Kennet Catchment Management Plan

Second edition
June 2019

Acknowledgements

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Note

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Author	Date	What has been altered?
Karen Parker	21/06/2011	Reformat plus major updates
Karen Parker	23/07/2011	Updates to action tables plus inclusion of investigations and prediction table.
Mark Barnett	25/01/2012	Update of table 9 & section 3.1
Scott Latham	02/02/2012	Addition of Actions + removal of pre 2010 actions
Scott Latham	16/02/2012	Update to layout and Design
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Charlotte Hitchmough	30/8/2012	Version issued to steering group for discussion at steering group meeting on 25th September 2012. ARK revisions following discussion with EA on 7th August 2012.
Charlotte Hitchmough	18/12/2012	Final 2012 version incorporating all comments from partners, revised front cover and new maps.
Charlotte Hitchmough	20/1/2013	Revised table numbers, updated table 16, revised front cover.
Charlotte Hitchmough	20/2/2013	Further comments from EA incorporated
Charlotte Hitchmough	26/6/2019	Updated to reflect progress in advance of steering group meeting July 2019. Remove all out of date tables. Bookmark all sections requiring updates.

This plan has been prepared by Action for the River Kennet in its role as host for the Kennet Catchment Partnership, whose members are: the Canal and Rivers Trust, the Environment Agency, Kennet Valley Fishery Association, Natural England, Thames Water and Reading and District Anglers, West Berkshire District Council, Craven Fishery and others.

Front page image: The River Kennet at Stonebridge Lane, Marlborough

Executive Summary

This plan sets out how the measures in the Thames Region River Basin Management Plan can be turned into actions to achieve a healthy river in the Kennet catchment. This is defined as Good Ecological Status (GES) or Good Ecological Potential (GEP).

Ecological and chemical classification for surface waters | 2016 Cycle 2

	Ecological status or potential					Chemical status	
Number of water bodies	Bad	Poor	Moderate	Good	High	Fail	Good
33	1	3	25	4	0	0	33

The Kennet catchment

The River Kennet is one of England's premier chalkstreams. Much of its length is a Site of Special Scientific Interest (SSSI) on account of its chalkstream habitats and associated wildlife. One of its main tributaries, the Lambourn, is also a SSSI and has been designated a Special Area of Conservation (SAC) under the Habitats Directive.

The Kennet catchment has been much affected by human activities over the past 60 years. The construction of the M4 motorway has driven urban development and a trebling of the population. Agriculture has seen a major switch from pasture to arable, with a trebling of the area cultivated.

The Kennet & Avon canal was re-opened in the 1990s and runs parallel with the River Dun from its source and then with the River Kennet downstream of Hungerford, at times sharing the same channel.

The populations of wild trout and grayling are much less healthy than would be expected for a natural chalkstream. In the lower reaches populations of barbell are perceived to be lower than expected. There is widespread algal growth and in certain places poor natural river weed growth, especially of water crowfoot (*Ranunculus)*. The bed of the river is often silty, rather than the clean gravels of a natural chalkstream. Water clarity, although variable is frequently poor, not the gin-clear characteristic of the best chalkstreams, especially downstream of Hungerford. The extensive modification of the river over the last few centuries for milling, water-meadows, land drainage, flood defence and amenity have significantly contributed to or exacerbated these problems.

The River Kennet at Hungerford

Dealing with the priority issues

Improving the condition of the Kennet requires six key issues to be addressed:

1. **Interaction with the Kennet & Avon canal** – a problem caused by significant differences in water quality, affecting the Kennet between Hungerford and Reading, and also the River Dun upstream of Hungerford. The poorer water quality in the canal is caused by diffuse pollution and nutrient enrichment generated outside the canal. This is made worse by slow-flowing canal water, long retention times and limited flushing. The passage of boats may stir up sediments and algae, which gets passed on to the river through the operation of locks and via canal overspill weirs. The canal/river problem can be dealt with through a combination of reducing the inflow of sediment and nutrients through better catchment management, preventing re-suspension of sediments by regular dredging and improving the quality of water being transferred from the canal to the Kennet. An engineered solution to separate the canal and river channels upstream of Newbury has been largely discounted due to the limited benefit and huge costs. Installation of bypass weirs in the Bedwyn area has had a significant positive impact on water quality in the Dun by preventing overflows and some improvement is perceived on the Kennet downstream from Copse Lock.
2. **Nutrients, sedimentation and algal growth** – these all affect river plants, insects and fish and are caused by a combination of diffuse and point source pollution. Once sources have been identified and apportioned, aided by a renewed programme of walk-over surveys and source apportionment modelling, the relevant sectors can be targeted with improved practices; much work is already underway to address this issue through Catchment Sensitive Farming.
3. **Channel modifications and degradation of habitats** – Much of the catchment has been affected by channel modification and the introduction of structures to control flow. River channel improvements can be made by removing or modifying structures and re-establishing the river morphology to recreate a more natural and dynamic river with fewer barriers to fish migration. There has been a significant amount of work over the last 20 years, but much more is needed.
4. **Over-abstraction** – The adverse impacts of abstraction at Axford have been proven, and a solution implemented in 2017. At Ogbourne abstraction ceased in 2017. The impact of over-abstraction is a localised but important issue, and the benefits of addressing it cascade downstream. The WINEP 2020 includes an action to investigate the impacts on abstraction upstream of Marlborough.

   Groundwater – the groundwater status in the catchment is poor. This is because there is not always enough groundwater to keep surface waters flowing. The groundwater may contain pollutants, which affect drinking water quality and may or may not have an impact on ecology. A large part of the catchment is designated a ‘nitrate vulnerable zone’ (NVZ), meaning that the groundwater is at risk of pollution from nitrates coming from agricultural activities. Groundwater in the upper catchment is high in Nitrate can require blending to be fit to put into water supply.
5. **Invasive non-native species** (INNS) – there are various aquatic and riparian invasive species present in the catchment. A few species will have no implications for achieving GES (e.g. mink), whereas the role of some species e.g. signal crayfish is significant. None of the key INNS on the Kennet is easy to eradicate, but a good programme for control should be the target for those species which may prevent achievement of GES or cause deterioration.

Provisional programme management

An aspirational programme for delivering the improvements is shown below. The key to successful completion of the programme will be availability of funding and partnership working. This will be facilitated by the continuation and strengthening of the Kennet catchment steering group.

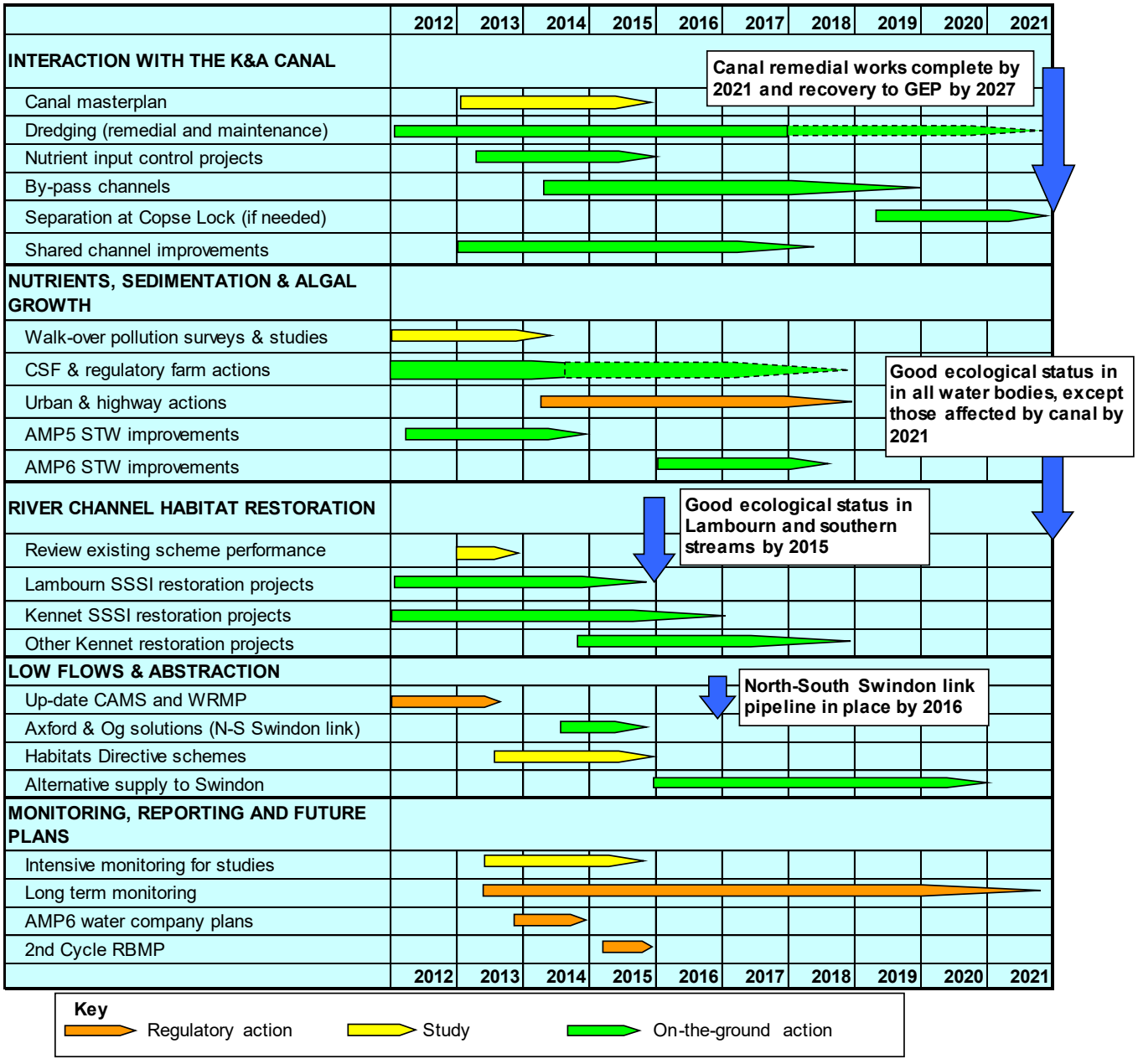


Table 1 - Provisional programme for meeting Water Framework Directive targets in the Kennet

Progress against the 2012 programme has been mixed. Notable successes have been ongoing habitat restoration and fish passage projects, reductions in abstraction from Axford and Ogbourne and installation of by pass weirs on the canal. The status of the Lambourn SSSI has improved to 'unfavourable recovering' but overall water bodies at good status have declined.

