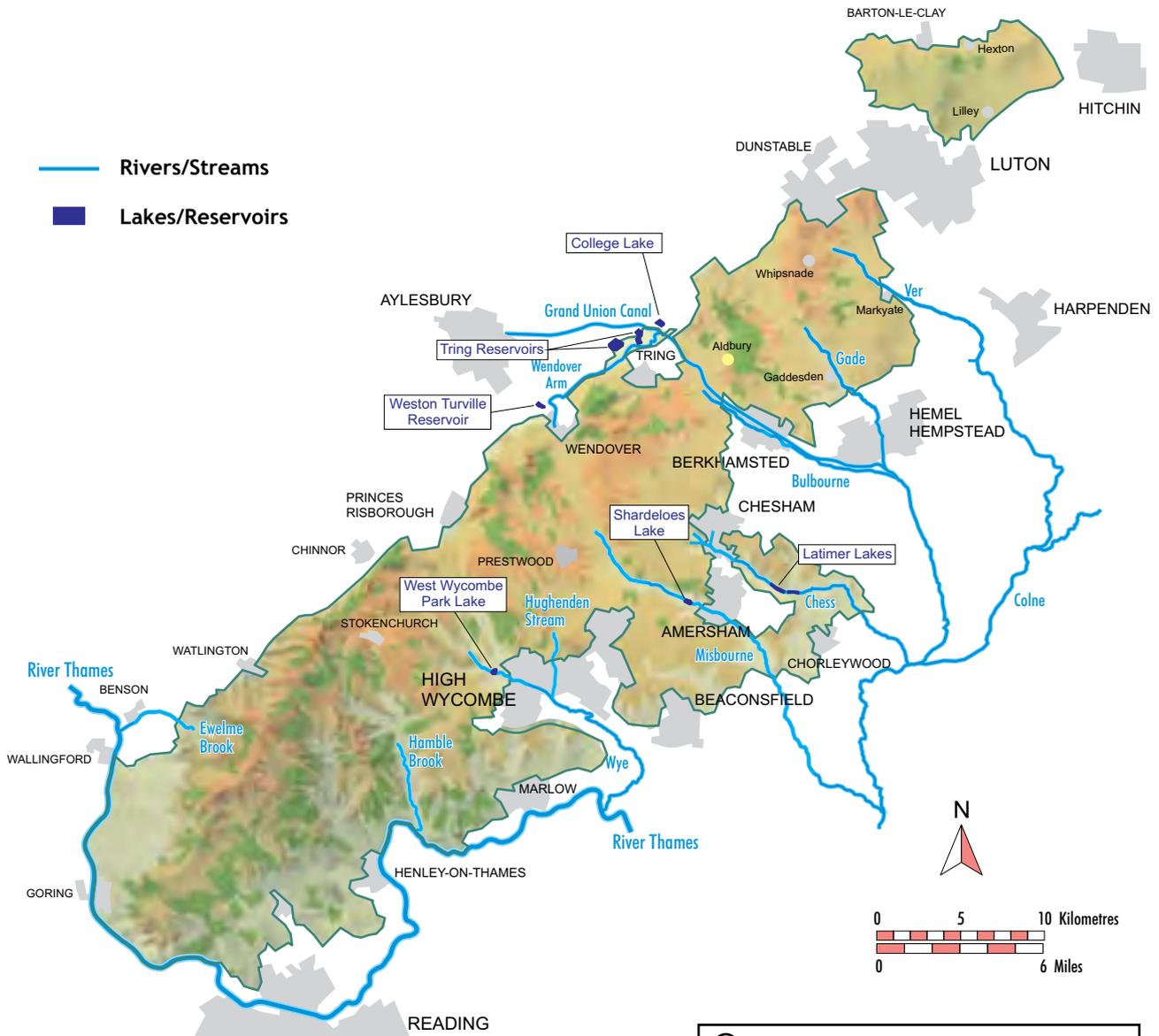


## Chilterns water bodies



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# Water environment

## Introduction

*River Chess at Latimer  
(Allen Beechey)*



1. As a consequence of its geology, the Chilterns is a relatively dry landscape, with wetland habitats sparsely distributed throughout the AONB. However, water has played an important role in the formation of the Chilterns and remains a key feature of the landscape today.
2. Chalk is the most significant aquifer of south east England. The Chilterns' chalk is part of this aquifer, which is of regional and national importance, both in terms of the water bodies it supports and for the amount of water that is abstracted from it for public supply.
3. The chalk aquifer provides a clean, mineral-rich and reliable supply of water on which much of the Chilterns' water environment relies on for its existence. As a consequence, the rivers and streams of the area, in particular, have special characteristics and have played a major part in the location and development of settlements and industry.
4. The major river of the Chilterns is the River Thames, which cuts through the chalk escarpment forming a long and sinuous boundary between the North Wessex Downs and Chilterns AONBs. It is also the boundary between counties and was once the boundary between Mercia and Wessex.
5. A key component of the Chilterns' water environment is the area's chalk streams. There are eight main chalk streams, which flow mainly in a south easterly direction down the dip slope of the Chilterns escarpment into the River Colne and River Thames. Chilterns chalk streams are naturally variable in flow as a result of seasonal climatic changes but have been adversely affected since the 1950s by increased incidence of drought and environmentally unsustainable levels of abstraction for public water supply.
6. In addition to the dip slope chalk streams, there are numerous chalk springs located at the foot of the northern face of the

escarpment that feed small streams such as the Barton Brook, Chalgrove Stream and Ewelme Brook. These streams are important tributaries of rivers such as the Thames, Ivel, Ouzel and Great Ouse and were key to the historical location of towns and villages along the foot of the scarp.

7. The Chilterns supports a number of other aquatic habitats and features including lakes, gravel and mineral extraction pits, reservoirs, canals and ponds. They are important for a range of nationally important species. Small areas of marsh, calcareous fen, wet flushes, wet meadow, wet woodland, alder carr and reed bed still occur.

### Broad Aims

- Conserve and enhance the river valley and wetland landscapes characteristic of the AONB.
- Conserve and enhance river and wetland habitats and the biodiversity they support.
- Support opportunities for new wetland habitat creation.
- Protect and improve the quality of the Chilterns' water resource.
- Increase public awareness and enjoyment of the water environment.
- Increase local community involvement in caring for the water environment.

### Special Qualities

#### Chalk streams

1. Chalk streams are a globally scarce habitat, and a key landscape feature of the AONB.
2. There are eight main chalk streams that flow down the dip slope of the Chilterns: the Ver, Gade, Bulbourne, Chess, Misbourne, Hughenden Stream, Wye and

