



# KENNET CATCHMENT PARTNERSHIP



# Kennet Catchment Management Plan

First Edition  
December 2012

## Acknowledgements

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## Note

If you are providing this plan to an internal or external partner please inform the plan author to ensure you have got the latest information

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

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## 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).

### *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 50 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.

Using Water Framework Directive water quality and biological monitoring data, the condition of the Kennet has been found to be about 70% in moderate condition and 30% in good condition.

The populations of wild trout and grayling are much less healthy than would be expected for a natural chalkstream. 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, 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 is a possibility, although it is unlikely that this solution would work for the lower Kennet. Installation of bypass weirs in the Bedwyn area will help to separate this section of the canal from the rivers.
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. There has been a significant amount of work over the last 15 years, but much more is needed.
4. **Over-abstraction** – this applies particularly to the Axford where the adverse impacts of abstraction have been proven, and a solution agreed. At Ogbourne the impact of abstraction is understood and the mitigating measure agreed with a timetable for implementation. There have been other reviews of abstraction impacts in the Kennet Valley, and the impact of over-abstraction is a localised but important issue.  
**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.
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.

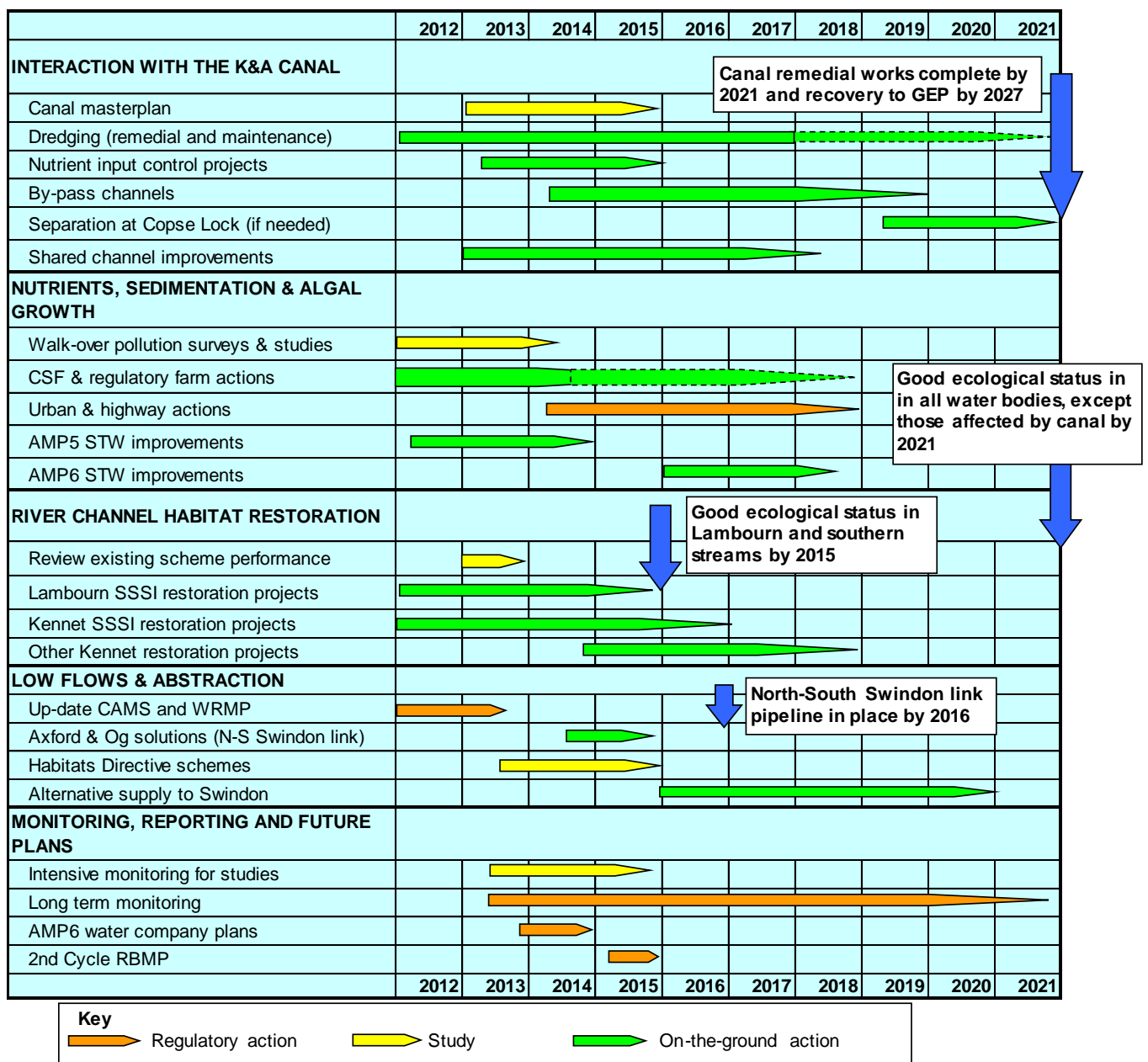
For each of these priority issues, further studies will be an important step (where required) to improve understanding of the problem and to investigate the solutions. This plan has identified which studies are required, and any associated costs if known. By the end of 2012 the first study results should be available, and the focus will switch to implementing the study outcomes and using them to better target existing and new programmes of work. Other work to implement solutions will not stop while further studies are undertaken.

In the case of the interaction with the Kennet & Avon Canal, there is still much uncertainty over how to deal with the problem. The partners are working to agree a programme of investigations and actions which will set out a detailed costed programme of activities needed to restore good conditions.

Improvements to the monitoring of the biological condition of the river are planned to improve the understanding of the river’s health and to measure the success of the planned improvements.

**Provisional programme management**

An aspirational programme for delivering the improvements is shown below. Although aspirational, it is considered achievable; 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 catchment**

The main features of the programme are:

- Water framework directive biological monitoring to be in place by spring 2013.
- All studies to be complete by 2015, feeding costed remedial actions into the 2<sup>nd</sup> River Basin Management Plan (RBMP) cycle from 2016 to 2021.
- By 2015, completion of all activities to achieve Good Ecological Status for the Lambourn Special Area of Conservation/protected sites.
- By 2015, completion of remedial actions for diffuse pollution through Catchment Sensitive Farming, to contribute to Good Ecological Status for the Froxfield Stream, Upper Dun, Shalbourne and Inkpen Stream. Agreement on a timeframe and funding for actions to deliver habitat improvements on these streams.
- By 2021, achievement of Good Ecological Status in all parts of the catchment, except where affected by interaction with the canal and in urban parts of Reading.
- Also by 2021, completion of all on-the-ground remedial works to deal with the canal interaction and urban diffuse pollution, in time for recovery of the affected rivers before the ultimate Water Framework Directive target date of 2027.

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 will require some funding, which is being sought.



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, through consultation with others. This plan will be reviewed and updated every six years, in 2016 and 2021.

This Kennet Catchment Management Plan builds on the Thames RBMP. It explores the local issues in more detail 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. The list of priority substances may be expanded in 2013 to include flame retardants (brominated diphenyl ethers) in which case many water bodies in the Kennet could fail to meet GES.

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.

Every water body has been assessed and assigned a status. These have been prioritised at the River Basin Management Plan level; those identified as top priority have actions identified and a commitment to deliver improvements by 2015.

There are 29 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. The aim of this catchment plan is to prevent any deterioration in these, and improve the status of the others from moderate or poor to GES and GEP.

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.

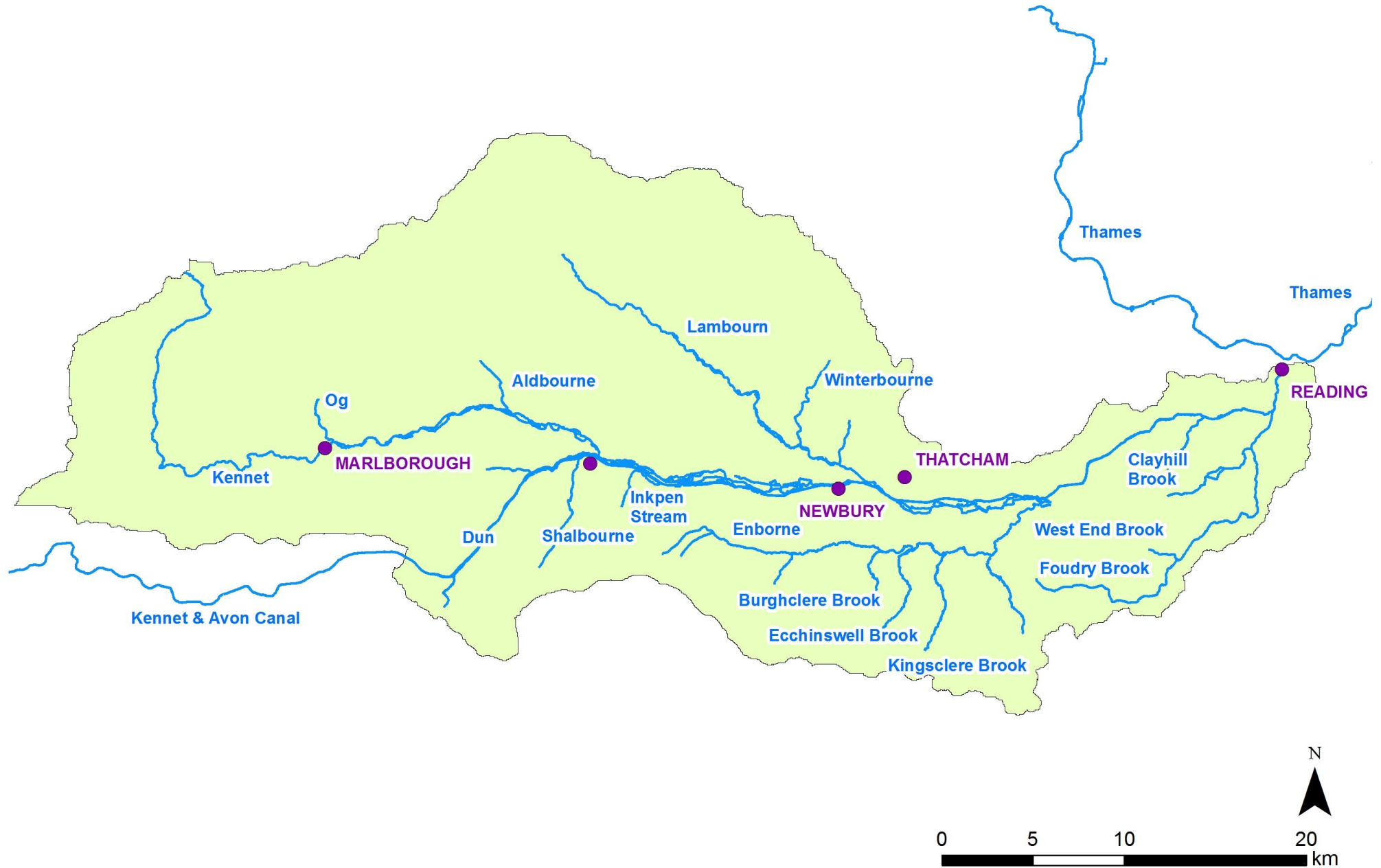
More detailed technical plans are being developed as “Issue papers” and used to support this management plan.



# 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 at <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

The condition of the River Lambourn SSSI remained “unfavourable unchanged” in 2010 with the main reason being siltation. The condition statement reports that:

*“There is significant progress in improving habitat condition and addressing problems but some key targets are not met. The extent of river habitat is maintained. This section of the river is not assessed for biological or chemical quality, but there are no known problems. There is no significant abstraction and there are no indications of problems relating to water quantity. There are no indications of widespread problems of excessive siltation, but there are known sources of sediment from farm tracks, roads and agricultural run-off in places. This gives rise to episodic events during heavy rainfall when large quantities of silt are washed downstream. ELS and HLS are being promoted to help address this. Additional means of reducing nutrient and sediment input are to be investigated and addressed through the production of a diffuse pollution action plan, due in December 2010”.*

The EA and NE have jointly developed a Diffuse Pollution Action Plan and a Whole River Restoration Plan for both of the riverine SSSIs. Actions from these plans have been included (where appropriate) in the following chapters or within the relevant “issues papers”.

The condition of the River Kennet SSSI was assessed by NE as “unfavourable unchanged” in 2002 and again in 2008.

