epidalia calamita*, reintroduced near Abingdon)	-	✓	-	-
Clubbed General Soldierfly [BAP] (*Stratiomys chamaeleon)*	✓	-	-	✓
Scarce Forest Horsefly [BAP] (*Hybomitra solstitialis*)	✓	-	-	✓
Priority species which are widespread nationally				
Bullhead [BAP] (*Cottus gobio*)	✓	✓		-
European eel [BAP] (*Anguila anguila*)	✓	✓	✓	-
Common toad [BAP] (*Bufo bufo*)	✓	Occasionally	✓	-
Great crested newt [BAP] (*Triturus cristatus*)	✓	-	-	-
Bittern [BAP] *(Botaurus stellaris)*	-	-	-	✓
Lapwing [BAP] (*Vanellus vanellus*)	✓	✓	✓	✓

UK Biodiversity Action Plan Priority species present in the project area (continued)				
Priority species which are widespread nationally				
	Ponds/ lakes	**Rivers/ streams**	**Ditches**	**Water-dependent habitats**
Grass snake [BAP] (*Natrix natrix*)	✓	-	✓	✓
Grasshopper warbler [BAP] (*Locustella naevia*)	-	-	-	✓
Water vole [BAP] (*Arvicola terrestris*)	✓	✓		-
Otter [BAP] (*Lutra lutra*)	✓	✓	✓	✓
Soprano pipistrelle [BAP] (*Pipistrellus pygmaeus*)	✓	✓	✓	✓
Protected or declining freshwater associated species found in the project area				
Bladder-sedge [D] (*Carex vesicaria*)	✓	✓	✓	✓
Mudwort [NS] (*Limosella aquatic*)	✓	✓	✓	✓
Pointed Stonewort [NS] (*Nitella mucronata*)	-	✓		-
Round-fruited Rush [NT] (*Juncus compressus*)				
Snake's-head Fritillary[NS], (*Fritillaria meleagris*)	-	-	-	✓
Tasteless Water-pepper [NS], *Persicaria laxiflora*	✓	✓	✓	✓
Water-violet [D] (*Hottonia palustris*)	✓	Unpolluted backwaters	✓	-
Brown dun mayfly[NS] (*Kageronia fuscogrisea*)	-	✓	-	-
Striped mayfly [RDB] (*Ephemera lineata*)	-	✓	-	-
Protected or declining freshwater associated species which have become extinct in the Oxford area in the last 20 years				
River water-dropwort [D] (*Oenanthe fluviatilis*)	Rarely	✓	✓	-
Glutinous snail[BAP] (*Myxas glutinosa*)	✓	-	-	-
White-clawed Crayfish[BAP] (*Austropotamobius pallipes*)	✓	-		-

[BAP] Priority species under UK Biodiversity Action Plan; [RDB] Red Data Book species;

[NS] Nationally Scarce species; [NT] Near Threatened; [D] Declining

Appendix 3. High and Good Ecological Status indicators

There are over 30 different criteria that determine if a water body is considered in Good Ecological Status under the Water Framework Directive. These fall into three categories: biological, chemical and physical. The indicators listed below have been identified as a 'reason for failure' in the Ock catchment.

Biological indicators

Biological indicators are the living organisms found within the river and their absence can be the first sign that it is not healthy. They are greatly affected by the habitat and chemicals within the water.

Fish species within the Weland are varied and include many Biodiversity Action Plan species such as brown sea trout, Atlantic salmon, and European eel. Surveys have shown that diversity and numbers of fish in the Ock have declined dramatically, and in some stretches only one or two fish have been found. The reasons include habitat quality and water chemistry and flow. The fish primarily associated with the Ock need gravel beds to successfully spawn, an abundance of invertebrate species upon which to feed, and plenty of dissolved oxygen in the water. All of these depend on the chemicals found in the water. Increased levels of phosphate, especially in slow or still water, encourage excessive weed and algal growth, choking the water leading it to become stagnant though low levels of dissolved oxygen. Sediment covers the gravels on the river bed and release chemicals into the water. Hydromorphological changes can create a barrier to fish migration. In the Ock pilot catchment area, 39% of water bodies fail for fish populations. Efforts to remove barriers, increase dissolved oxygen, lower phosphate and improve habitat will help to restore fish numbers.