Action for the River Kennet plans to continue in the role of “catchment host”, organising the steering group, coordinating actions, reporting progress and supporting the Environment Agency, who will continue to hold ultimate responsibility for achievement of Water Framework Directive objectives. ARK’s continuing role has been funded through the Environment Agency.

Figure 1 - The Kennet & Avon Canal at Hungerford

Foreword

The Water Framework Directive (WFD) is a piece of EU legislation that requires member states to make plans to protect and improve the water environment. It was made into law in the UK in 2003.

The four main aims of the Water Framework Directive are;

- to improve and protect inland and coastal waters
- drive wiser, sustainable use of water as a natural resource
- create better habitats for wildlife that lives in and around water
- create a better quality of life for everyone

The WFD applies to:

- Surface freshwater bodies, including lakes, streams, rivers and canals
- Transitional water bodies such as estuaries
- Groundwaters, and;
- Coastal waters out to 1 mile from low tide

The main issues and actions needed to improve and protect the water environment have been drawn up at a river basin district level across England and Wales. The Thames River Basin Management Plan (RBMP) was developed and published in 2009 by the Environment Agency. A revision was published in 2016 and another is due in 2021.

This Kennet Catchment Management Plan adds detail to the local issues to establish the specific actions required to improve the health of the Kennet Catchment. This delivery plan is where local communities can make a real contribution to improving the water environment. In supporting and helping drive this work, the Environment Agency will ensure that information and decisions taken at one level inform planning at another.

WFD uses classification tools to assign a quality status to each water body, that together make up each river catchment. These are grouped into ecological status and chemical status:

Ecological

- Physico-chemical e.g. nutrients, pH, dissolved oxygen, ammonia
- Biological elements e.g. phytoplankton, macro-algae, fish, invertebrates
- Specific pollutants e.g. metals and compounds, organic compounds
- Hydromorphology e.g. depth, width, flow, structure

Chemical status

- Priority substances (chemicals) which present a significant risk to the water environment. These include, for example, the anti-fouling agent TBT.

Good Ecological Status: where a water body has biological, structural and chemical characteristics similar to those expected under nearly undisturbed conditions, it is classified as having Good Ecological Status (GES).

GES is the WFD target for all surface water bodies except for artificial and heavily modified waters (e.g. canals). The target for these water bodies is to achieve Good Ecological Potential

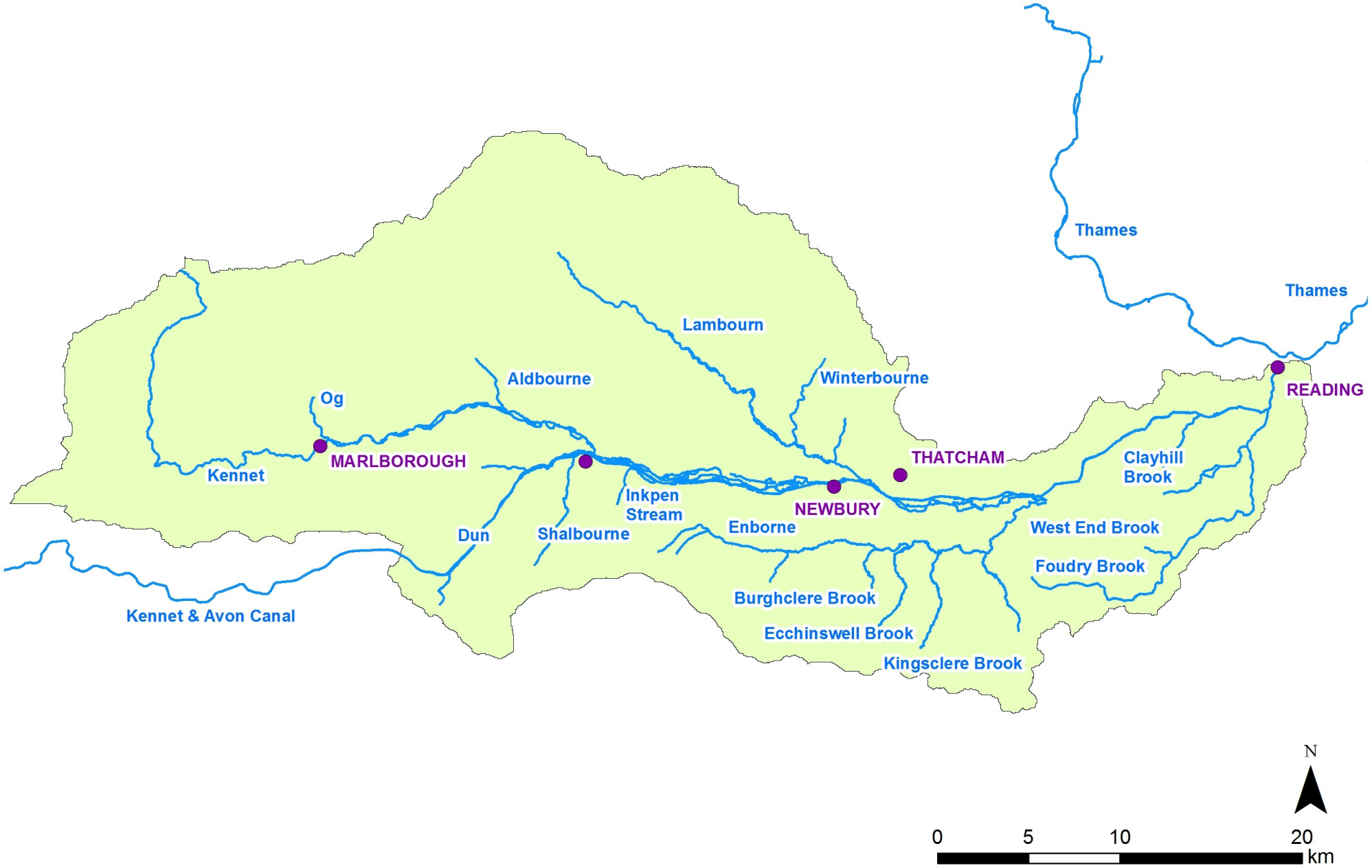
(GEP). This status recognises the maximum achievable quality given the constraints caused by the physical alterations or characteristics necessary for its use. The target for Groundwater water bodies is Good Status; where the quantitative status and chemical status are both good with no deterioration.

There are 33 water bodies in the Kennet catchment. At the start of the first cycle of the Thames RBMP in 2009, nine of these were assessed as achieving GES. By 2016 only four reached GES and four had deteriorated to poor and one to bad. Four water bodies are at good status with none at high.

The plan contained in this document is a management plan that will set out and drive delivery. It is recognised that addressing some of the more important problems in the catchment will require more detailed technical analysis, which will be essential for justifying significant investment or regulatory interventions. At every point funding of some level of funding is required, although there are cost and outcome benefits from working in partnership with other businesses, organisations and residents in the catchment.

1. Characterisation of the Catchment

Figure 2 - Kennet catchment



1.1. Introduction

The Kennet catchment is mainly rural in character and is defined by the chalk uplands of the Berkshire and Marlborough Downs to the north and the Hampshire Downs to the south. Much of the area falls within the North Wessex Downs Area of Outstanding Natural Beauty. The three largest tributaries are the Lambourn, Dun and Enborne.

The principal towns are Reading, Newbury, Thatcham, Hungerford, and Marlborough (Figure 1).

Location and description of protected areas

The Water Framework Directive specifies that areas requiring special protection under other EC Directive and waters used for the abstraction of drinking water are identified as protected areas. These are protected for their use, or because they have important habitats and species that depend on water.

Protected areas have their own objectives and standards, which should be complied with by December 2015, unless otherwise specified under the original Directive. Some areas may require special protection under more than one EC Directive.