The reasons for the unfavourable condition were:

- Inappropriate weirs dams and other structures
- Invasive freshwater species
- Siltation
- Water abstraction
- Water pollution from agricultural run-off and sewage discharges

#### 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<sup>1</sup>:

- 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.

<sup>1</sup> Impact of land use changes on the Kennet Catchment, Paul Whitehead *et al* 2002

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.



**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.**

## 1.2. Overview of water bodies and WFD characterisation

### Overview of current status

The River Kennet catchment has been divided into 29 water bodies for the purposes of the Water Framework Directive. These are shown in Figure 4. Nine waterbodies have been classified at good ecological status and 16 at moderate ecological status.

Four are designated 'heavily modified' under WFD criteria. The waterbody 17420 (Kennet (Lambourn confluence to Enborne confluence)) will be de-designated in the 2<sup>nd</sup> cycle RBMP and will be dealt with as a natural water course from now on. The waterbodies 23140 (Kennet and Holy Brook) and 23172 (Middle Kennet) have been proposed for de-designation as heavily modified, but a decision is yet to be made.

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





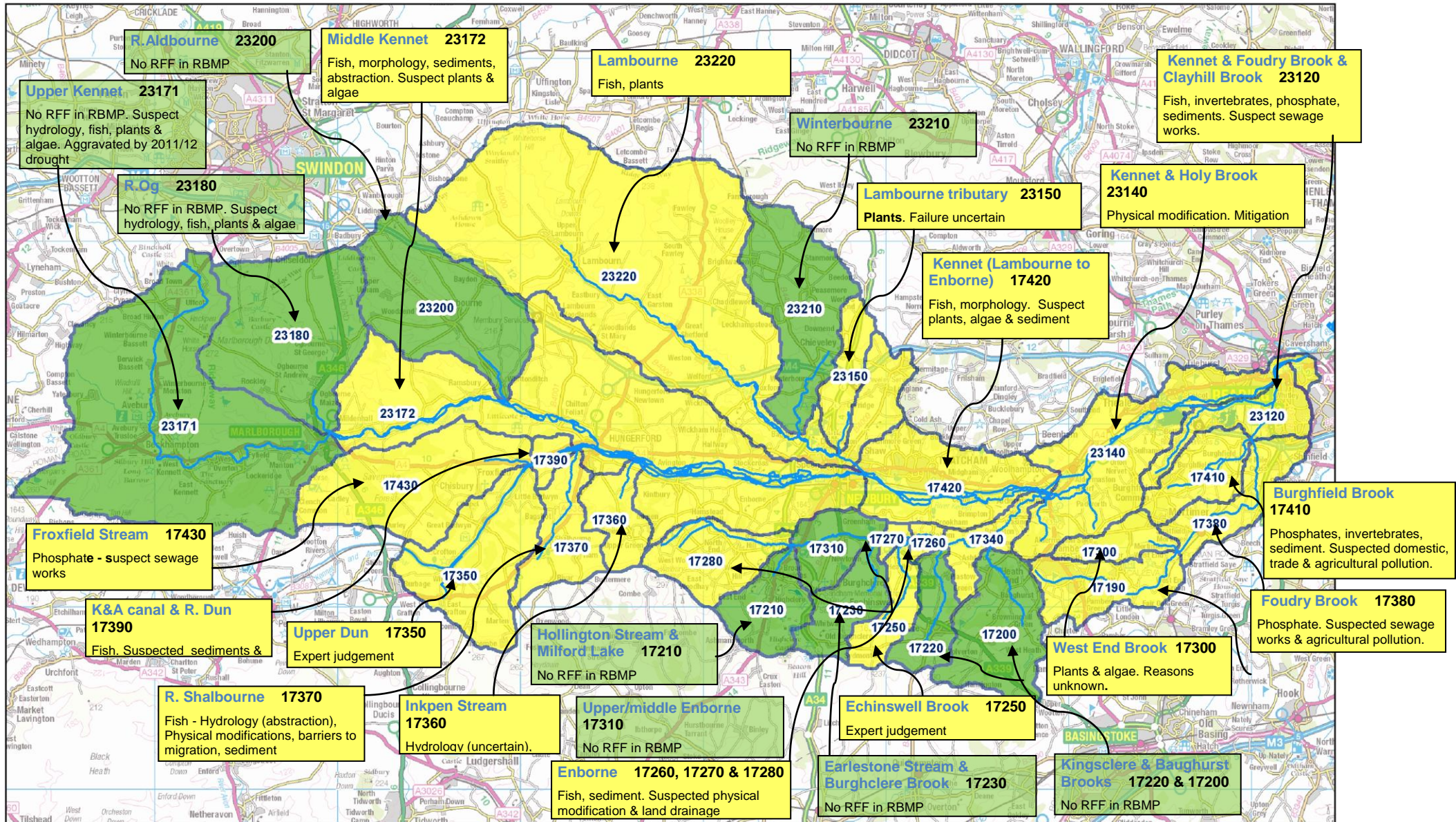


Figure 4 - Ecological status and reasons for failure in the Kennet catchment



RFF Reason For Failure: Ecological status and reasons for failure (RFF) are as Thames RBMP, Annex B

Table 2 Factors determining waterbody classifications (see overleaf for key)

WB code (GB1060390...)	Heavily modified?	Priority WB?	WB name/ ecological status	Classification driver (i.e. parameter(s) that determine classification)	Phytobenthos	Macrophytes	Invertebrates	Fish	Ammonia	DO	pH	P	Temp	Annex 8 Chem	Annex 10
23120	*	P	Kennet and Foudry Brook and Clayhill Brook in Reading	Phosphate, Mitigation Measures Assessment			C	C		U		U	U		
17190			Foudry Brook (Source to WestEnd Brook)	Invertebrates			U		U			U			
17200			Baughurst Brook	Phosphate, Dissolved Oxygen, Invertebrates					U	U		U	U		n/a
17210			Hollingtonstand Milford Lake (source to Enborne)	Macrophytes		U							U		n/a
17220		WR	Kingsclere Brook (Source to Enborne)	Invertebrates			U								n/a
17230			Earlstone Stream and Burghclere Brook (source to Enborne)	Phosphate, Dissolved Oxygen											n/a
17250		WR	Ecchinswell Brook (source to Enborne)	EJH											n/a
17260			Enborne (Ecchinswell Brook to Kingsclere Brook)	Fish			U	C		U		U	U		n/a
17270			Enborne (Burghclere Brook to Ecchinswell Brook)	Fish			U	U							n/a
17280			Enborne (Source to downstream A34)	Fish				C							n/a
17300			West End Brook (tributary of Foudry Brook)	Phytobenthos, Macrophytes, Fish	C	U		U							n/a
17310			Enborne (downstream A34 to Burghclere Brook)	Phosphate, Dissolved Oxygen											n/a
17340			Lower Enborne	Phosphate, Fish			U	C		U		C	U		n/a
17350		WR	Upper Dun	EJH											n/a
17360		WR	Inkpen Stream (source to Kennet)	EJH											n/a
17370		WR	Shalbourne (source to Kennet at Hungerford)	Fish			U	C				U			n/a
17380			Foudry Brook (West End Brook to M4)	Phosphate			U	U	U			C	U		
17390		P	Kennet and Avon Canal and Dun above Hungerford	Fish				U							n/a
17410			Burghfield Brook	Phosphate, Invertebrates			C					C			
17420	*		Kennet (Lambourn confluence to Enborne confluence)	Mitigation Measures Assessment			U	U					U		
17430			Froxfield Stream	Phosphate								U			n/a
23140	*	P	Kennet and Holy Brook	Mitigation Measures Assessment			U	U					U		
23150			Lambourn tributary (North of Newbury)	Macrophytes		U									n/a
23171			Upper Kennet to Marlborough	Phosphate, Invertebrates			U								n/a
23172	*		Middle Kennet (Marlborough to Newbury)	Fish, Mitigation Measures Assessment				C							
23180		WR	Og	Invertebrates			U								n/a
23200			Aldboune	Phosphate, Invertebrates					U			U			n/a
23210			Winterbourne	Phosphate											n/a
23220		P	Lambourn (Source to Newbury)	Fish, Macrophytes		U		C		U					

## Keys for Table 2

Classification Colours:	Data certainty:	Annex 10:
No Data	U = Uncertain	n/a - Assessment not required
High	C = Certain	Fail
Good		Pass
Moderate		
Poor		
Bad		

Code:	Meaning:	Definition:
WR	Water Resources	water body under investigation with respect to water resources
P	Priority	waterbody at risk of deterioration
EJH	Expert Hydrological Judgement	
C	Certain	there is good evidence to support the classification,
U	Uncertain	there is some doubt and more evidence is required to be certain
Annex.10	hazardous substances which pollute water	e.g. Benzene, Trichloromethane

On the basis of the WFD monitoring information, the condition of the Kennet catchment can be summarised as:

- The headwater streams and upper reaches of tributaries are mostly classed as being in good condition
- The main bodies of the rivers are all in moderate condition, mainly because of poor fish populations.
- There is significant uncertainty over both the condition of the rivers and the actions needed to improve them.
- There are 3 groundwater bodies which fall within or overlap the Kennet catchment. All of these have been classified as poor status

Before committing to improvement actions, it is important to review the quality of the information on which the condition of the catchment has been based, and to identify uncertainties.

For Heavily Modified Water Bodies (HMWB) and Artificial Water Bodies (AWB), a separate classification process applies because these water bodies cannot reach GES due to socio-economic uses. The EA identify whether a HMWB or AWB meets its Ecological Potential or not by :

- Identifying the impacts affecting the water body;
- Identifying the actions, known as mitigation measures, necessary to ensure the hydromorphological characteristics of a water body are consistent with Good or Maximum Ecological Potential; and
- Assessing whether those measures have been taken (mitigation measures assessment (MMA)).

Where all applicable mitigation measures are in place, the water body can be classified as Good Ecological Potential or better. Where one or more mitigation measure remains to be taken, the water body will be classified as Moderate Ecological Potential (MEP) or worse.

### 1.3 Uncertainty and Further Investigation

#### *Review of information quality and new data requirements*

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

- Fish
- Phosphorous levels
- Hydromorphology
- Invertebrates

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.



**Figure 5 - EA Fisheries staff sampling the river**

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<sup>2</sup> 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.

<sup>2</sup> 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

Investigating these uncertainties will give a better understanding of the river, and help to target effective actions on the ground. These actions will include existing initiatives, which have already proven their need and benefit, and new programmes of work. The actions are addressed in Chapter 2 of this plan.

It is difficult to predict how quickly waterbodies will recover after actions have taken place. Robust monitoring will help to assess which actions are most successful. These results can be used to guide further actions in the catchment.

Section 2.9 of this plan proposes additions to existing monitoring and studies to allow these uncertainties to be addressed before the start of planning for the 2<sup>nd</sup> cycle RBMP

There are 3 stages to WFD investigations:

**Stage 1:** confirm failure – to ensure that the reported failure is a ‘real’ result.

**Stage 2:** identify reason for failure

**Stage 3:** identify measures (field actions) to address the failure.

The EA are required to complete programmed investigations by December 2012. As each investigation is completed, new actions or further investigations may be implemented.

The following table details the current status of investigations for the Kennet Catchment.

Gaps in the action tables below in table 3 may be due to lack of evidence or uncertainty about evidence. In all cases these should be matched with an ongoing or planned investigation.