Hamble Brook. There is a total of 49km of chalk stream habitat within the AONB.

3. They are groundwater-fed, shallow, fast flowing water courses with a gravel bed and low banks. They typically have high water quality which is alkaline (pH 8-9), clear, mineral-rich and stable in temperature.
4. Flows are dependent on groundwater levels in the underlying aquifer.
5. Chalk streams are considered by many organisations including the Environment Agency as a priority habitat for protection. They frequently have associated valuable habitats such as reed beds and wet woodland/carr habitats.
6. Chalk streams support high biodiversity and are home to some of the UK's most endangered species. Associated UK BAP priority species include: otter, water vole, reed bunting and brown trout.
7. There are two SSSIs and 30 Local Wildlife Sites that incorporate sections of chalk stream within the AONB.
8. Winterbourne sections of dip slope streams are an important habitat of chalk streams. Winterbournes are the ephemeral upper reaches of dip slope chalk streams which dry seasonally in response to changing groundwater levels. They support a unique assemblage of plants and animals, specifically adapted to ephemeral flow conditions.
9. The numerous chalk springs that occur all along the base of the north west-facing escarpment are an important but largely overlooked part of the Chilterns' water environment. They are important tributaries of major rivers, providing a reliable contribution to flow in these mainly surface water-fed rivers throughout the year.
10. Chalk springs are also historically important having been a key factor in the location of settlements along escarpment. Villages and towns such as Ewelme, Watlington, Chinnor, Wendover

and Tring are all located close to chalk springs.

### River Thames

11. The River Thames is a dramatic landscape feature with a wide valley and many valuable associated habitats. Its role as a major navigable waterway has led to extensive modifications and the creation of an extensive range of facilities for leisure and recreation. The Thames Path National Trail follows its entire length as it passes through the Chilterns.
12. Along the banks of the Thames are some of the region's finest houses with associated parkland and ornamental landscapes.
13. Ecologically significant features along the main river and its backwaters include nationally-important species such as loddon lily, black poplar, club-tailed dragonfly and Daubenton's bat.

### Canals and stillwaters

14. The Grand Union Canal is an important and distinctive component of the Chilterns' water environment. The main canal route passes through Tring, Northchurch and Berkhamsted whilst the Wendover Arm winds along the base of the escarpment from Wendover to the main canal at Tring. The canal is an attractive and popular feature of the area, used extensively for various recreational purposes such as boating, walking and fishing. It is also an important wildlife corridor and is home to species such as kingfisher and water vole.
15. The lakes of the AONB are exclusively man-made, created for a variety of purposes such as water storage, ornamental landscaping or as a consequence of mineral or gravel extraction. They are, however, important features contributing greatly to landscape character and biodiversity.