There are several types of protected areas relevant to the Kennet Catchment:
Drinking Water Protected Area: designated for the abstraction of water for human consumption
Areas designated for the protection of economically significant aquatic species, such as freshwater fish.
Nutrient sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive.
Areas designated for the protection of habitats or species.
Further information on protected areas is available oat http://www.environment-agency.gov.uk/research/planning/125035.aspx.

There are three groundwater bodies designated as Drinking Water Protected Areas:

- Aldermaston Bagshot Beds
- Berkshire Chalk Downs
- Thatcham Tertiaries

There are three Special Areas of Conservation (SACs) wholly or partly within the catchment:

- The Kennet and Lambourne Floodplain
- Berkshire Downs Chalk
- Thatcham Tertiaries

Under the Nitrates Directive (Council Directive 91/676/EEC) introduced in December 2002, the majority of the Kennet Catchment is designated as a Nitrate Vulnerable Zone. Farmers are required to limit the application of manures and nitrogen fertilisers, subject to a closed season for the application of certain manures, and required to keep records of cropping, stocking and fertiliser applications.

Important additional features

Sites of Special Scientific Interest

There are also two river SSSIs within the Kennet Catchment

- River Lambourn
- The Kennet from Marlborough to Woolhampton

Since 2012 the condition of the River Lambourn SSSI has improved from “unfavourable unchanged” in 2010 to ‘unfavourable recovering’ in 2019.

‘The last reported SSSI assessments were in 2008 (units 2 & 3) and 2010 (unit 1) when the condition was reported as ‘unfavourable-no change’ (see appendix 1). Since that time a number of agencies, partners and individuals have undertaken work and projects to contribute to the improved condition and conservation of the river. These include (in no particular order):-
Implementation of most of the priority projects in the ‘Whole River Restoration Plan for the Kennet and Lambourn SSSIs (2011)’. This work has been mostly undertaken by the Environment Agency in partnership with various estates, landowners and specialist contractors.
Improvements to water company infrastructure to reduce the impacts of discharges, and agreement of a programme of further improvements.
Changes to the operating protocol for the West Berkshire Groundwater Scheme to ensure that the Lambourn is not compromised by its use
Improved land management achieved through agri-environment agreements and the work of the Catchment Sensitive Farming project. Examples include grass margins and plots between the river bank and arable fields, fencing livestock out of the river, and improvements to tracks and yards to reduce polluting run off.
Sensitive management of the river and riparian habitats by landowners.
Active involvement of the voluntary sector – notably the rivers trust ARK (Action for the River Kennet) and the Renewal project in Newbury.
Survey, monitoring and vigilance by various parties, such the riverfly monitoring and reporting of invasive species.
Development of a diffuse water pollution plan, and production of a catchment pollution risk assessment and septic tank risk assessment.
Improved liaison and co-operation between various agencies to ensure that flood risk is managed by appropriate weed cutting and agreed works.
Improved consultation regarding development and small sewage discharges in proximity of the river.
Some actions to manage or reduce invasive non-native species.
Investigations by highway departments to address localised sources of potentially damaging run off.
As well as positive actions there have been occasional instances of undesirable works or direct damage, such as by unconsented dredging or bankside works. These are mostly small scale and result in localised minor impacts, but these are addressed and rectified where possible. Whilst many attributes of the river have improved, it is still failing to meet a number of SSSI targets and as such is assessed to remain in unfavourable condition. To reflect the improvements achieved so far, and as it is considered that the necessary measures are either planned or in place to address outstanding issues, the condition is now assessed as being unfavourable ‘recovering’. It is important that all agencies continue to work diligently towards achieving favourable condition for this special chalk river.

The EA and NE have jointly developed a Diffuse Pollution Action Plan and a Whole River Restoration Plan for both of the riverine SSSIs. Implementation of the actions in these plans is of critical importance to work towards GES.’

Areas of Outstanding Natural Beauty

The Kennet flows through the North Wessex Downs Area, which was designated an Area of Outstanding Natural Beauty in 1972, and a 'Council of Partners' exists to ensure good management of the AONB, including the rivers.

Pressures affecting Ecological Status in the Kennet Catchment

The Kennet catchment has changed substantially since the 1930s, changes include[1]:

- Significant land use changes including urban expansion, road infrastructure and gravel extraction
- A two-thirds reduction in the area of pasture
- The trebling of arable cultivation
- The trebling of the population

These changes have put the catchment under more pressure, particularly from diffuse pollution from increased use of agricultural chemicals, and increased sediment run-off from arable fields.

The balance between farming and sustainable management of the land is a significant pressure on rivers.

Water abstraction to meet the increased demand for water from urban expansion and increased living standards has reduced the flow in the river. Urban expansion has increased the quantity of treated sewage discharges, which has impacted water quality and changed the flow regime. The UK's water consumption one of the highest in Europe.

The increase in urbanisation has increased the run-off from built-up areas, changing the catchment's response to heavy rainfall events and flushing debris and pollutants from road surfaces into the river. In 1990 the Kennet and Avon Canal was re-opened; over time this has caused deterioration in the water quality of the River Kennet.

All these pressures should be seen in the context of the extensive physical modifications to the river channel, some of which preceded the 1930s but also include post-war works for land drainage and flood defence. These modifications make the river more vulnerable to additional stresses and significantly detract from the quality of the in-stream habitat.

[1] Impact of land use changes on the Kennet Catchment, Paul Whitehead *et al* 2002

Figure 3 - Examples of physical modifications to the River Kennet, a legacy from historic water mills, which both prevent fish movement and cause impoundment in the upstream reach. These two structures have been modified or bypassed to enable fish passage an improve river morphology as a result of actions in the Kennet Catchment Management Plan and funding from the River Improvement and Catchment Restoration Funds.

1.2. Overview of water bodies and WFD characterisation

Overview of current status

The classifications have been based on the available monitoring data for the four WFD biological elements

- Fish e.g. brown trout, bullhead, roach and pike
- Insects (invertebrates), e.g. caddis fly, mayfly, and stonefly
- Large Plants (macrophytes), e.g. water crowfoot, starwort and sedges
- Simple microscopic plants (phytobenthos) e.g. *Diatoma* and *Cocconeis*

The biological elements

Rutilus rutilus **Roach**
Fish

Baetidae **Blue Winged Olive Nymph**
Invertebrate

Ranunculus peltatus
Macrophyte

Diatoma and Cocconeis
Phytobenthos

1.3 Uncertainty and Further Investigation

Review data – this section requires updating in response to increased data availability.

A water body can only meet 'Good Ecological Status' if the following elements are good:

- Fish
- Phosphorous levels
- Hydromorphology
- Invertebrates

Figure 4 - EA Fisheries staff sampling the river

The **water quality information** has been reasonably comprehensive: 83% of the waterbodies have been analysed for the full water quality suite of chemicals (apart from Annex 10 substances). The five water bodies where no data were available are in the smaller tributaries, in each case data is available in the next downstream waterbody in the same stream.

The **biological information** is sparse for macrophytes and phytobenthos. One waterbody has been surveyed for phytobenthos and four waterbodies for macrophytes. Classification has been assessed as "uncertain" in over 70% of cases where monitoring data exists and certainty has been statistically determined.

Uncertainty related to the classification of biological factors is the primary reason for not aiming to achieve good status by 2015 in the RBMP. The lack of monitoring information for some biological elements is an issue, both for understanding the problems and for identifying the actions needed to deal with them. This can be addressed through extra monitoring and investigations to be pursued through this plan, which should to provide the robust evidence base required.

The conclusions from the review of all the available data and feedback from partners are:

- There is uncertainty surrounding the biological condition of some waterbodies because there is very little macrophyte and phytobenthos monitoring.
- Recent fish surveys[2] and local observation of algal growth suggest that the upper Kennet and Og need further investigation to clarify the current 'good status'.
- The fishery status below Newbury needs clarifying with further investigation.
- The relative importance of point and diffuse sources of pollution, and the locations of diffuse sources are uncertain.

  Many problems in the Kennet catchment appear to be caused by sedimentation and turbidity which are not monitored for WFD classification. The magnitude and sources of sedimentation and turbidity and the extent to which they constrain the achievement of good status are not known. Measuring and understanding sedimentation and turbidity appears to be a key to developing actions to achieve GES.

[2] River Og and Upper Kennet Fishery Survey December 2012 Windrush AEC on behalf of ARK

- The extent to which abstraction constrains the achievement of good status is not clear

Planned actions and investigations represent a programme of works for the catchment that will deliver good ecological status as quickly as feasible.