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

**Table 3 Planned and completed investigations**

(NB mitigation measures removed from Middle Kennet 23172 &amp; Kennet: Lambourne to Enborne 17420)

WB code (GB1060390...)	Heavily modified WB	WB name/ecological status	Investigations: Sub-component	Investigations: Sub-component / Failing element	Investigation stage	Expected completion date
23120	*	Kennet and Foudry Brook and Clayhill Brook in Reading	Invertebrates Fish Surface water quality Mitigation Measures	Invertebrates Fish Sediments	Stage 2 identify reason for failure Stage 2 identify reason for failure Stage 2 identify reason for failure	Dec - 2012 Dec - 2012 Dec - 2012
23150		Lambourn tributary (North of Newbury)	Macrophytes	Plants	Stage 1&2 confirm failure & reasons	Completed - GES
23172	*	Middle Kennet (Marlborough to Newbury)	Surface water quality	Ammonia Sediments	Stage 1 - confirm failure Stage 1 - confirm failure	Completed - GES Dec - 2012
23220		Lambourn (Source to Newbury)	Phytobenthos Fish	Phytobenthos Fish	Stage 1 - confirm failure Stage 1 confirm failure	Dec - 2012 Mar - 2012
17190		Foudry Brook (Source to WestEnd Brook)	Invertebrates Surface water quality	Invertebrates Sediments Phosphate	Stage 1&2 confirm failures & reasons Stage 1&2 confirm failures & reasons Stage 1&2 confirm failures & reasons	Completed - GES Dec - 2012 Dec - 2012
17250		Ecchinswell Brook (source to Enborne)	Hydrology	Hydrology	Stage 1 confirm failure	Completed - GES
17260		Enborne (Ecchinswell Brook to Kingsclere Brook)	Fish Surface water quality	Fish Sediments	Stage 1&2 confirm failures & reasons Stage 1 confirm failure	Dec - 2012 Completed - GES
17270		Enborne (Burghclere Brook to Ecchinswell Brook)	Fish Surface water quality	Fish Sediments	Stage 1&2 confirm failures & reasons Stage 1 confirm failure	Dec - 2012 Completed - GES
17280		Enborne (Source to downstream A34)	Fish	Fish	Stage 1&2 confirm failures & reasons	Dec-12
17300		West End Brook (tributary of Foudry Brook)	Fish Phytobenthos Macrophytes	Fish Phytobenthos Macrophytes	Stage 2 - identify reasons Stage 2 - identify reasons Stage 2 - identify reasons	Dec - 2012 Dec - 2012 Mar - 2012
17340		Lower Enborne	Fish Surface water quality	Fish Sediment Phosphate	Stage 1&2 confirm failures & reasons Stage 1 - confirm failure Stage 1&2 confirm failures & reasons	Dec - 2012 Dec - 2012 Mar - 2012
17350		Upper Dun	Hydrology	Hydrology	Stage 1 confirm failure	Completed - GES
17360		Inkpen Stream (source to Kennet)	Hydrology	Hydrology	Stage 1 confirm failure	Completed - GES
17370		Shalbourne (source to Kennet at Hungerford)	Fish Surface water quality Hydrology	Fish Sediment Hydrology	Stage 1&2 confirm failures & reasons Stage 1 - confirm failure Stage 1 confirm failure	Dec - 2012 Dec - 2012 Completed - GES
17380		Foudry Brook (West End Brook to M4)	Surface water quality	TBT Phosphate	Stage 1 - confirm failure Stage 1&2 confirm failures & reasons	Mar - 2012 Mar - 2012
17390		Kennet and Avon Canal and Dun above Hungerford	Fish	Fish	Stage 1 confirm failure	Mar-12
17410		Burghfield Brook	Invertebrates Surface water quality	Invertebrates Sediment Phosphate	Stage 2 - identify reasons Stage 1 - confirm failure Stage 1&2 confirm failures & reasons	Completed - S3Habitat&flow Completed-GES Mar - 2012
17420	*	Kennet (Lambourn confluence to Enborne confluence)	Surface water quality Fish	Sediment Fish	Stage 1 confirm failure Stage 2 - identify reasons	Dec - 2012 Dec - 2012
17430		Froxfield Stream	Surface water quality	Phosphate	Stage 1&2 confirm failures & reasons	Dec-12



## 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 where the adverse impacts of the groundwater potable supply licence have been proven. At Ogbourne the impact of abstraction is understood and the mitigating measure has been agreed but not yet implemented. Other abstraction investigations have concluded no adverse impact or required some mitigation and safeguards for Habitats Directive sites.
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.

Discussion papers on the first four issues are available from the EA. A national EA report will provide further detail on Non-native Invasive Species, but no publication date is available. This issue should be tackled locally until national guidance is available. Groundwater is discussed within this plan through an integrated approach with surface waters linking quality and quantity pressures.



## 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 Cope 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.

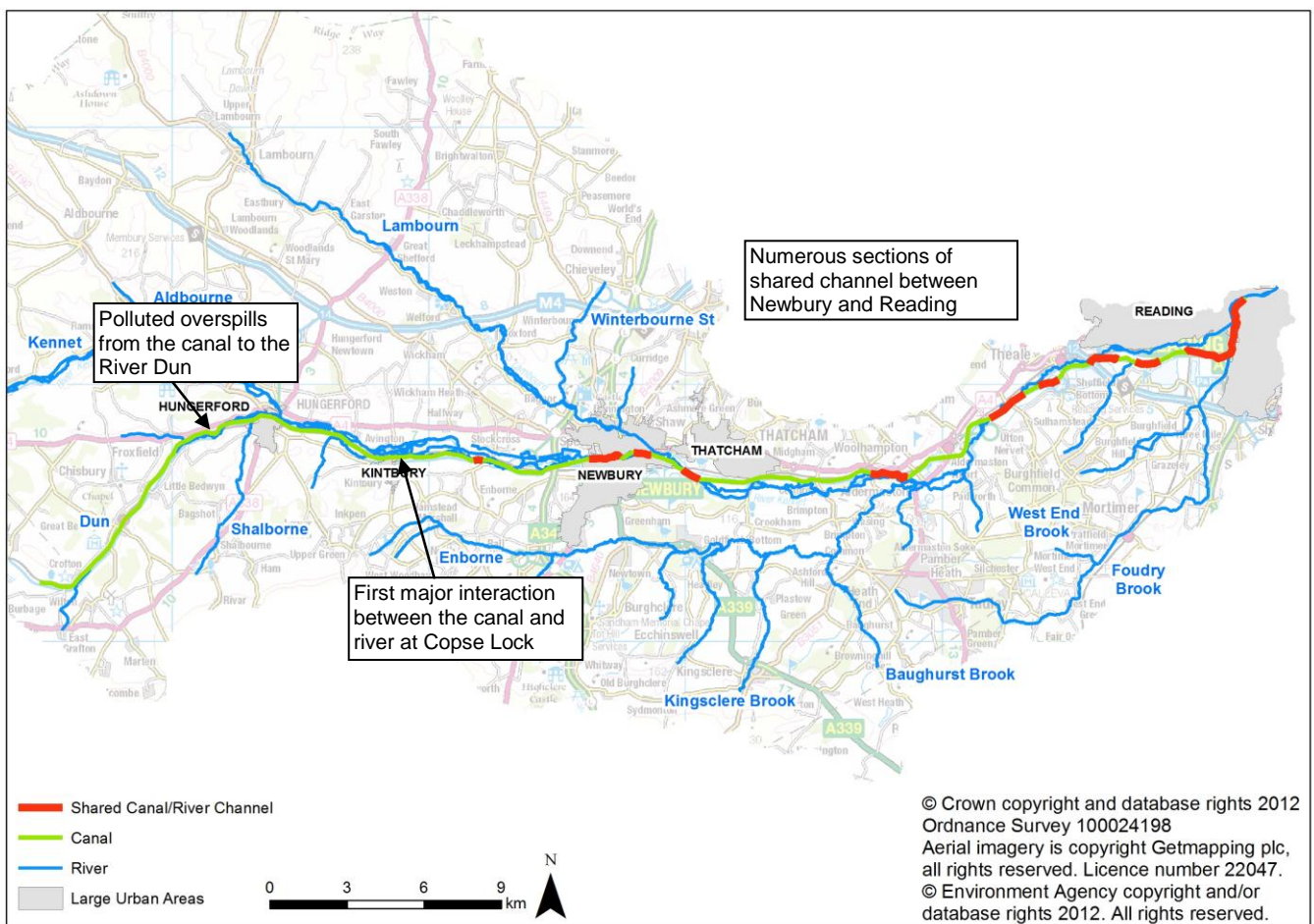


Figure 6 - Interaction between the Kennet and the K&A canal

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 7** - Plume of sediment laden water from canal entering river at Copse Lock

Actions to address this impact can be found in the Programme of Measures in the River Basin Management Plan, available on the Environment Agency website and are listed in Issue Paper 1. 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.
- 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.
- Design of bypass channels to reduce residence time of water between locks and prevent overflows to the River Dun. Work on these is due to start in 2013.

Most of the measures listed in the Thames River Basin Management Plan have been completed or are well in hand. Some improvements have been made and our understanding of the problems has improved, but we are still a long way from fully understanding these complex issues and what can feasibly be done.

To move forward and improve both the canal and the river, the outcomes of Atkins December 2012 Kennet AMP 5 Water Quality Investigations will inform future activity, which will need to be intensified to enable Water Framework Directive targets to be met. In 2006/7 Halcrow suggested a programme of activities which should now be reviewed to assess the most cost-effective options to achieve GEP.

- These activities could include:
  - Diagnostic investigations to be completed by mid-2014
  - Feasibility studies of potential improvement projects
  - A draft Masterplan by 2014, setting out a fully costed programme for achievement of good condition in the river and canal
  - Negotiations with potential funders and affected land-owners ahead of the 2<sup>nd</sup> cycle River Basin Management Plan at the end of 2015
  - Actions to be completed by the end of the second cycle in 2021

This programme is shown in Table 4.

Studies and masterplan	2012	2013	2014	2015	RBMP Cycle 2 2016 - 2021
Report on impact of Sewage Treatment Works	→				
Diagnostic investigations		→			
Feasibility studies of remedial actions			→		
Prepare masterplan			→		
Negotiate with funders and land-owners, refine masterplan				→	
<b>Improvement projects (indicative - dependent on Masterplan conclusions)</b>					
Remedial and maintenance dredging	-----				
Peartree Bottom culvert (if needed)					→
Sewage works improvements (if needed)					→
By-pass channels, Dun valley		→			
By-pass channels, H'ford to Newbury					→
By-pass channels, Newbury to Reading					→
River channel restoration projects		→			
Copse Lock channel separation (if needed and feasible)					→

Draft Masterplan

Second cycle RBMP

Remedial works complete by 2021 and recovery to GEP by 2027

**Table 4 - Indicative programme for dealing with interaction with the K&A canal – this programme is subject to discussion and refinement**

At present, the remedial projects and their costs are highly uncertain. However, potential projects have been identified and indicative costs have been put forward to the steering group for discussion.

Strenuous efforts will be required to raise money firstly to identify the most effective actions, and then to carry out remedial works. The driving force will be WFD compliance; without this work, it is difficult to see that GES/GEP will be achieved.

Until the detail of remedial works has been identified and agreed, the costs remain very uncertain and could be in the range of £5 million to £15 million. More certain costs would be one of the outcomes of the draft masterplan at the end of 2014. This will doubtless trigger debate about whether the benefits justify the expenditure and whether achievement of GES/GEP will be disproportionately costly. The justification of the agreed programme of measure for the 2<sup>nd</sup> cycle RBMP would be covered by the final masterplan in 2015.

### 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 or dredging. 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.

It is vital that we understand the sources of the inputs and the processes affecting river ecology to ensure that current and future programmes of work are properly targeted.

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 10 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.
- Farm improvements have been pursued through the Catchment Sensitive Farming Programme
- Various diagnostic studies have been undertaken, including a diffuse water pollution action plan, studies for improvement of several of Thames Water's smaller sewage treatment works and an urban diffuse pollution plan for Newbury