Macrophytes are plant species that live in or near the water and can include water lily, bryophytes (mosses) or algae. They are highly responsive to water quality so it can easily become apparent when pollution enters the water, and to changes to light levels through the water or depth. Increased levels of nutrients including phosphate can lead to replacement of naturally occurring species by filamentous algae which clog the river. Macrophytes play an integral role in maintaining a healthy river ecosystem by providing spawning habitat for fish and producing oxygen through photosynthesis. They also trap sediment and absorb phosphate from the water. In the Ock pilot catchment area, 9% of water bodies fail for macrophytes. Reduction of pollution, natural water flows and natural banks instead of concrete will improve macrophyte populations.

Invertebrates include the insects that are found in and around the water. Surveys can quickly determine the quality of the water and habitat, as many are only found in high-quality rivers with low pollution levels, high dissolved oxygen and low sediment. Others are more tolerant of a lower quality river. They are an important source of food for fish and an integral part of the river ecosystem. In the pilot catchment area, 9% of water bodies fail for invertebrates. Reducing sediment and phosphate and ensuring a low water temperature will improve invertebrate populations along the Ock.

Diatoms are unicellular algae that can vary in size and shape. They provide a food source for the freshwater invertebrates that live in the rivers. They are sensitive to high water temperatures, high levels of phosphate or other pollutants and sediment. In the Ock pilot catchment area, 9% of water bodies fail for diatoms. Reducing sources of pollution and sediment will reduce excessive diatom populations within the River.

Chemical indicators

Chemicals that are found within the water can include phosphate, nitrogen, dissolved oxygen, oils or any industrial chemicals or pesticides. They have a huge impact on the living organisms that live in and around the river, and changes in these are often the first sign that there is a problem with the water chemistry.

Phosphate is a chemical nutrient and can come from a variety of sources including pesticides, manure, artificial fertilisers, sewage treatment works, septic tanks, household products and many others. Increased levels of phosphate can affect the species composition of invertebrates and macrophyte growth, often leading to phosphate-tolerant plants dominating the river. In turn, light reaching the river bed and reduced dissolved oxygen levels cause stagnation. This is a process known as eutrophication - "The enrichment of waters by

inorganic plant nutrients resulting in stimulation of an array of symptomatic changes including… increased production of algae and/or other aquatic plants affecting the quality of the water and disturbing the balance of organisms within it"[1]. In the Ock pilot catchment area, 45% of water bodies fail for phosphate levels. Reducing phosphate levels by addressing diffuse and point source pollution sources, and improving river flows, will help to reduce its negative impacts.

Dissolved oxygen in the water is essential for the fish and invertebrate species in the water. Low levels of dissolved oxygen can often be demonstrated by the fish or invertebrates that are found, with some present only in rivers with high dissolved oxygen. Macrophytes produce oxygen by photosynthesis and release it into the water during the day, but respiration at night removes dissolved oxygen so having too much plant matter in the water will be deleterious. In the Ock pilot catchment area, 18% of water bodies fail for dissolved oxygen levels. High water temperatures, excessive weed or algal growth and pollutants can lower dissolved oxygen levels. Removing concrete banks that increase macrophytes, reducing water temperatures and reducing pollutants will help to improve dissolved oxygen levels.

Ammonia is a gas that is emitted from livestock slurry and is present in fertilisers, which dissolve in water. It alters the acidity (as measured by pH) of the water, and the free unionised ammonia is toxic to fish and invertebrates. It also increases nitrogen levels in the water, leading to increased weed and algal growth and the associated problems. Many fish and invertebrates are sensitive to pH changes. In the Ock pilot catchment, 15% of water bodies fail for ammonia. Reducing fertiliser run-off into the water and preventing livestock entering the river other than via a single-point cattle drinker can improve ammonia levels.

Physical indicators

Physical changes to the River that change its water level and flow are said to affect its hydromorphology. Such modifications include: straightening and deepening of channels; installation of weirs, sluices or flood defences; and raising the river level above the surrounding land. All of these modifications can cause severe habitat degradation, affecting the living organisms within the river. Changes in natural flow rates between summer and winter or after heavy rainfall can also be impacted by these modifications. In the Ock pilot catchment area, 48% of water bodies fail under the Water Framework Directive for this indicator. Removal of physical barriers enables fish to pass freely. Re-naturalisation of the river though the installation of materials to re-create natural riffles and pools greatly improves habitat quality. A natural and adequate flow along the river also improves habitat quality and the biological and chemical indicators.