2. Addressing the problems of the catchment

2.1. Overall catchment priorities

There are six priority issues which need to be addressed through this catchment plan:

1. **Interaction with the Kennet & Avon Canal** – a significant issue in the catchment, affecting the Kennet between Hungerford and Reading, and the River Dun upstream of Hungerford.
2. **Nutrients, sedimentation and algal growth** – these are inter-linked through physical and chemical processes and all adversely affect aquatic plants, insect life and fish. The problem is widespread throughout the catchment. Improving the understanding of the sources of pollution and the processes affecting river ecology will be essential to ensure existing and future programmes of work are properly targeted.
3. **Channel modifications and degradation of habitats** – A significant part of the catchment has been subject to numerous man-made changes over the past centuries. The combined impact of the changes is a significant factor in failure to achieve good ecological status.
4. **Over-abstraction** – this applies particularly to Axford but significant investment made in 2017 has largely resolved this problem although there are still options which could maximise the benefits for the river. Other abstraction investigations on the upper Kennet are due from 2020.
5. **Groundwater -** the groundwater status in the catchment is poor because there is not always sufficient groundwater to keep surface waters flowing. The groundwater may also contain pollutants, which affect drinking water quality and may or may not have an impact on ecology. A large part of the catchment is designated a 'nitrate vulnerable zone' (NVZ), meaning that the groundwater is at risk of pollution from nitrates coming from agricultural activities.
6. **Non-native Invasive species** – There are various aquatic and riparian species present in the catchment which are not naturally found in the UK and disrupt the ecosystem. A few non-native species will have no implications for achieving GES (e.g. mink), whereas the some species (e.g. signal crayfish) can prevent a water body from reaching GES. None of the key non-native species on the Kennet is easy to eradicate. A good programme for control should be created to tackle the species which will prevent water bodies reaching GES, or cause a Good Status waterbody to deteriorate.

2.2. Issue 1 - Dealing with interaction of the river and the Kennet & Avon canal.

The Kennet & Avon Canal re-opened in 1990 and from the mid-1990's onwards there have been water quality and habitat problems resulting from the impact of the canal mixing with River Kennet (and River Dun). The river and canal share the same channel at a number of locations, with the first permanent connection downstream of Copse Lock (west of Newbury).

The water quality in the river and the canal differ greatly. The river is a groundwater-fed chalkstream whose chief characteristics are clear and fast flowing water. The canal, by contrast is a slow-flowing watercourse, which allows sediments to accumulate and nutrients to concentrate. During periods of increased boat movements and warmer water temperatures algal blooms appear in the canal. When the canal water mixes with the river water, nutrients, sediments and algal growth have a detrimental effect on the river, particularly impacting aquatic plants and fish, and creating poor conditions for wild trout spawning. In addition there are local concerns regarding canal boats on winter moorings and how they are managing sewage pumpouts. Canal and Rivers Trust have updated their national advice on composting toilets in response to local concerns.

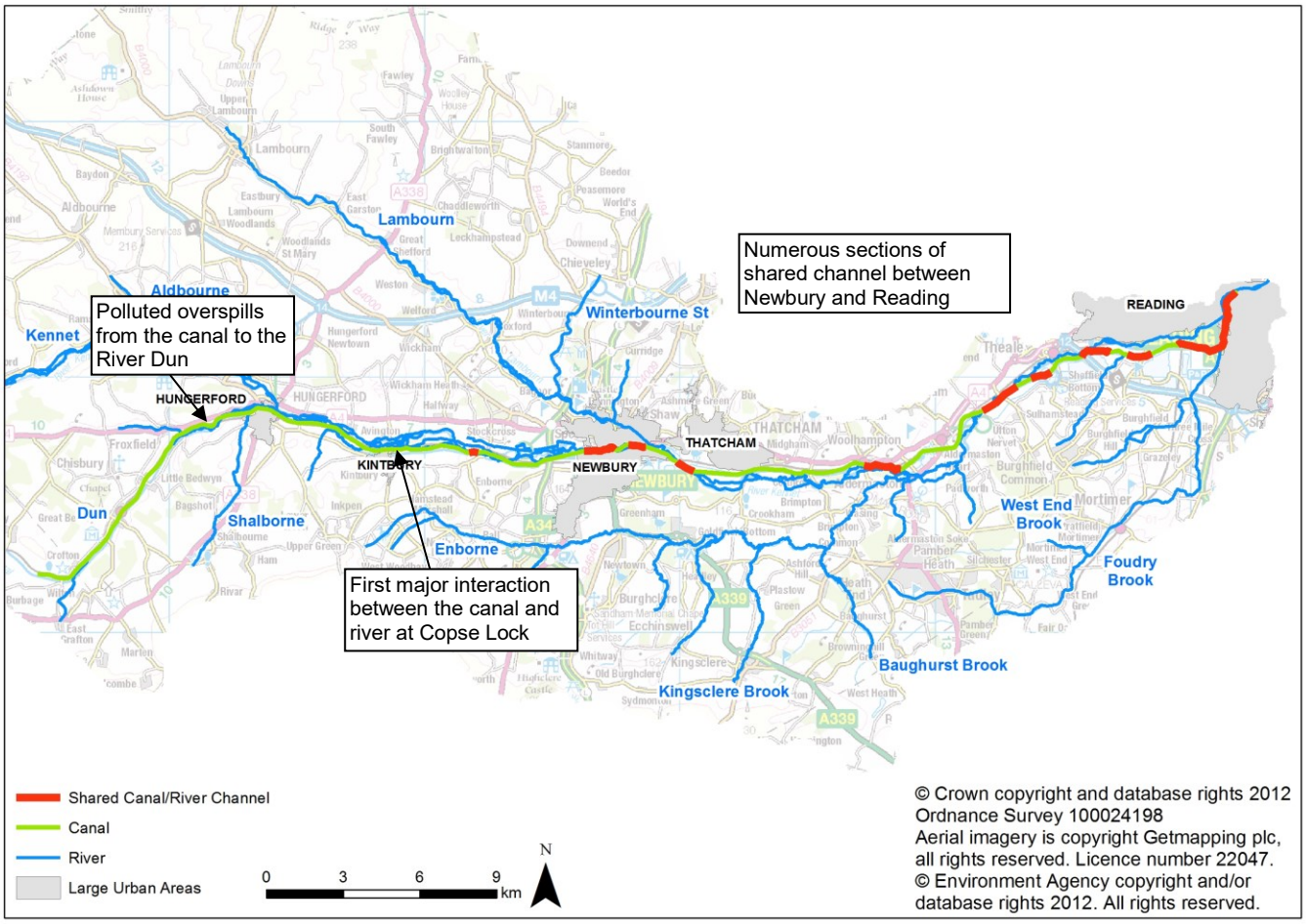


Figure 5 - Interaction between the Kennet and the K&A canal

Nutrients and sediment in the canal come from both point and diffuse sources including:

- Sewage Treatment Works
- Wilton Water: the water source for the canal, which itself receives effluent from two Sewage Treatment Works and diffuse pollution sources.
- Agricultural and overland run-off from fields, farm tracks and ditches
- Direct runoff from urban areas via surface drainage

- Small tributaries which carry large quantities of sediment into the river and canal
- Organic material from decay of leaf litter and vegetation within the canal
- Canal bank erosion

Figure 6 - Plume of sediment laden water from canal entering river at Copse Lock

Recent activities have included:

- Remedial dredging carried out by the Canal and River Trust to remove potentially polluted sediments and reduce the amount of their re-suspension by boat traffic.
- Reduction of sediments and agricultural pollutants entering the canal at Peartree Bottom through Catchment Sensitive Farming advice.
- Reduction of sediments and agricultural pollutants entering the canal and Wilton Water as a result of actions by the Southern Streams farmer cluster.
- Floating reed islands installed at Wilton Water to encourage the development of zooplankton capable of removing harmful planktonic algae.
- Tightening of the phosphorous consent at Kintbury sewage works to improve the quality of effluent entering the canal.
- Investigation into how much pollution can be attributed to different sources. December 2012 Kennet AMP 5 Water Quality Investigations.
- Construction of bypass channels to reduce residence time of water between locks and prevent overspills to the River Dun.
- New flow management through Barton Court to reduce sediment input from the River Kennet into the canal during winter months.
- Reduction in overflow from the canal into the Kennet at the Wilderness through local change in management.
- Agreement to close the winding hole upstream from Copse Lock to minimise sediment disturbance immediately upstream from Craven Fishery.

Whilst improvements have undoubtedly been made the impact of the canal on the River Kennet, particularly downstream from Copse Lock all the way through to Reading is yet to be resolved. Fobney Water Treatment Works has to be closed when sediment in the Kennet reaches a level that requires screens to be cleaned. This is a significant cost to Thames Water.

A proposal by the Catchment Partnership to create a master plan of action failed to find funding support.

In 2019 a Kennet Catchment Canal/River working group was established.

Action points from the first meeting were:

- Identify hot spots for sediment problems in river
- Re-run Muddy Walks training and add to citizen science data
- Continue land use partnership work with farmers
- Complete the closure of the winding hole at Craven
- Monitor lock movement data and Pear Tree Bottom bathymetry
- Investigate option of a bubble curtain at canal/river interaction points
- Investigate options for sediment reduction around Fobney Water Treatment works.

Without further work to address the canal/river interaction it is difficult to see how GES/GEP will be achieved.

2.3. Issue 2 - Dealing with nutrients, sedimentation and algal growth.

The issue

Nutrients, algal growth and sedimentation are significant causes of biological failures in the Kennet catchment.

Nutrients emanate mainly from diffuse agricultural sources and sewage works, although discharges from septic tanks and urban run-off also contribute. Algae develop in response to high nutrient levels, elevated temperatures and reduced flow rates, particularly where the river has been adversely affected by modifications, such as weirs, dredging or online lakes and ponds. Deepening, widening and slowing the river exacerbates the impacts of nutrients, sedimentation and algal growth. Historic river dredging and structures create over-wide or impounded river channels which cause sediment deposition and nutrient storage.