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

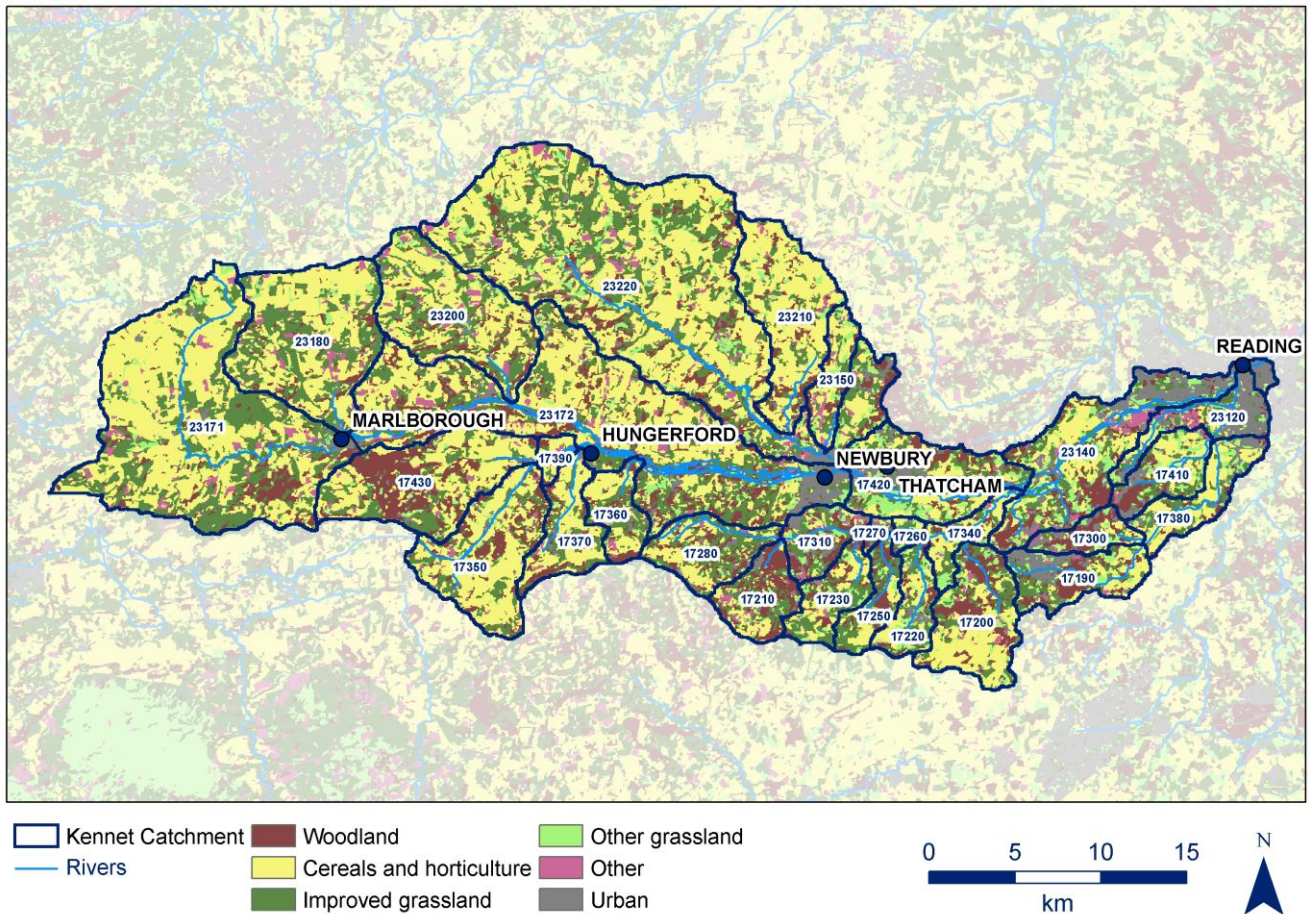


Figure 8 - Land use in the Kennet catchment

**Measures to be taken**

Annex C of the Thames River Basin Management Plan contained a suite of measures to address sedimentation, diffuse pollution and algal growth, as shown in Table 5.

RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner
				Implementation	Completion: Actual (expected)		
TH0039	Diffuse Water Pollution Action Plan for the River Kennet and Lambourn SSSIs	Kennet (Marlborough to Enborne), Lambourn	EA & NE	2010	2010	NE	Graham Scholey
TH0039 & 055	Kennet Catchment Sensitive Farming Project	Lambourn, Kennet and Avon Canal and Dun above Hungerford	EA & NE	2005	2013+	NE	Graham Scholey
TH0282	AMP5 investigation into water quality impacts of sewage treatment works on the Kennet and Avon Canal	Kennet and Avon Canal and Dun above Hungerford	Thames Water		2012	BW	Kat Cornfield
TH0282	Investigation into canal bypass weir feasibility	Kennet and Avon Canal and Dun above Hungerford	BW & EA		2011	BW	Kat Cornfield

RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner
				Implementation	Completion: Actual (expected)		
TH0038 & TH0039	Biological monitoring of River Kennet SSSI between Hungerford and Newbury	Middle Kennet (Marlborough to Newbury)	EA		2010		Kat Cornfield
TH0412	Farm Inspection	Froxfield Stream	EA				Aida Simon
TH0351 TH0098 TH0099	Cross compliance farm inspections	Kennet from source to Newbury, Og, Shalbourne	EA				Aida Simon
TH0021	OSM Site Inspection – Reading, Newbury & Silchester STWs.	Kennet from Newbury, Foudry Brook	EA	2010	October 2010		Andrew Valentine
TH0019	Sediment fingerprint project	Shalbourne (source to Kennet at Hungerford)	EA	2011	2012		Robert Iles
TH0020	Horse manure project	Lambourn (Source to Newbury)	EA	2011	2012		
TH0021	Inspect for compliance with water company permit to discharge including storm discharge permit.	Lambourn, Kennet and Foudry Brook and Clayhill Brook in Reading	EA	2011	Q2 2011		Andrew Valentine

**Table 5 Planned actions for dealing with nutrients, sedimentation and algal growth**

### Walk-over surveys

Walk-over surveys of the catchment to identify specific sources of pollution, particularly agricultural pollution began in 2012 and are an important and cost effective way to identify problems within the catchment.

The walk-over surveys, by APEM for the EA (APEM report 411940) provide an important new source of information. A sample of their output is shown in Figure 9.

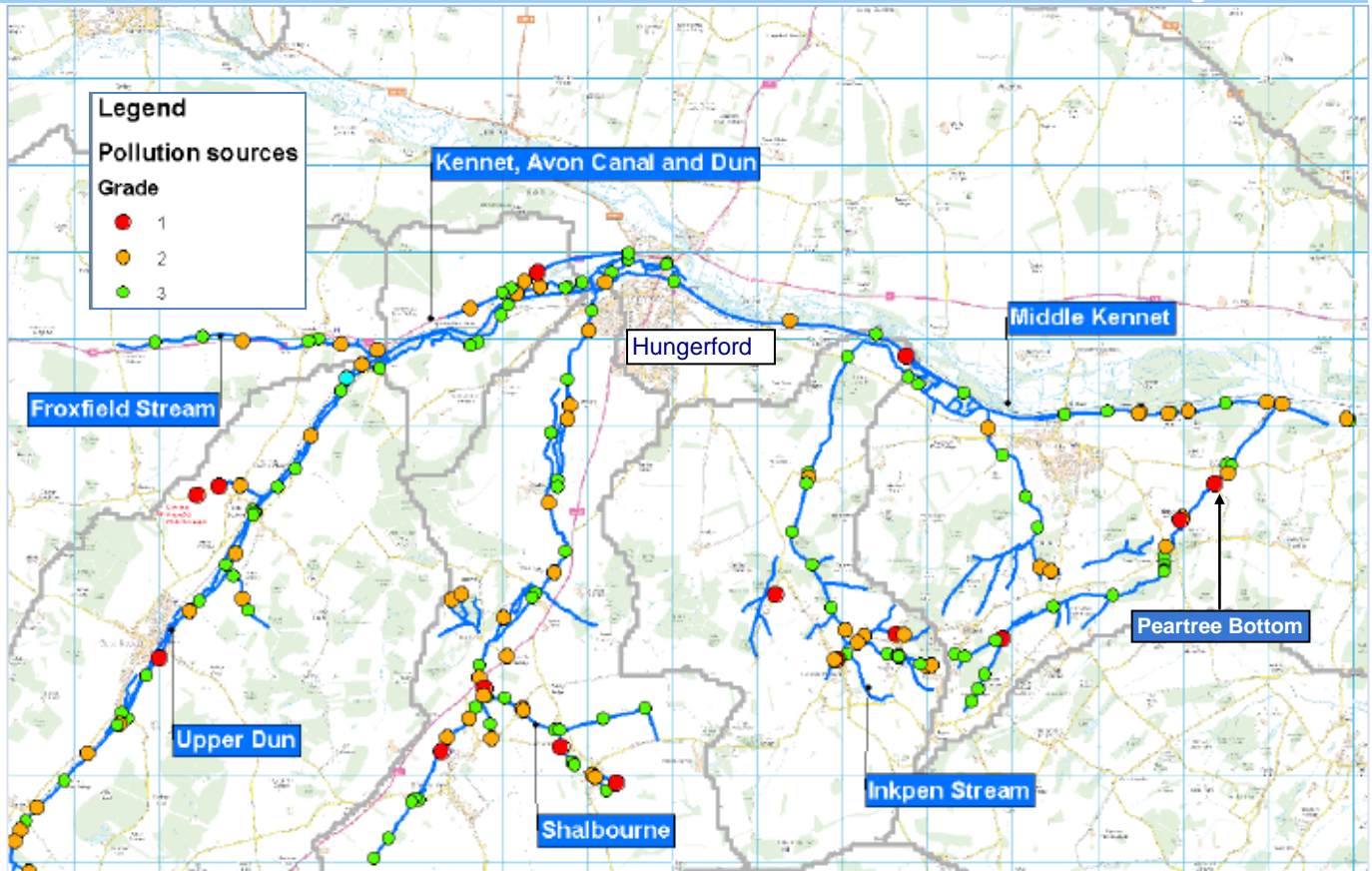


Figure 9 - Identification of pollution sources through walk-over surveys

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. Following the success of the walk-over surveys in identifying the pollution sources, more work is now needed on remedial work and on extending the walk-overs to other parts of the catchment. Currently funding through CSF is only available until 31/03/2014, future funding would be needed to extend catchment walkovers beyond this date.

Problems which the walk-overs discover are primarily addressed by the Catchment Sensitive Farming programme, which is now being re-focused away from general advice to farmers through farm visits (which, inevitably, tend to focus on farmers who are willing to listen and already adopting good practices). Specific pollution hot-spots identified by the walk-overs are being addressed by EA field officers.

In December 2012 ARK began a 'Muddy Walks' project, employing volunteers to identify polluted runoff in the catchment. The initial training was well attended and it is hoped that the volunteers' input will add to the evidence base.



### Surface Water Management Issues identified in the Thames River Basin Management Plan


**Point source pollution** originates from a specific point, such as a sewage treatment works (STW) discharging into a river, or the operation of a combined sewer overflow (CSO). Such pollution can introduce ammonia, phosphorus, hazardous substances or raw sewage.

**Programme and costs**

The programme for dealing with nutrients, sediments and algal growth is shown in Table 6.

	2012	2013	2014	2015	2016	2017	2018							
<b>Diffuse pollution actions</b>	<div style="border: 1px solid black; padding: 5px; display: inline-block;">                     Continue regulatory actions for diffuse pollution                 </div>													
Further walk-over surveys								[Solid arrow from 2012 to 2014]						
Continuing CSF actions								[Dashed arrow from 2012 to 2015]						
Targeted farm improvements								[Dashed arrow from 2012 to 2015]						
Targeted road & urban improvements								[Dashed arrow from 2012 to 2015]						
<b>Thames Water actions</b>														
Improvements at 5 STWs	[Solid arrow from 2012 to 2014]													
Baydon STW improvements	[Solid arrow from 2012 to 2014]													
Studies at 2 STWs	[Solid arrow from 2012 to 2014]													
Study of discharges to K&A canal	[Solid arrow from 2012 to 2014]													
Develop projects for AMP6 plan		[Solid arrow from 2013 to 2015]												
Implement projects in AMP6					[Solid arrow from 2016 to 2018]									
<b>Monitoring of improvements</b>														
Establish baseline	[Solid arrow from 2012 to 2013]													
Monitor remedial works		[Solid arrow from 2013 to 2015]												
More diagnostic work if needed		[Dashed arrow from 2013 to 2015]												

GES in whole catchment by 2019



**Table 6 - Aspirational programme for dealing with nutrients, sediment and algal growth**

The aim will be to complete the walk-over surveys by mid-2014 and implement the diffuse pollution improvements by 2015.

Improvements to sewage treatment works arising from studies currently being done by Thames Water will be assessed and if found to be viable and proportionately costly, will be put forward for consideration in the AMP6 programme of work.

The recent walk-over surveys have identified the likely sources of diffuse pollution in the ‘Southern Streams’ area. Walkovers are an important tool used to identify sources of pollution and target both ongoing WFD actions and EA regulatory action. The programme includes monitoring to establish baseline conditions and to measure the effectiveness of remediation. The monitoring will need to be an appropriate combination of water quality and biological indicators.

The costs of Thames Water’s work in improving sewage disposal will be covered through their business planning cycle, so are not estimated here. The costs of the walk-over surveys and associated remedial works through the CSF programme will need to be funded, currently funding for this work ends in March 2014. The priority is to clarify where additional walkovers are needed, and to ensure they are included in the EA work programme.



## 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 10** - 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.

In 2008 the EA produced a Kennet Habitat Restoration Strategy which identified reaches of the catchment where morphological restoration and/or improvements to fish passage would be most important to assist recovery to 'favourable condition' for the River SSSIs, and to move towards GES under the WFD. The strategy was based on studies including the Water Level Management Plans, a Kennet Fluvial Audit, River Habitat Surveys, and the in-house knowledge of EA Fisheries and Conservation staff to identify the most degraded sections of river. The EA's current programme of work (2012) identifies 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. The EA intend to produce a whole catchment strategy by 2013 which will update the 2008 Kennet Strategy and include non-SSSI sites.

**Measures to be taken**

The “Whole river restoration plan for the River Kennet and River Lambourn SSSI” produced in 2011 (to meet the requirements of guidance on the content of SSSI restoration strategies), built on existing work and set out priorities and a timetable for action within the SSSI. Further feasibility and design work is underway for more reaches identified in the Whole River Restoration Plan, but there are a number of other reaches for which there is currently no funded programme or timetable for implementation. The EA are currently developing a whole catchment restoration strategy, which will address these gaps.

Issue Paper 3 *Dealing with river channel habitat degradation* summarises all current actions, funded projects from 2012-2015 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, which will be up-dated by 2013 to include non-SSSI priorities. The sequencing of the proposed programme of improvements is shown in Figure 11, but may be reviewed in the light of the updated Whole River Restoration Plan.

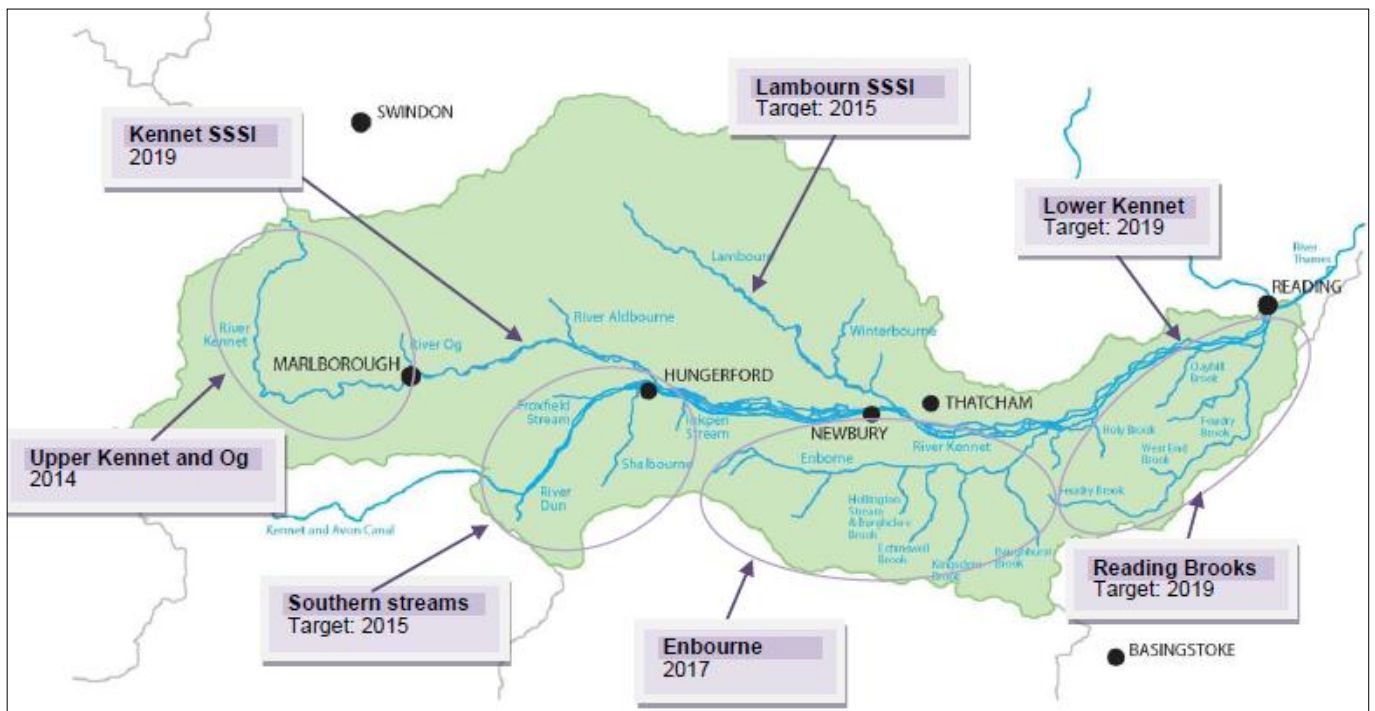


Figure 11 – Proposed location and phasing for habitat restoration

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	
<b>Actions for River Kennet SSSI*</b>												
Modification of 8 key structures	[Bar chart showing work from 2012 to 2018]											
River habitat restoration at 8 further key sites		[Bar chart showing work from 2013 to 2019]										
<b>Actions for River Lambourn SSSI*</b>												
Restoration and enhancement	[Bar chart showing work from 2012 to 2015]											
<b>Actions outside SSSI</b>												
<b>Upper Kennet &amp; Og</b> habitat restoration	[Bar chart showing work from 2012 to 2015]											
<b>Southern streams</b> (Froxfield stream, Dun, Shalbourne, Inkpen stream, incl. Pear Tree Bottom).		[Bar chart showing work from 2013 to 2015]										
<b>Enbourne</b> habitat restoration & fish passage		[Bar chart showing work from 2013 to 2018]										
<b>Reading Brooks:</b> West End Brook, Foundry Brook, Burfiled Brook, Holy Brook, Clayhill Brook					[Bar chart showing work from 2015 to 2020]							
<b>Lower Kennet (23140, 23120)</b>	[Bar chart showing work from 2012 to 2014]							[Bar chart showing work from 2018 to 2021]				
<b>Agree system for monitoring project success</b>		[Bar chart showing work from 2012 to 2013]										

Good ecological status in whole catchment by 2020

Good ecological status in Southern Streams by 2015



**Table 7** - 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. The programme to work towards GES is shown in Figure 9 is an outline strategy which may be subject to change once the EA’s whole catchment restoration strategy is published in 2013.

**Costs and funding**

There are significant costs associated with habitat restoration on this scale. There are £811,000 of funded projects about to begin or in progress, and a further £2.3 million of projects scoped but not yet funded, mainly within the SSSI. The additional costs of work to bring the whole catchment, including the non-SSSI waterbodies, to good status will require several million pounds of investment. The Catchment Restoration Fund has not been sufficient to meet the demand from community groups, and innovative funding solutions will need to be found.

**Case Study: Restoration of the River Kennet at Barton Holt**



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

Within the Kennet catchment there are three main areas of concern over impacts of abstraction:

1. In the main Kennet around Axford – this is being addressed with an agreed solution to be funded through the Environment Agency’s fund for restoring sustainable abstraction. Thames Water is aiming for a completion date between 2015 and 2016. The solution to the Axford and Og over-abstractions requires a pipeline to transfer water from Farmoor Reservoir to south Swindon. This would allow Thames Water to supply south Swindon from Farmoor Reservoir instead of from the Kennet aquifer.
2. In the River Og – a low flow investigation has confirmed the adverse impacts of abstraction. In response, the abstraction at Ogbourne will be reduced to zero in Thames Water’s ‘Water Resource Management Plan 2014’.
3. In the upper Kennet at Marlborough and above – the potential over-abstraction was identified in the Catchment Abstraction Management Strategy in 2004, but the significance of any impact was uncertain. The drying of the river above Marlborough during the drought of 2011/12 has re-activated Action for the River Kennet’s concerns about over-abstraction, and they would like to see these concerns resolved.

In addition to the concerns above, a review of abstraction consents affecting areas protected by the EU Habitats Directive has led to a requirement to reduce peak abstraction at Speen, Newbury. There is also a requirement to amend the operating strategy for the West Berkshire Groundwater Scheme (an EA responsibility) and to provide mitigation for the impacts of the Enborne well-field on Thatcham Reedbeds under very dry conditions. These improvements are underway and expected to be complete by 2015.

The Environment Agency’s new Catchment Abstraction Strategy (CAMS) for the Kennet and Pang was due to be completed in December 2012, updating the 2004 version. This assessed the abstraction status of the overall catchment and determined whether sub-catchments are over-abstracted, over-licensed or with water available for abstraction (which may be seasonal availability only). The outcome of the updated CAMS will feed into the second cycle of the River Basin Management Plan.

Action for the River Kennet have been working in partnership with Thames Water on the ‘Care for the Kennet’ Campaign, encouraging Kennet Valley residents to reduce water consumption by installing water saving gadgets in their homes. The project has also worked with school children using ‘Mayfly in the Classroom’ and ‘Trout in Schools’ as a vehicle for explaining the chalkstream ecosystems and the value of water in the environment as well as in the home.



### Surface Water Management Issues (SWMI) identified in the Thames River Basin Management Plan

**Low flows** can occur naturally – be it seasonally for “winterbourne” streams – or due to over-abstraction. Low flows have less of a flushing effect, resulting in longer residence times for any contaminants thus worsening their impact upon the river system. Additionally, low flows lessen the dilution of point-source inputs, leading to their concentration within the waters. The resultant chemical characteristics and the low flows themselves can damage habitats and the life that depends upon them.

	2012	2013	2014	2015	2016	2017	2018
<b>CAMS up-date</b>							
Review issues raised by ARK	→						
Stage 2, licensing strategy	→						
Stage 3, measures appraisal		→					
<b>Thames Water up-dated Water Resource Management Plan</b>							
Appraise ARK proposed option	→						
Draft new WRMP	→						
Consultation		→					
Final WRMP			→				
<b>Axford low flow alleviation</b>							
Resolve availability of funding	→						
Design and contract N-S Swindon link	→	→	→	→			
Construct and commission				→	→		
<b>Og low flow alleviation</b>							
Design and contract N-S Swindon link		→	→				
Construct and commission				→	→		
<b>Protection of Habitats Directive Sites</b>							
Mitigation of risks from Berks G/W scheme			→	→			
Modify licences to protect Kennet & Lambourn Floodplain SAC			→	→			

**Table 8 - Suggested programme for dealing with over-abstraction**

The suggested programme to achieve flows to support GES throughout the catchment is shown Table 8.

The costs associated with this programme are covered by the Environment Agency’s funding of the Restoring Sustainable Abstraction programme and by Thames Water’s business planning cycle, as approved by Ofwat. Although the timing of availability of funding is uncertain and could affect the programme, the achievement of flows sufficient to achieve the Water Framework Directive objectives does not require any additional funding.

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.

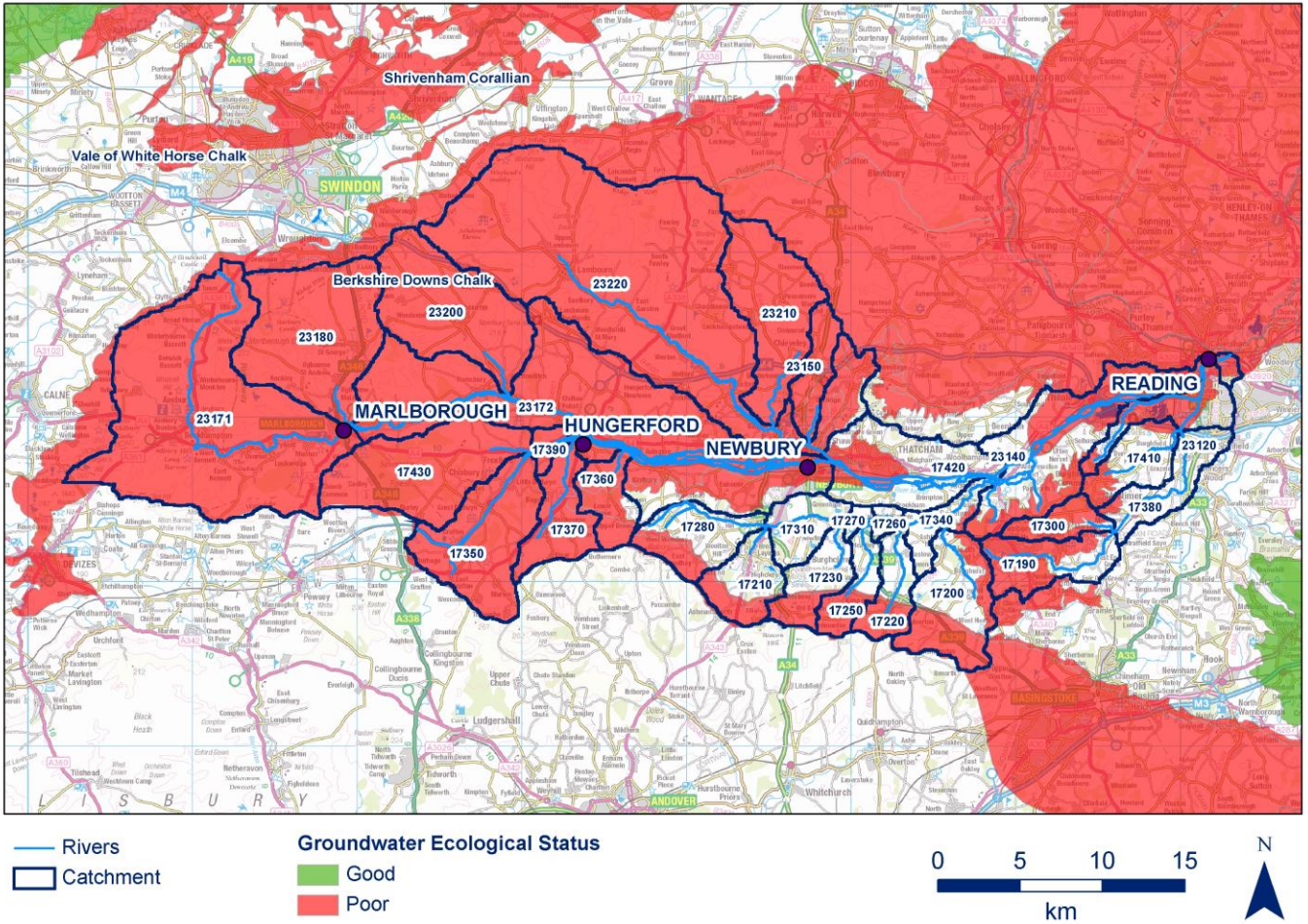


Figure 12 - Groundwater status in the Kennet catchment

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 as shown in Table 9.