Sediment comes largely from agricultural and urban run-off, and causes siltation of the river bed with detrimental impacts on macrophyte growth and fish spawning. This illustrates the complexity of the problem. The relative influence of point and diffuse pollution sources, their spatial extent and their ecological impact are not yet fully understood in the Kennet catchment, despite a number of modelling studies and field investigations.

Figure 5 shows the dominance of arable farming in the catchment. Arable fields can add significant sediment loads to rivers although simple measures can be taken to reduce runoff.

The western part of the catchment is largely agricultural land, mainly used for arable crops. The eastern part is more urbanised and also contributes diffuse pollution. Identifying the sources of sediments and diffuse pollution is one of the key challenges facing the Kennet catchment.

What has been done so far

Much has already been done to address point source and diffuse pollution:

- Over the past 15 years, Thames Water has undertaken major improvements to most sewage treatment works in the catchment, introducing best available technology for reducing nutrients, thereby lowering phosphate levels in the river to meet WFD targets. East Grafton and Marlborough STW have had storm water holding capacity increased to prevent storm water overflow discharges.
- Farm improvements have been pursued through the Catchment Sensitive Farming Programme. There is a greater awareness in the catchment of the issues of agricultural runoff and some significant changes in farm practise have resulted, including holdings adopting cover cropping, the impacts of which are being recorded as part of a cover crop trial.
- ‘Yellow Fish’ drain marking now extends to more than 1,000 storm water drains in the catchment.

However, despite the physical improvements and investigations, problems with sediments and algal growth persist and the route to achieving GES/GEP remains unclear.

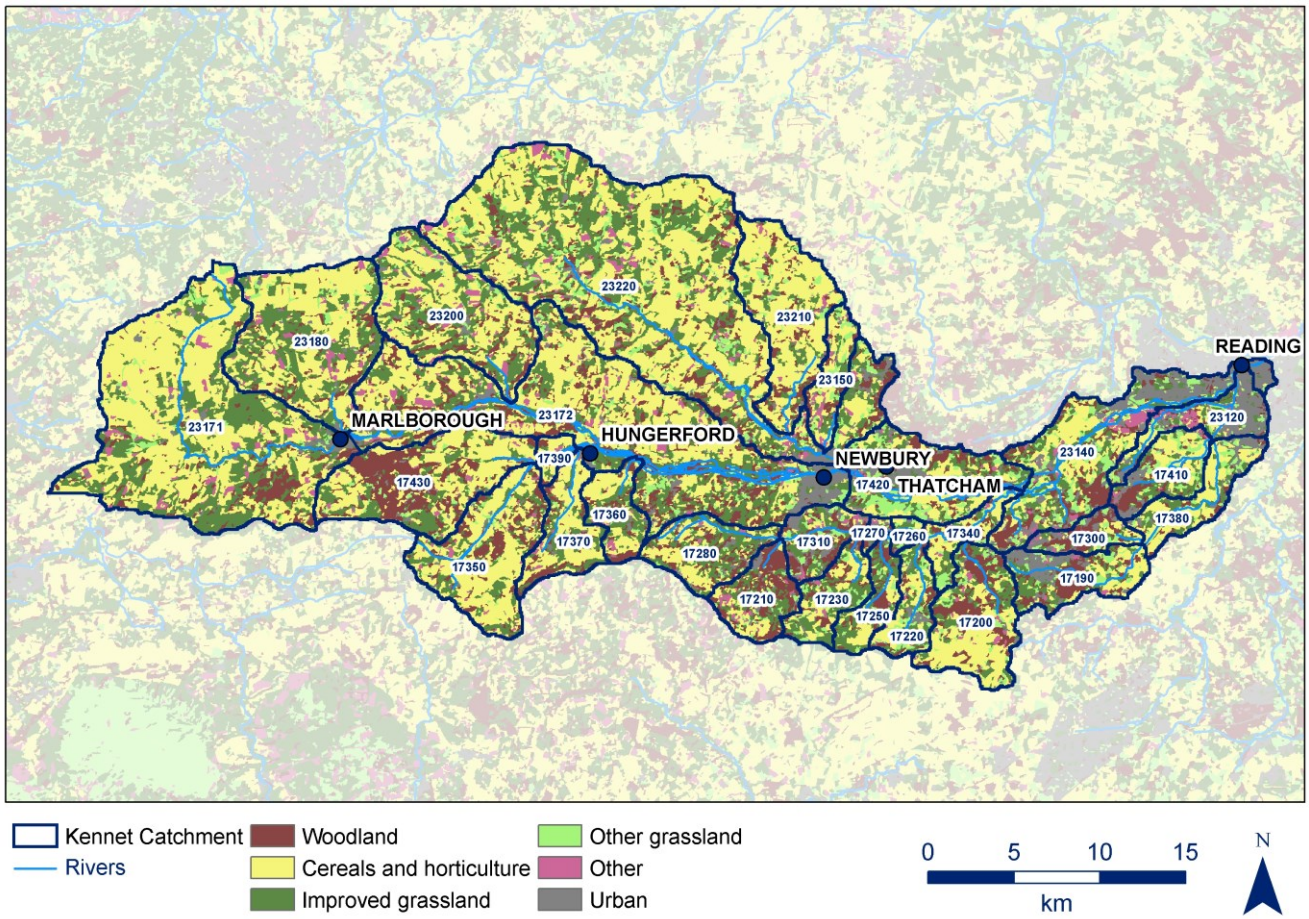


Figure 7 - Land use in the Kennet catchment

Walk-over surveys of the catchment to identify specific sources of pollution, particularly agricultural pollution took place in 2012. The walk-over surveys, by APEM for the EA (APEM report 411940) provided information to help target advice. A sample of their output is shown in Figure 9.

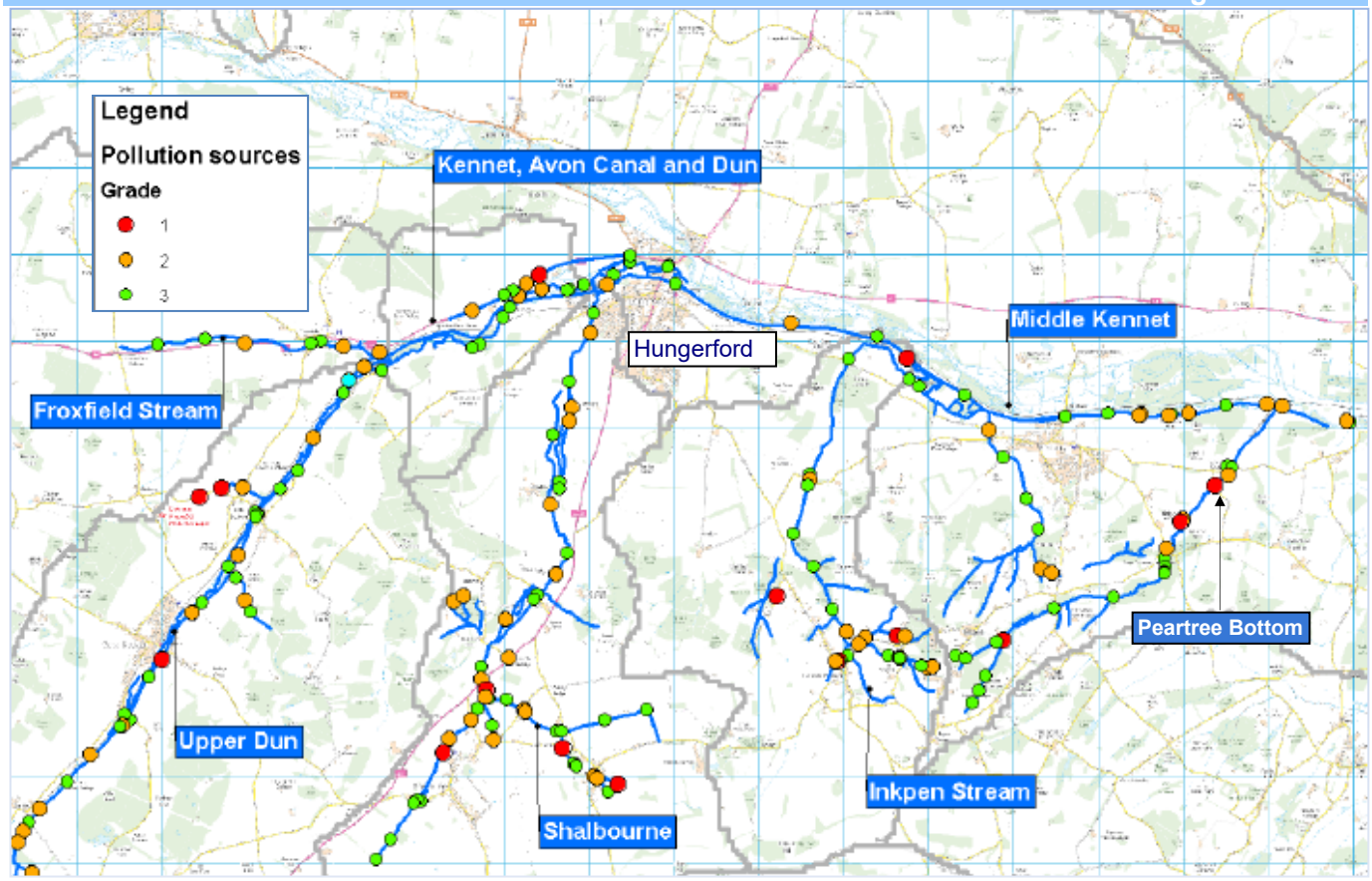


Figure 8 - Identification of pollution sources through walk-over surveys

So far, the walk-over surveys have only covered the southern central part of the catchment shown in Figure 9. However, they showed that run-off from arable fields was a major source of sediments and nutrients, and farm tracks and ditches were the main conduits for transferring the pollutants to the river. CSF advice to farmers has included specific workshops on track management.