WB code (GB100390...)	Heavily modified WB	WB name/ecological status	GWB (i)	Chemical GWB	Quantitative GWB	GWB (ii)	Chemical GWB	Quantitative GWB
23120	*	Kennet and Foudry Brook and Clayhill Brook in Reading	Thatcham Tertaries	Impact on surface waters (nutrients & PHS %)	Good			
23140	*	Kennet and Holy Brook	Thatcham Tertaries					
23150		Lambourn tributary (North of Newbury)	Berkshire Downs Chalk	Nutrients, PHS's	Poor			
23171		Upper Kennet to Marlborough						
23172	*	Middle Kennet (Marlborough to Newbury)				Thatcham Tertaries	Impact on surface waters (nutrients & PHS %)	Good
23180		Og						
23200		Aldbourne						
23210		Winterbourne						
23220		Lambourn (Source to Newbury)						
17190		Foudry Brook (Source to WestEnd Brook)				Aldermaston Bagshot Beds	Impact on surface waters (nutrients)	Good
17200		Baughurst Brook	Berkshire Downs Chalk	Nutrients, PHS	Poor			
17210		Hollingtonstand Milford Lake (source to Enborne)						
17220		Kingsclere Brook (Source to Enborne)						
17230		Earlstone Stream and Burghclere Brook (source to Enborne)						
17250		Ecchinswell Brook (source to Enborne)						
17260		Enborne (Ecchinswell Brook to Kingsclere Brook)						
17270		Enborne (Burghclere Brook to Ecchinswell Brook)						
17280		Enborne (Source to downstream A34)	Berkshire Downs Chalk	Nutrients, PHS's	Poor			



WB code (GB100390...)	Heavily modified WB	WB name/ecological status	GWB (i)	Chemical GWB	Quantitative GWB	GWB (ii)	Chemical GWB	Quantitative GWB	
17300		West End Brook (tributary of Foudry Brook)	Aldermaston Bagshot Beds	Impact on surface waters (nutrients)	Good				
17310		Enborne (downstream A34 to Burghclere Brook)							
17340		Lower Enborne							
17350		Upper Dun							
17360		Inkpen Stream (source to Kennet)	Berkshire Downs Chalk	Nutrients, PHS's	Poor	Thatcham Tertiaries	Impact on surface waters (nutrients & PHS's)	Good	
17370		Shalbourne (source to Kennet at Hungerford)							
17380		Foudry Brook (West End Brook to M4)							
17390		Kennet and Avon Canal and Dun above Hungerford							
17410		Burghfield Brook							
17420	*	Kennet (Lambourn confluence to Enborne confluence)							
17430		Froxfield Stream							

**Table 9 Factors determining groundwater body status**

The 'Quantative Groundwater Body (GWB)' status looks at the impacts of groundwater abstraction, which can also impact the good status of surface waters. 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. Though further investigations are needed to confirm the poor status of these groundwater bodies, the actions to be undertaken for *Issue 4 – Dealing with Abstraction*, will only help improve groundwater quantitative status.

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.

**Measures to be taken**

RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner	Expected costs (£s)	Funded (Y/N)	Actual Costs (£s)
				Implementation	Completion: Actual (expected)					
TH0291 TH0306	Desk Exercise to review underlying data in WRGIS and CAMS that gave initial quantitative status result and risk. Check existing or amended data with ecological evidence. Carried out by area Hydrogeologists.	Berkshire Downs Chalk & Thatcham Tertiaries & Aldermaston Bagshot Beds	EA	2010	2011		Vicky Fry		EA	
TH0070	If determined this is expected to be designated as a special site. Waiting for decision on planning due End of September 2010 or decision on determination as contaminated land from Local Authority	Berkshire Downs Chalk	EA	2010	Revised DATE		Craig Hampton		EA	
TH0068	Work with agricultural EOs on pollution prevention and farm visits, particularly wrt nitrates (fertilisers and manures) within SPZ3 and beyond if relevant for the following PWS: Bradfield, Bradfield Windmill, Gatehampton, Woods Farm, Leckhamstead, Fognam Down, Ashdown Park, Axford, Ogbourne, Marlborough, Hungerford, Bedwyn, Tidworth Garrison borehole.	Berkshire Downs Chalk	EA	2010	2014	Thames Water Utilities Ltd	Gill Davies		EA	
TH0069	GwQual Lead Area and West Area work together developing conceptual model for the following SPZ 3:Bradfield, Bradfield Windmill, Gatehampton, Woods Farm, Leckhamstead, Fognam Down, Ashdown Park, Axford, Ogbourne, Marlborough, Hungerford, Bedwyn, Tidworth Garrison borehole.. National guidance currently being developed.	Berkshire Downs Chalk	EA	2012	2014	Thames Water Utilities Ltd	Jenny Thomas		EA	
TH0027	As specific pollution risks arise. None identified at present. GWHCL W knowledge to be used to update this as appropriate.	Berkshire Downs Chalk	EA	Ongoing	Ongoing	Local Authority	Craig Hampton		EA	Day job

RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner	Expected costs (£s)	Funded (Y/N)	Actual Costs (£s)
				Implementation	Completion: Actual (expected)					
TH0084 TH0085 TH0086	As redevelopment and local development frameworks come into GWHCL will respond accordingly with local knowledge and groundwater protection guidance using conditions and informatives	Berkshire Downs Chalk	EA	Ongoing	Ongoing	Local Authority	Craig Hampton		EA	Day job
TH0182	GWHCL will use opportunities such a seminars, informal meetings, LA cluster groups, industry forums to inform people about our policies	Berkshire Downs Chalk	EA	Ongoing	Ongoing	Local Authority	Craig Hampton		EA	Day job
TH0272	Lack of monitoring data. BH drilling required, subject to funding. Initial investigation.	Berkshire Downs Chalk	EA	2012	2014	Natural England	Jenny Thomas		EA	
TH0212	Baydon (Reinstatement of herringbone system to increase denitrification by 2014), Wickham (meet new consent conditions by 2013), Yattendon (meet new consent conditions by 2013). Lower Basildon (discharge to ground to cease by 2013)	Berkshire Downs Chalk	Thames Water Utilities Ltd	2014	2014	Thames Water Utilities Ltd	Jenny Thomas		Thames Water Utilities Ltd	Day job

**Table 10 - Planned actions for dealing with groundwater issues**

## 2.7. Issue 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), Water Fern (Lambourn), Japanese Knotweed (various sites), New Zealand Pygmyweed (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 13** - 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.

Control and eradication of floating pennywort has been underway in the lower part of the catchment for a number of years, and advice has been given to landowners and measures taken on an ad hoc basis to deal with Japanese Knotweed, Himalyan Balsam and Water Fern (*Azolla*) in other parts of the catchment.

Biosecurity measures and campaigns including the 'Check, Clean & Dry' campaign, the 'Be Plant-wise' campaign and the new Plant-tracker app. could all be promoted within the catchment by all the partners. The EA also have a 'mail box': [westthamesinvasives@environment-agency.gov.uk](mailto:westthamesinvasives@environment-agency.gov.uk), which has been set up for anyone to use to report sightings of invasive species.

The River Basin Management plan contains general national measures for control of invasive non-natives and these need to be incorporated in to a Kennet-specific programme. Actions which may be relevant to the Kennet catchment plan area include:

- Providing advice and training on identification, control and disposal of invasive non-natives.
- Working with existing bodies to identify and eradicate non-native species.
- Developing an alien species action plan for the Kennet catchment.

- Working to achieve eradication and control within SSSI and Natura 2000 sites (on Kennet and Lambourn.)
- Participating in a river-basin wide invasive non-native species forum.
- Undertaking further analyses to better elucidate the role of signal crayfish in ecological deterioration.

A national paper on Alien Species is due to be written by the EA, but its publication date is uncertain, and a Kennet specific action plan should be created in 2013.

### Measures to be taken

The following table will be updated when areas have planned actions. An invasive species action plan specific to the Kennet Catchment should be written in 2013 for implementation from 2013 onwards.

**Table 11 - RBMP Annex C actions to deal with invasive non-native species.**

RBMP Measure Code	Delivery Team	What needs to be done
TH0066	National (Biodiversity)	Contribute to the development of any EU level initiatives to improve legislation and controls relating to invasive non-native species.
TH0071	National (Biodiversity)	Develop a national early warning system with contingencies for rapid response control measures to eradicate new invasions of non-native species
TH0076	National (Biodiversity)	Develop and implement codes of practice to reduce the spread of invasive non-native species
TH0087	National (Biodiversity)	Draw together a database of projects to facilitate better information sharing and increase opportunities for partnership working
TH0088	National (Biodiversity)	Draw up Individual Species Action Plans for species identified as presenting particular risk levels, to minimise the risks associated with them
TH0110	Regional HD lead	Eradication and control at selected SSSIs and Natura 2000 sites
TH0111	National (Biodiversity)	Establish a central repository for holding data on invasive non-native species distribution.
TH0117	National (Biodiversity)	Establish National Invasive Non-Native Species Forums to plan, prioritise and coordinate action
TH0224	National (Biodiversity)	Increase awareness of the importance of the 'preventative approach' in addressing the threats posed by invasive non-native species. This would include 'horizon scanning' for new potentially invasive species.
TH0242	National (Biodiversity)	Integrate invasive non-native species control measures across all policy areas
TH0326	Area Fisheries, Area Biodiversity	Make appropriate use of existing legislative powers which prohibit the sale of high-risk species; Salmon and freshwater fish act (S30); Import of live fish act; Wildlife & Countryside Act 1981; Environment Agency Fisheries byelaws.
TH0372	Area Biodiversity, Area Fisheries	Provide advice and training on identification, control and disposal of invasive non-native species to all relevant groups and encourage monitoring schemes. [Joint delivery by: Regional Biodiversity lead, Regional Fisheries lead]
TH0397	National (Biodiversity)	Seek sustainable and cost-effective methods for managing established invasions, such as biological control
TH0400	Regional Biodiversity lead x	Set up and maintain a website that acts as a "one stop shop" for information and advice on invasive non-native species.
TH0404	Area Biodiversity	Support established local flora by providing advice and guidance and support control actions by selected local flora
TH0424	National (Biodiversity)	Undertake risk assessments to identify priority invasive species for mitigation and control action at GB and national levels
TH0445	National (Biodiversity)	Work to raise awareness of the of the risks transferring non-native species to the wild amongst the public and target groups

## 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. Some of this work is detailed in the table below.

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, although not a major concern in this catchment. There are no significant development plans in the area at present, and the Environment Agency should ensure that all development plans promote sustainable development. 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, such as calling for a ban on phosphates in dishwashing tablets and as an additive in processed foods.

### Measures to be taken

**Table 12 - Field actions planned to deal with other catchment issues including 'no deterioration'**

RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner
				Implementation	Completion: Actual (expected)		
TH0358	SWMP visits on all construction sites in the area. Raising awareness via on site visits, new guidance and advice to business	Enborne, Middle Kennet (Marlborough to Newbury); Milford Lake; Og ; West End Brook (tributary of Foudry Brook); Winterbourne	TW/EA	2010	2012	TW	
TH0124	Visiting all fire stations for PP Visits	Farnham Flint or Englefield Lagoon Foudry Brook (Source to West End Brook) Foudry Brook (West End Brook to M4) Froxfield Stream	TW/EA	2010	2012	TW	
TH0158	Working with business on planning level to promote SUDS	Hollingtonstand Milford Lake (source to Enborne) Ecchinswell Brook (source to Enborne) Inkpen Stream	TW/EA	2010	2012	TW	

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RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner
				Implementation	Completion: Actual (expected)		
		(source to Kennet) Kennet (Lambourn confluence to Enborne confluence)					
TH0192	Working with business on planning level to promote SUDS	Kennet and Avon Canal and Dun above Hungerford; Kennet and Foudry Brook and Clayhill Brook in Reading; Kennet and Holy Brook; Kingsclere Brook (Source to Enborne)	TW\EA	2010	2012	TW	
TH0104	Develop and implement MOU with Highways, for use during incidents and day to day work.	Lambourn (Source to Newbury) Lambourn tributary (North of Newbury) Shalbourne (source to Kennet at Hungerford); Upper Dun; Upper Kennet to Marlborough	TW\EA	2010	2012	TW	
TH0358	Talking to and promoting the code of practise to all companies using oil filled cables in the area of work		TW\EA	2010	2012	TW	
TH0358	Undertake around 9 SWMP Visits in this area over the course of the year.		TW\EA	2010	2012	TW	
TH0172	West Berkshire's Core Strategy (submission version) contains good policy on protection of Green Infrastructure including natural and semi-natural spaces and waterways & we will work to positively influence the forthcoming GI SPD design guidance. We will refer to this policy when responding to planning applications when adopted to positively influence future development.	Lambourn (source to Newbury) & Kennet and Avon Canal and Dun above Hungerford			2010		
TH0235	West Berkshire's Core Strategy (submission version) contains a good policy that all new development must attenuate surface water runoff to green field rates with SUDs. We will refer to this policy when responding to planning applications when adopted to positively influence future development.	Lambourn (source to Newbury)			2010		

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RBMP Measure Code	What Needs to be done	Location	Lead organisation	Dates		External partners	EA owner
				Implementation	Completion: Actual (expected)		
TH0234	In the absence of specific RBMP LDF policy and for windfall sites, we will work with West Berkshire DC and developers to influence high quality development which has the potential to protect and enhance the natural river corridor.	Lambourn (source to Newbury) & Kennet and Avon Canal and Dun above Hungerford			ongoing		
TH0234	We will work with West Berkshire Council to produce and implement their Thatcham Surface Water Management Plan	Kennet and Avon Canal and Dun above Hungerford			ongoing		PFO
TH0124	Visited all Bucks fire station and gave PP advice	Burghfield Brook	TW\EA	2010	2010		
TH0190	Promoting the code of practise to all companies using oil filled cables in the area of work	Earlstone Stream and Burghclere Brook (source to Enborne)	TW\EA	2010	Q4 2010	TW	
TH0190	Promoting the code of practise to all companies using oil filled cables in the area of work	Lower Enborne	TW\EA	2010	Q4 2010	TW	
TH0358	SWMP visits on all construction sites in the area. Raising awareness via on site visits, new guidance and advice to business	Enborne (downstream A34 to Burghclere Brook)	TW\EA	2010	2012	TW	
TH0358	Undertook around 30 SWMP Visits in this area	Enborne (downstream A34 to Burghclere Brook)	TW\EA	2010	Q3 2010	TW	



## 2.9. Improving monitoring

The analysis of the condition of the catchment in Section 1 has highlighted the need for improved monitoring for the purpose of:

- Improving our understanding of the causes of waterbody failures and enabling appropriate remedial actions to be designed.
- Setting a baseline against which the success of actions can be targeted and measured.
- Confirming the possible need to change classification of water bodies.

The priorities for improved monitoring are:

1. Macrophytes – recognising their importance in providing habitats for fish and invertebrates and as indicators of river condition in their own right.
2. Phytobenthos – recognising algal growth as a major factor in poor habitat quality.
3. Fish – recognising natural recruitment of trout, grayling and other gravel-spawning species as an indicator of the health of the river.
4. Sedimentation – recognising that it has a major impact on fish spawning, macrophytes and invertebrates.

The monitoring improvements should be a combination of formal data acquisition for studies and WFD classification, and less formal approaches, making more use of visual observations and engaging the resources of eNGOs and the voluntary sector. However, the classification of waterbodies and assessment against WFD performance criteria has to be achieved by using robust scientifically validated methods of data acquisition; less formal monitoring will provide additional supporting information for interpretation or help to target action on the ground.

### *Measures to be taken*

The EA in the process of finalising the monitoring strategy nationally, and their recommendations should be available by the end of 2012. In the interim a proposed monitoring strategy is included here.

Annex C of the RBMP has a number of measures to improve monitoring. Measures of particular relevance to the Kennet catchment are:

- Carry out investigative monitoring and field work into the origins, causes and solutions to sedimentation.
- Promote the 'Riverfly Partnership' monitoring programme to assess the status of river health.
- Provide advice and training on identification, control and disposal of invasive non-native species to all relevant groups and encourage monitoring schemes.

Current plans for monitoring improvements in the Kennet catchment are shown below in Table 13 and illustrated in Figure 14.

The monitoring programmes shown leave very sparse coverage of biological indicators. We suggest the planned improvements be augmented by more monitoring of:

- Sediments, particularly in the main body of the Kennet and the Lambourn.
- Fish, macrophytes and phytobenthos, addressing the sparse coverage of biological monitoring throughout the Kennet catchment.

Table 13 Monitoring sites 2010-12

WaterBody ID	Type of Monitoring	Driver
23171, 17190, 23180	Invertebrate	National EA Programme
17300, 23220	Macrophyte	National EA Programme
17190, 17370, 17430, 23120, 23220	Physico-Chem	National EA Programme
23172, 23171, 23180, 23220	Invertebrates (WR)	EA Local Driver
23172, 23171, 17420, 23200, 23210	Physic Chem	EA Local Driver

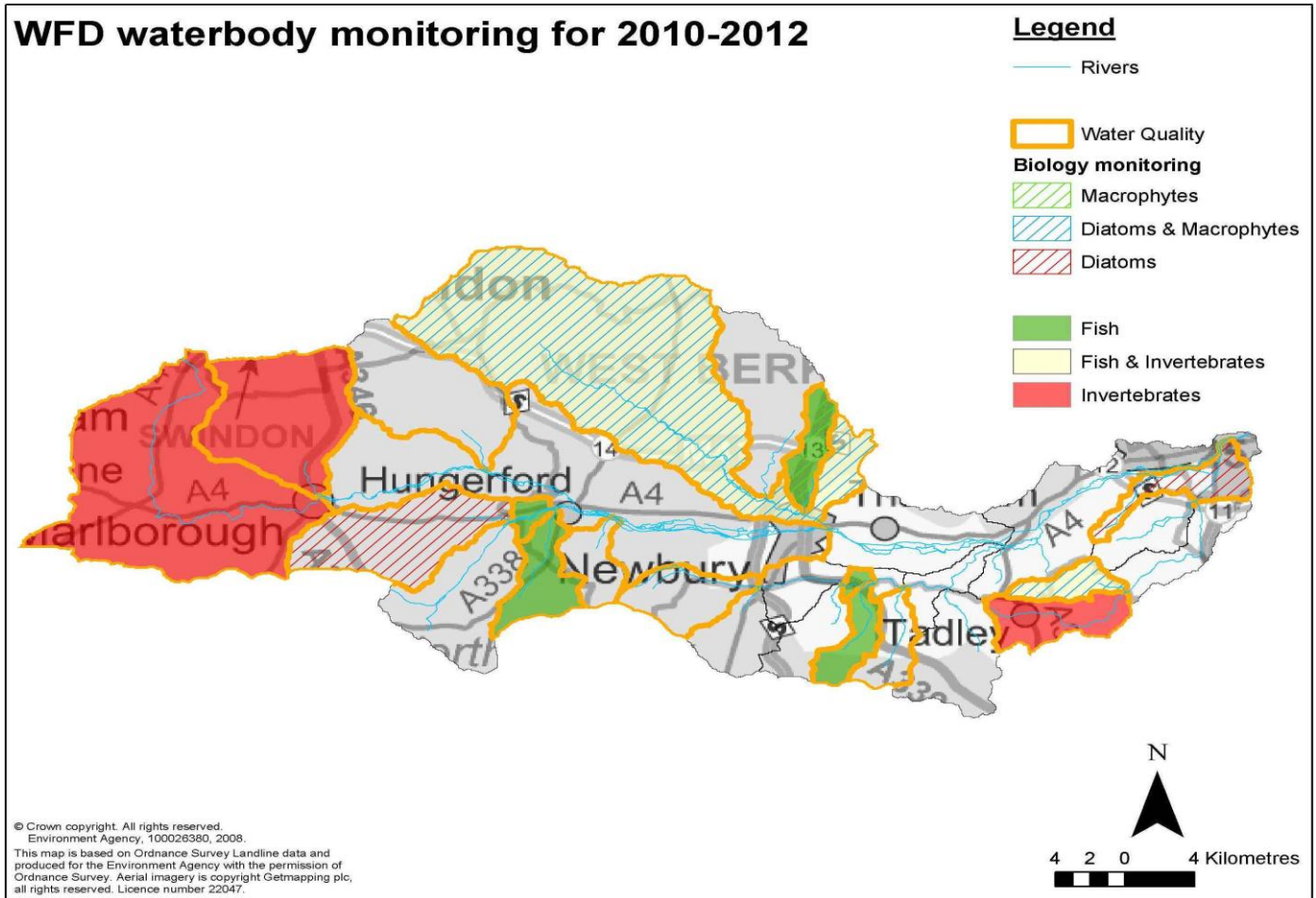


Figure 14 - WFD water body monitoring for 2010 to 2012

The biological monitoring activity in 2010-2012 has focused on uncertainties associated with invertebrate classifications in five water bodies and plant classifications in two water bodies. Even after this additional monitoring, the biological monitoring in the 29 water bodies remains very sparse, particularly for phytobenthos and macrophytes:

**Present biological monitoring coverage (for 29 water bodies)**

Phytobenthos	Macrophytes	Invertebrates	Fish
1	3	20	13

At present 37 out of a possible 116 biological indicators are monitored. Proposed biological monitoring improvements for 2013 to 2015 are shown in Table 14.

<b>Classification Colours:</b>	<b>Monitoring requirement</b>
<b>No Data</b>	<b>H = high priority</b>
High	<b>L= lower priority</b>
Good	Covered by 2010/12 programme
Moderate	
Poor	
Bad	

**Legend for Table 10**

**Table 14 Proposal for biological monitoring improvements 2013 to 2015**

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

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WB code (GB1060390...)	Heavily modified WB?	Priority WB/MWR priority WB?	WB name/ecological status	Classification driver (i.e parameter(s) that determine classification)	Phytobenthos	Macrophytes	Invertebrates	Fish	Comments
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	
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			Aldbourn	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
<b>Total WBs monitored</b>					<b>13</b>	<b>10</b>	<b>29</b>	<b>20</b>	

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

The improved monitoring should be in place by the start of 2013.



### 3. Catchment management programme



### 3.1. Predictions for the Kennet catchment

If all the actions presented in this plan are put in place, the following stages of improvement should result through RBMP cycles. Classification results obtained between 2010 and 2014 are interim results and are affected by natural fluctuations, so only results from 2009, 2015, 2021 and 2027 have a direct bearing on the compliance of the waterbodies.