A key group of farmers within the Southern Streams area have adopted a no till approach to farming. ARK and NE have worked with Marlborough Downs Space for Nature Farmers to promote Catchment Sensitive Farming.

Volunteers trained by ARK to identify polluted runoff in the catchment , known as the 'Muddy Walks' project, is mapping reported hotspots using EpiCollect.

A more strategic approach to walk overs would deliver more effective results.

Measures to be taken

Walk-over surveys and Muddy Walks
Better understanding and identification of diffuse pollution through a combination of funded and voluntary catchment walkovers and muddy walks.
Extended catchment sensitive farming
Led by NE with support from catchment partners
Outfall Safari programme to better understand the scale of misconnections
Led by ARK with support from Catchment Partners
Increased uptake of SuDS to reduce storm water overflows
Promoted by whole catchment partnership with active engagement from local authority
Promotion of SuDS in schools

2.4. Issue 3 - Dealing with river channel habitat degradation.

The issue

The River Kennet, like most chalk rivers in England is a highly physically modified system. Recent modifications, particularly dredging and channel widening for land drainage or agricultural purposes, have had detrimental impacts on river ecology. In urban and sub-urban areas the river is often channelised with no marginal vegetation. Historic structures, for example mill hatches, can impact the river by impounding upstream sections and obstructing fish passage.

Figure 9 - Example of an impounding structure at Fobney pumping station. Structures like these prevent fish passage and the impounded water results in sedimentation upstream.

The EA Water Level Management Plans for the SSSIs on the Kennet and Lambourn identify all these structures and their adverse impacts, and prioritise actions required to address these impacts.

Failure to meet Good Ecological Status due to biological issues can often be remedied by addressing channel habitat degradation. Waterbodies with good habitat and morphology are better able to cope with other problems such as algal growth and sedimentation, and they have healthier fish and invertebrate populations.

What has been done so far

The programme of river restoration work outlined in figure 9 should be seen in the light of much that has already been achieved in the Kennet, by EA, NE, landowners and others over the last 15 years.

The EA's current programme of work in 2012 identified 21 key projects to bring the Lambourn to GES by 2015 and the Kennet SSSI by 2019. Many habitat restoration projects within this plan have already been delivered.

Measures to be taken

Issue Paper 3 *Dealing with river channel habitat degradation* summarises all current actions, funded projects from 2012-2020 and targets for addressing channel habitat degradation across the whole catchment. The issue paper is supplemented by the "Whole Rivers Restoration Plan for the River Kennet and River Lambourn SSSI" report.

The aspirational programme for completion of the river habitat restoration is shown in Table 7.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actions for River Kennet SSSI*											
Modification of 8 key structures											
River habiat restoration at 8 further key sites											
Actions for River Lambourn SSSI*											
Restoration and enhancement											
Actions outside SSSI											
Upper Kennet & Og habiat restoration											
Southern streams (Froxfield stream, Dun, Shalbourne, Inkpen stream, incl. Pear Tree Bottom).											
Enbourne habitat restoration & fish passage											
Reading Brooks: West End Brook, Foundry Brook, Burfiled Brook, Holy Brook, Clayhill Brook											
Lower Kennet (23140, 23120)											
Agree system for monitoring project success											

Good ecological status in whole catchment by 2020

Good ecological status in Southern Streams by 2015

Table 2 - Indicative programme to deal with river channel habitat degradation

It is not possible to predict with certainty what scale of work is required to achieve GES under the WFD; to a large extent this will be informed by the ecological response to the habitat restoration works as they continue to progress, and also in response to the reduction of other pressures being addressed as part of this plan.

Costs and funding

In 2012 £2.3 million of habitat restoration projects scoped but not yet funded, mainly within the SSSI. Projects delivered so far have been funded by the EA, Thames Water's Community Fund, the River Improvement and Catchment Restoration Funds, the Water Environment Fund and various charitable trusts.

Case Study: Restoration of the River Kennet at Barton Holt

Phase 1 site before restoration

Phase 1 site after restoration

Restoration work at Barton Holt was initiated by the EA and led by (ARK) in 2011. The restoration work was undertaken in 2 phases. Phase 1 involved the removal of 2 river impoundments (a footbridge and weir, pictured above), to achieve a more natural river channel.

Phase 2 provided river enhancements by returning the natural gravel substrate to the channel, and helping to create habitat and flow diversity using woody debris.

The River Kennet at Barton Holt after Phase 2

Volunteer surveying site for riverfly

Case Study: Community-led restoration at Cooper's Meadow, Marlborough

Small scale restoration can be cost effective in some situations

Back stream at Cooper's Meadow, Marlborough – Before, after work, and after two years.

2.5 Issue 4 - Dealing with over-abstraction

The impact of over-abstraction is a localised but important issue, and the benefits of addressing it cascade downstream.

1. Axford: the adverse impacts of abstraction at Axford have been proven, and a solution implemented in 2017. Thames Water are achieving the new abstraction licence requirements and through the Abstraction Incentive Mechanism often perform better than the licence limit. ARK would like to see greater use made of the new Swindon pipeline to maximise its benefit in protecting the chalk stream and have proposed ways in which this could be achieved. Ongoing dialogue is required to achieve this.
2. Ogbourne: abstraction ceased in 2017.
3. Upper Kennet at Marlborough and above: the potential for over-abstraction was identified in the Catchment Abstraction Management Strategy in 2004, but the significance of any impact was uncertain. ARK presented a report to Thames Water and the Environment Agency in 2008 highlighting the impact of over-abstraction. The WINEP 2020 includes an action to investigate the impacts on abstraction upstream of Marlborough.
4. Action for the River Kennet have been working in partnership with Thames Water on the Water Matters capaign to drive down water demand in the Kennet Valley through education and access to free water saving devices. This programme is set to develop and expend during the next AMP phase (2020-2015).

2.6. Issue 5 - Dealing with Groundwater Issues

The extent and status of the groundwater bodies underlying the Kennet catchment are shown in Figure 14.