**Table 15 Predicted ecological status of surface waterbodies within the Kennet catchment**

**Bold signifies changed status**

WB ID (GB106039 <sup>+</sup> )	WB name	Start of 1st RBMP cycle						End of 1 <sup>st</sup> cycle	End of 2 <sup>nd</sup> cycle	End of 3 <sup>rd</sup> cycle
		2009	2010	2011	2012	2013	2014	2015	2021	2027
23120	Kennet and Foudry Brook and Clayhill Brook in Reading	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
23140	Kennet and Holy Brook	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
23150	Lambourn tributary (North of Newbury)	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
23171	Upper Kennet to Marlborough	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
23172	Middle Kennet (Marlborough to Newbury)	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
23180	Og	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
23200	Aldbourn	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
23210	Winterbourne	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
23220	Lambourn (Source to Newbury)	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
17190	Foudry Brook (Source to WestEnd Brook)	Mod	Poor	Poor	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
17200	Baughurst Brook	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
17210	Hollingtonstand Milford Lake (source to Enborne)	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
17220	Kingsclere Brook (Source to Enborne)	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
17230	Earlstone Stream and Burghclere Brook (source to Enborne)	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
17250	Ecchinswell Brook (source to Enborne)	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
17260	Enborne (Ecchinswell Brook to Kingsclere Brook)	Mod	Poor	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
17270	Enborne (Burghclere Brook to Ecchinswell Brook)	Mod	Mod	<b>Good</b>	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
17280	Enborne (Source to downstream A34)	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
17300	West End Brook (tributary of Foudry Brook)	Mod	Mod	Poor	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
17310	Enborne (downstream A34 to Burghclere Brook)	<b>Good</b>	Mod	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>	<b>Good</b>
17340	Lower Enborne	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>
17350	Upper Dun	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>	<b>Good</b>
17360	Inkpen Stream (source to Kennet)	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>	<b>Good</b>
17370	Shalbourne (source to Kennet at Hungerford)	Mod	Poor	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>	<b>Good</b>
17380	Foudry Brook (West End Brook to M4)	Mod	Poor	Poor	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
17390	Kennet and Avon Canal and Dun above Hungerford	Mod	Mod	<b>Good</b>	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
17410	Burghfield Brook	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
17420	Kennet (Lambourn confluence to Enborne confluence)	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Mod	<b>Good</b>
17430	Froxfield Stream	Mod	<b>Good</b>	Mod	Mod	Mod	Mod	<b>Good</b>	<b>Good</b>	<b>Good</b>

Note: the status of any of the water bodies could change as more monitoring data becomes available, or if the list of priority substances changes. The Upper Kennet and Og water bodies may have deteriorated, aggravated by the 2011/12 drought, so their classification may drop from Good, when biological monitoring data become available during 2013.

The improvements shown in Table 15 are aspirations which should be achievable, provided funding is available and land-owners are partners in the process. The overall targets are:

- Water bodies currently at GES to retain this status – 7 water bodies (excludes Upper Kennet and Og, which were GES in the River Basin Management Plan, but are expected to be moderate status when biological monitoring is available)
- Streams subject to recent APEM walk-overs (see Section 2.3) and follow-up remedial action to achieve GES at end of 1<sup>st</sup> cycle in 2015 – Froxfield Stream, Shalbourne, Upper Dun and Inkpen Stream – 4 water bodies improved
- All other rural water bodies not affected by the K&A canal interaction to achieve GES by end of 2<sup>nd</sup> cycle in 2021 – 9 further water bodies improved
- Water bodies affected by canal interaction or within Reading to achieve GEP by end of 3<sup>rd</sup> cycle in 2027 – 8 further water bodies improved

These classification predictions will change as new or aspirational measures are confirmed for delivery.

### 3.2. Summary of the overall programme activities

#### Overall Programme

The overall programme for achieving GES/GEP in the Kennet catchment is shown on Table 16.

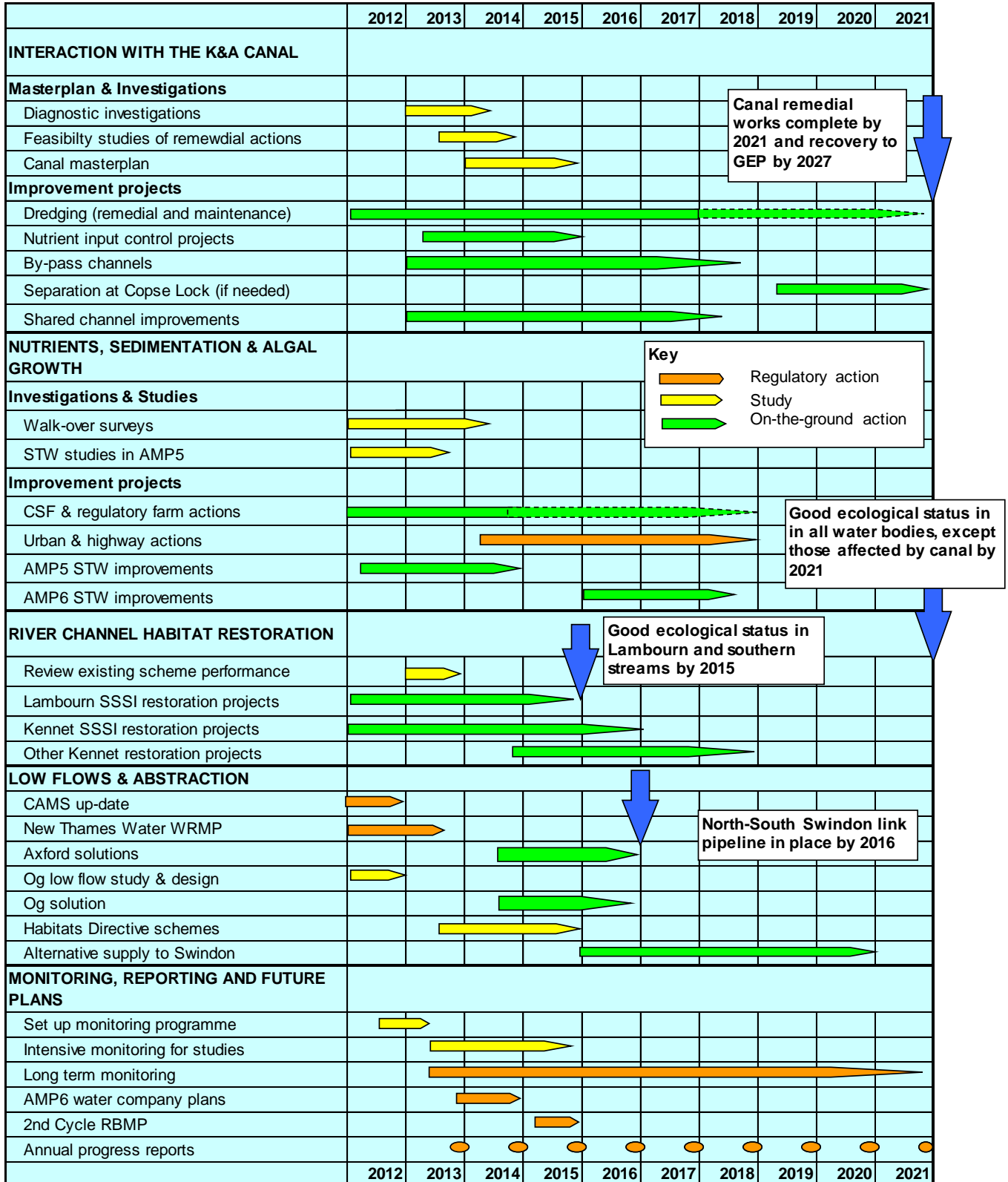


Table 16 - Overall aspirational programme for the Kennet catchment



The main features of the programme are:

- Resolving what needs to be done to deal with the interaction with the Kennet & Avon canal by 2015
- Current actions to deal with diffuse pollution will become more targeted through evidence from the latest Newbury diffuse pollution project and the APEM walk-over surveys
- Completion of schemes to alleviate abstraction pressures on Habitats Directive sites by 2015
- Habitat restoration focussing initially on the Lambourn and southern tributaries to achieve GES by 2015 and then switching attention to the lower river
- It is anticipated that, subject to funding availability, all of the on-the-ground improvements can be complete by 2021, allowing all parts of the catchment to recover to GES/GEP by the end of the 3<sup>rd</sup> RBMP cycle.

The key to successful completion of this programme will be the availability of funding, which is uncertain. More detail about the work required is available in a number of 'issue papers' which set out the background to the six individual issues and provide more detail of the work plans to address them and implement solutions on the ground.

### 3.3. Costs and funding

#### *Estimated costs*

Where possible an indication of the best estimates will be provided for all work, with recognition that estimates will be continually refined as more information becomes available.

More detailed cost estimates of actions will be generated by the individual programmes of work. These will be reflected in updated versions of the Plan and/or the associated issues papers.

### 3.4. Management of the programme

#### *The programme management team*

Overall responsibility for the Kennet Catchment Plan will remain with the Environment Agency in its regulatory role. The Kennet catchment steering group will continue to oversee all activities, and provide the mechanism for interested parties to reach agreement on priorities and actions. Action for the River Kennet would like to continue their role as catchment hosts and will be seeking funding to support this work. The day-to-day management of implementation of the plan will be shared between the EA and ARK as shown in Table 12.

Many of the areas of activity required to deliver the Plan have existing mechanisms or initiatives in place, of which a number involve a range of partner organisations who provide advice, and assist or lead in delivery. Some areas of work may need new initiatives or changes of regulatory rules to enable them to happen.

All those sectors and organisations with responsibilities under the Plan will have responsibility for delivery of the action plan and achievement of WFD objectives.

Task	Lead
Chairing and organising Steering Group Meetings	ARK
Masterminding the actions needed to achieve GES, drawing upon the advice of technical specialists and the steering group	ARK/EA jointly
Co-ordinating the activities of other parties where necessary	ARK with EA support
Arranging for the preparation of technical specifications for significant actions	EA with ARK support
Co-ordinating and facilitating negotiations with landowners affected by the actions	ARK/EA/NE
Arranging for consultation and communication with interested parties and the public	ARK with steering group
Arranging for contracts to deliver the actions, coordinating other parties who may lead	EA/NE
Monitoring progress on the actions	ARK/EA
Updating the catchment plan at least annually, taking account of the outcomes of actions and new information on the condition of the catchment	ARK with EA and steering group support

**Table 17 Division of management responsibility between EA and ARK**

### 3.5. 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.

### 3.6. 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
- **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** - Tributyltin  
**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 20°C. 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](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.

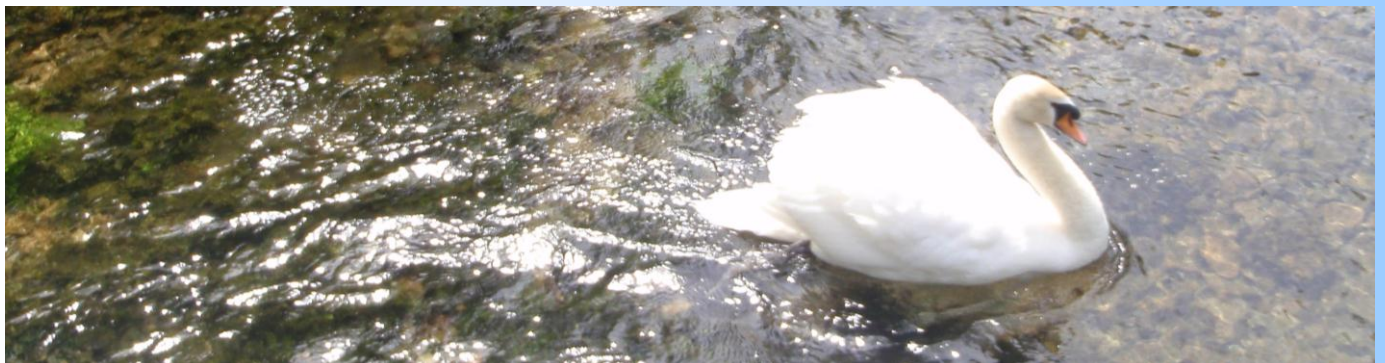
**Water Body** is a discrete and significant element of surface water such as a river, lake, reservoir or a distinct volume of groundwater within an aquifer.

**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.

**Appendix C: Waterbody Priority**

<b>Top priority</b>	Those waterbodies where there is a commitment to delivery by 2015.
<b>Very high priority</b>	Those waterbodies where there is confidence there is an ecological failure, the reasons are understood and why they are of bad or poor biological status.
<b>High priority</b>	Those waterbodies where there is confidence there is an ecological failure, the reasons are understood and why they are of moderate or better biological status.
<b>Medium priority</b>	Those waterbodies where there is still a need to confirm the ecological failure or understand the reasons for the failure, and they are of bad or poor biological status.
<b>Lowest priority</b>	Those waterbodies where there is still a need to confirm the ecological failure or understand the reasons for the failure, and they are of moderate or better biological status.
<b>Compliant</b>	Those waterbodies which are currently of GES





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