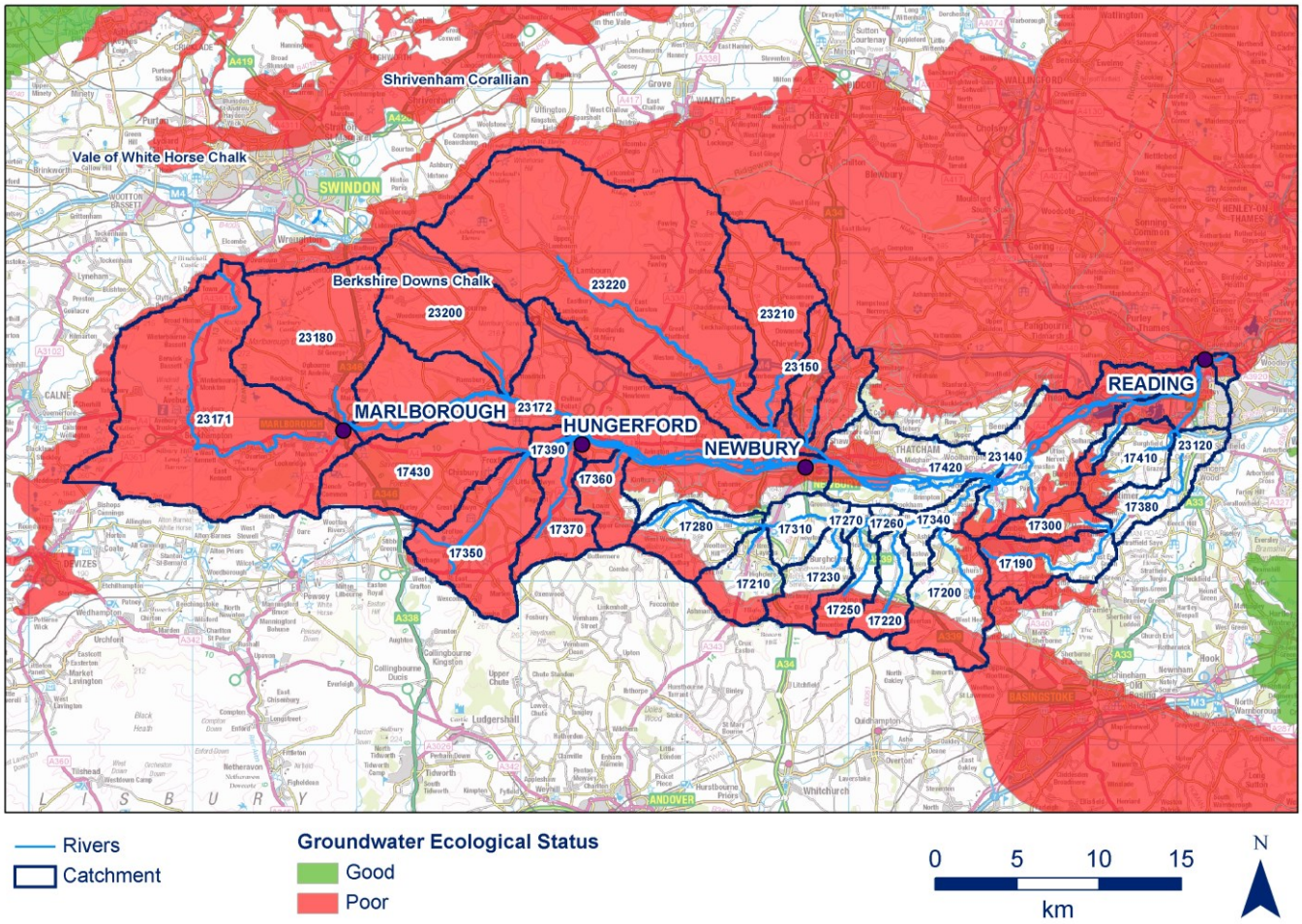


Figure 10 - Groundwater status in the Kennet catchment

The groundwater status in the catchment is poor because there is not always enough groundwater to keep surface waters flowing. The groundwater may also contain pollutants, which affect drinking water quality and may or may not have an impact on ecology.

The majority of groundwater abstractions in this catchment plan are from the Chalk aquifer of the Berkshire Downs Chalk. Other poor status groundwater bodies of the Thatcham Tertiaries and Aldermaston Bagshot Beds have very few groundwater abstractions, highlighting the need review these status results.

The chemical status affects drinking water quality and increases water treatment costs, but is found not to impact on the good ecological status of surface waters.

Land management measures including Nitrate fertilizer restrictions in NVZ and Drinking Water Protection Areas can help to prevent an increase in ground water levels.

2.7.6 – Dealing with Invasive non-native species

The Invasive non-native aquatic and riparian species present on the catchment include American Signal Crayfish (whole catchment), Himalayan Balsam (particularly downstream of Ramsbury), Fairy Fern (Lambourn), Japanese Knotweed (various sites), New Zealand Pygmy weed (Hampstead Park), Floating Pennywort (around Reading) and American mink (widespread but decreasing). The most significant non-native species, with probably the greatest impact on the achievement of GES/GEP is the signal crayfish. There is currently no solution to dealing with this species, despite considerable research. Its impacts on invertebrate and fish populations are unquantified but likely to be significant. It might be challenging to meet Water Framework Directive targets where American Signal Crayfish are present.

Figure 11 - American Signal Crayfish is widespread throughout the catchment, while floating pennywort is restricted to the lower reaches, pictured above right at Foudry Brook, Reading.

None of the key invasive non-native species on the Kennet is easy to eradicate, but a good programme for control needs to be developed along with a strategy to reduce the risk of other non-natives, e.g. 'killer shrimp' entering or moving up the catchment.

A comprehensive programme of floating pennywort removal on Foudry Brook was begun in 2018, co-ordinated by a catchment steering group and funded through an Environmental Undertaking. This properly funded, mult-year approach is delivering significant benefits.

Measures taken to deal with Japanese Knotweed and Water Fern (*Azolla*) in other parts of the catchment on an ad hoc basis.

Himalyan Balsam is being reported via the EpiCollect app and ARK are leading volunteer work parties to remove it.

2.8. Other activities

There are many field actions that are not specifically tackling one of the six main Kennet issues outlined in the previous sections, or that are all-encompassing measures.

The day to day activities of Environment Agency field teams help to stop any waterbodies deteriorating.

Urban development and transport can give rise to many issues that may impact on the ecological status of the catchment. These can vary from pollution arising from urban drainage, fragmentation and damage to river corridors, pesticides for highway maintenance or transport, and pollution due to pressures on the wastewater treatment infrastructure. It will be necessary to continue to influence these to prevent deterioration from Good Ecological Status. All bodies and partners will need to play a part in safeguarding the water environment.

Urban development is a significant issue across the region and the Environment Agency should ensure that all development plans promote sustainable development, including SuDS which promote all four pillars: Water Quality, Water Quantity, Biodiversity and Amenity).

To promote sustainable development in the Kennet catchment the Environment Agency will support the local authorities through the planning process to ensure that the optimum location, design and infrastructure for new development are achieved.

In addition the Kennet Catchment Partnership can add a local voice to national issues, protection of flood plains, net biodiversity gain from new developments, design of good sustainable drainage and embracing opportunities for Natural Flood Management.

Table 3 Proposal for biological monitoring improvements 2013 to 2015

EA to update this table with 2019 monitoring provision

WB code (GB1060390…)	Heavily modified WB?	Priority WB/WR priority WB?	WB name/ecological status	Classification driver (i.e parameter(s) that determine classification)	Phytobenthos	Macrophytes	Invertebrates	Fish	Comments
23120	*	P	Kennet and Foudry Brook and Clayhill Brook in Reading	Phosphate, Mitigation Measures Assessment	H	H	C	C	
17190			Foudry Brook (Source to WestEnd Brook)	Invertebrates			U		
17200			Baughurst Brook	Phosphate, Dissolved Oxygen, Invertebrates					
17210			Hollingtonstand Milford Lake (source to Enborne)	Macrophytes		U	L		
17220		WR	Kingsclere Brook (Source to Enborne)	Invertebrates			U		
17230			Earlstone Stream and Burghclere Brook (source to Enborne)	Phosphate, Dissolved Oxygen			L	H	Currently no biological monitoring
17250		WR	Ecchinswell Brook (source to Enborne)	EJH			L	H	Currently no biological monitoring
17260			Enborne (Ecchinswell Brook to Kingsclere Brook)	Fish			U	C	
17270			Enborne (Burghclere Brook to Ecchinswell Brook)	Fish			U	U	
17280			Enborne (Source to downstream A34)	Fish			L	C	
17300			West End Brook (tributary of Foudry Brook)	Phytobenthos, Macrophytes, Fish	C	U	L	U	
17310			Enborne (downstream A34 to Burghclere Brook)	Phosphate, Dissolved Oxygen			L	H	Currently no biological monitoring
17340			Lower Enborne	Phosphate, Fish			U	C	
17350		WR	Upper Dun	EJH	L	L	L	L	Sensitive upland chalkstream/winterbourne currently with no monitoring
17360		WR	Inkpen Stream (source to Kennet)	EJH	L	L	L	L	Sensitive upland chalkstream/winterbourne currently with no monitoring
17370		WR	Shalbourne (source to Kennet at Hungerford)	Fish	L	L	U	C	Sensitive winterbourne affected by drought. GES targeted by 2015
17380			Foudry Brook (West End Brook to M4)	Phosphate			U	U	

WB code (GB1060390…)	Heavily modified WB?	Priority WB/WR priority WB?	WB name/ecological status	Classification driver (i.e parameter(s) that determine classification)	Phytobenthos	Macrophytes	Invertebrates	Fish	Comments
17390		P	Kennet and Avon Canal and Dun above Hungerford	Fish	H			U	Phytobenthos monitoring needed to assess condition upstream of interaction
17410			Burghfield Brook	Phosphate, Invertebrates			C		
17420	*		Kennet (Lambourn confluence to Enborne confluence)	Mitigation Measures Assessment	H	H	U	U	Main river affected by canal interaction
17430			Froxfield Stream	Phosphate					Targeted for GES by 2015
23140	*	P	Kennet and Holy Brook	Mitigation Measures Assessment	H	H	U	U	Main river affected by canal interaction
23150			Lambourn tributary (North of Newbury)	Macrophytes		U			
23171			Upper Kennet to Marlborough	Phosphate, Invertebrates	H	H	U	H	Affected by 2011/12 drought. Frequent algal blooms. Scarce ranunculus
23172	*		Middle Kennet (Marlborough to Newbury)	Fish, Mitigation Measures Assessment	H	H		C	Frequent algal blooms. Scarce ranunculus
23180		WR	Og	Invertebrates	H	H	U	H	Affected by 2011/12 drought. Frequent algal blooms. Scarce ranunculus
23200			Aldbourne	Phosphate, Invertebrates					
23210			Winterbourne	Phosphate					
23220		P	Lambourn (Source to Newbury)	Fish, Macrophytes	L	U		C	Habitats Directive site. Needed as comparator for other WBs
				Total WBs monitored	**13**	**10**	**29**	**20**	

With the additional monitoring shown in Table 14, the biological monitoring coverage would increase from 32% to 62%. The target areas for additional monitoring are:

- The main river where affected by canal interaction
- Upland chalk water bodies affected by 2011/12 drought
- Water bodies with good status in question (Upper Kennet and Og)
- Water bodies affected by diffuse pollution and planning to achieve GES by 2015

2.9. Risks

Successful delivery of this plan will lead to meeting Water Framework Directive objectives in the Kennet catchment.

However, there are many risks that the plan will not be successful, including:

- Inadequate funding
- Lack of buy-in to the plan from those affected by it
- Failure of proposed studies to deliver clear options for on-the-ground actions
- Failure of on-the-ground actions to deliver ecological improvements
- Lack of resources for monitoring that will enable success of actions to be measured
- Lack of funding or high level support for project team members from their parent organisations
- Staff turnover amongst team members
- Lack of support for the plan from government or regulators, e.g. OFWAT or Defra

The primary mechanism for dealing with these risks is systematic monitoring of progress towards the milestones shown in this plan, combined with coordinated action by the steering group partners as the need arises. Regular progress reporting to the steering group is essential and a primary duty of the catchment hosts, Action for the River Kennet.

2.10. Who's who in the catchment?

Outlined below are the various agencies, organisations and individuals, known otherwise as "stakeholders", present in the Kennet catchment. This list is not definitive, as these and other stakeholders will be approached with the publication of this catchment management plan.

- **Environment Agency**: identified as the competent authority.
- **ARK** (Action for the River Kennet): Catchment hosts
- **Swindon, West Berkshire, Wiltshire, and Basingstoke and Deane** are the local authorities for the area.
- **Thames Water**: responsible for public water supply and sewage treatment in the catchment, with the exception of a small area in the south around Basingstoke, which is supplied by **Southern Water** and an area in the far west, which is supplied by **Wessex Water**.
- **Canal and Rivers Trust**: responsible for inland waterways in the UK. The major waterway in the Kennet catchment is the Kennet & Avon canal.
- **Natural England**: Government advisor on the natural environment.
- **National Farmers Union**: the largest farming organisation in the UK
- **Kennet Valley Fisheries Association**
- **Kennet & Pang Fisheries Stakeholder Group**
- **Kennet & Avon Canal Trust**
- **Riparian and Landowner Representatives**
- **Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust**
- **Wiltshire Wildlife Trust**
- **West Berkshire Countryside Society**
- **Cleaner Kennet campaign**

Appendices

Appendices A: Acronyms

AMP - *Asset Management Plan (e.g. AMP5 Investigation)*
CAMS- *Catchment Abstraction Management Strategy*
CSF - *Catchment Sensitive Farming*
CSO - *Combined Sewer Overflow*
DEFRA – *(Government) Department for Environment, Food and Rural Affairs*
DrWPA - *Drinking Water Protected Area*
EA - *Environment Agency*
eNGO - *Environmental Non-governmental organisation*
EO - *Environmental Officer (EA Staff)*
GEP – *Good Ecological Potential*
GES – *Good Ecological Status*
GI SPD - *Green Infrastructure Supplementary Planning Document*
GWHCL - *Groundwater Hydrology and Contaminated land (EA Team)*
GWB - *Groundwaterbody*
(f)RMBP - (*first) River Basin Management Plan (Published in 2009)*
INNS - *Invasive Non-Native Species*
KCRP – *Kennet Chalkstream Restoration Project*
LDF - *Local Development Framework*
LWD - *Large Woody Debris*
NE - *Natural England*
NVZ - *Nitrate Vulnerable Zone*
OFWAT – *Office of Water Services*
OSM - *Operator Self Monitoring*
PHS – *Priority Hazardous Substance*
PP - *Pollution Prevention*
RBMP – *River Basin Management Plan*
SGZ - *Surface Water Safeguard Zones*
SPZ - *Source Protection Zone*
SSSI - *Site of Special Scientific Interest*
STW – *Sewage Treatment Works*
SUDs - *Sustainable Urban Drainage Systems*
SWMP - *Surface Water Management Plan*
TBT - *Tributylin*
WFD - *Water Framework Directive*
WBID - *Waterbody ID*
WRGIS - *Water Resources Geographic Information Systems*
WRMP – *Water Resource Management Plan*

Appendix B: Glossary

Artificial Water Bodies are surface water bodies which have been created in a location where no water body existed before and which have not been created by the direct physical alteration, movement or realignment of an existing water body.

Biochemical Oxygen Demand is the amount of dissolved oxygen consumed by chemical and microbiological action when a sample effluent is incubated for 5 days at 20oC. This test is used to show the presence of sewage in water.

Catchment is the area from which precipitation contributes to the flow from a borehole spring, river or lake. For rivers and lakes this includes tributaries and the areas they drain.

Catchment Sensitive Farming is an initiative aimed at promoting water-friendly farming to help tackle agricultural pollution.

Chemical Status is the classification status for the water body against the environmental standards for chemicals that are priority substances and priority hazardous substances. Chemical status is recorded as good or fail. The chemical status classification for the water body, and the confidence in this (high or low), is determined by the worst test result.

Classification is the methods for distinguishing the environmental condition or “status” of water bodies and putting them into one category or another.

Diffuse Sources of Pollution are generally associated with surface water run-off and different land uses such as agriculture and forestry. Pollution also originates from septic tanks associated with rural dwellings and from the land with the spreading of industrial, municipal and agricultural wastes.

Dissolved Oxygen is the concentration of oxygen dissolved in water. This is expressed in mg/l or as a percent saturation where saturation is the maximum amount of oxygen that can be dissolved in water at a given altitude or temperature.

Ecological Status applies to surface water bodies and is based on the following quality elements: biological quality, general chemical and physico-chemical quality, water quality with respect to specific pollutants (synthetic and non synthetic), and hydromorphological quality. There are five classes of ecological status (high, good, moderate, poor or bad). Ecological status and chemical status together define the overall surface water status of a water.

Ecological Potential is status of a heavily modified or artificial water body measured against the maximum ecological quality it could achieve given the constraints imposed upon it by those heavily modified or artificial characteristics necessary for its use. There are five ecological potential classes for Heavily Modified Water Bodies/Artificial Water Bodies (maximum, good, moderate, poor and bad).

Environment Agency Water Body Identifier All Water Bodies throughout England and Wales have been given a unique twelve digit code. This code allows for the quick and precise identification of any given Water Body.
An example of this in Thames West Area would be the code: GB106039042650 which gives reference to the Upper Kennet at Byfield.

Eutrophication is the enrichment of waters by inorganic plant nutrients that results in increased production of algae and/or other aquatic plants, which can affect the quality of the water and disturb the balance of organisms present within it.

Good Chemical Status means that concentrations of pollutants (priority substances and priority hazardous substances) in the water body do not exceed the environmental limit values specified in the Water Framework Directive Article 16 daughter Directive.

Good Ecological Potential Those surface waters which are identified as Heavily Modified Water Bodies and Artificial Water Bodies must achieve 'good ecological potential' (good potential is a recognition that changes to morphology may make good ecological status very difficult to meet). In the first cycle of river basin planning good potential may be defined in relation to the mitigation measures required to achieve it.

Good Ecological Status The objective for a surface water body to have biological, structural and chemical characteristics similar to those expected under nearly undisturbed conditions.

Good Status is a term meaning the status achieved by a surface water body when both the ecological status and its chemical status are at least good or, for groundwater, when both its quantitative status and chemical status are at least good and show no signs of deterioration

Groundwater refers to water occurring below ground in natural formations (typically rocks, gravels and sands).

Hydromorphology is a term used in river basin management to describe the combination of hydrological and geomorphological (structural) processes and attributes of rivers, lakes, estuaries and coastal waters.

Heavily Modified Water Bodies are surface water bodies whose nature has changed fundamentally as a result of physical alterations due to human activities.

Macrophytes are larger plants, typically including flowering plants, mosses and larger algae but not including single-celled phytoplankton or diatoms.

Measure is the term used in the Water Framework Directive and domestic legislation. It means an action which will be taken on the ground to help achieve Water Framework Directive objectives.

Phytobenthos are bottom-dwelling multi-cellular and unicellular aquatic plants such as some species of diatom.

Point Sources of Pollution are primarily discharges from municipal wastewater treatment plants associated with dense areas of population or effluent discharges from industry.

Priority Hazardous Substances are those which are considered to be extremely harmful. Concentrations of these substances are measured to determine whether a waterbody meets Good Chemical Status. Emissions of PHS must be phased out by 2025. A full list can be found here: http://ec.europa.eu/environment/water/water-dangersub/pdf/com_2006_397_en.pdf?lang=_e

Quantitative Status for Groundwater is an expression of the degree to which a body of groundwater is affected by direct and indirect abstractions. If this complies with Directive requirements the status is good.

River Basin is the area of land from which all surface water run-off flows, through a sequence of streams, rivers and lakes into the sea at a single river mouth, estuary or delta.

River Basin Characterisation is the first stage in the Water Framework Directive management cycle. It describes the water environment and the human pressures upon it, so that the risk of failing to meet the Water Framework Directive's targets or objectives can be assessed.

River Basin Management Plan(s) set out in general terms how the water environment will be managed. They also provide a framework for more detailed decisions to be made.

Surface Water is a general term used to describe all the water features such as rivers, streams, springs, ponds and lakes.

Water Body is a discrete and significant element of surface water such as a river, lake, reservoir or a distinct volume of groundwater within an aquifer.

The Water Framework Directive, introduced in December 2000, is the most substantial piece of water legislation from the EC to date. It promotes a new approach to water management through river basin planning, helping the Environment Agency to improve and protect inland and coastal waters and create better habitats for wildlife that lives in and around water.