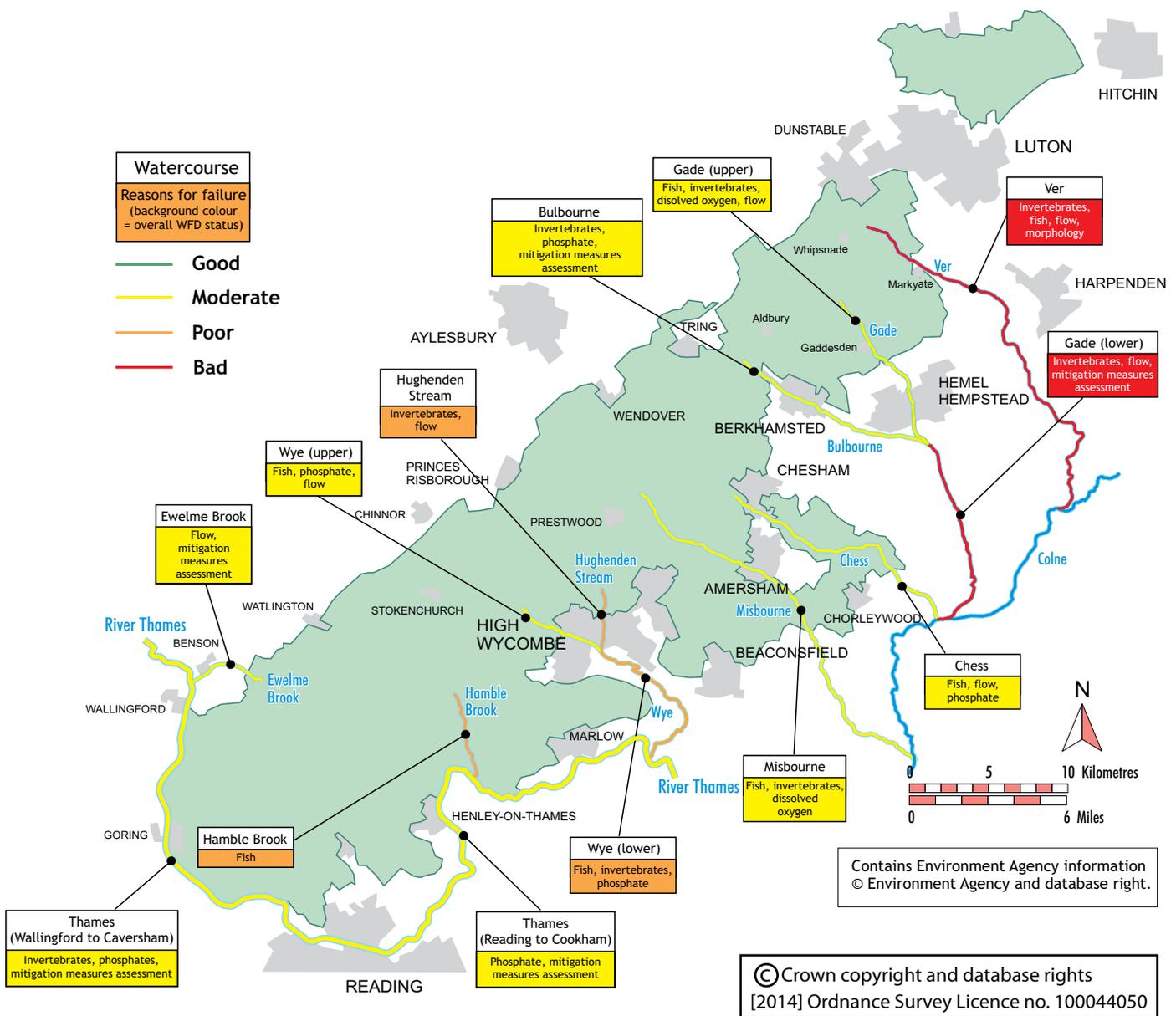
16. There are many ponds, especially on farmland and common land, created to water livestock or sometimes resulting from extraction of soil or clay. They provide habitat for a variety of specialist flora and fauna including great crested newt and the nationally rare starfruit *Damasonium alisma*. One survey<sup>1</sup> found 932 ponds marked on the 1:25,000 OS maps. This is thought to be an underestimate.
17. Rivers and wetlands are a major educational resource and add significantly to the landscape. Locations such as the Ewelme Watercress Beds, College Lake Nature Reserve and the River and Rowing Museum in Henley provide excellent educational facilities to learn about the Chilterns water environment.

### Key Issues

1. According to the 2009 baseline assessment of water bodies under the EU Water Framework Directive (WFD) all nine chalk streams, which flow through the AONB currently fail to attain Good Ecological Status or Potential (GES/P).
2. The single most common reason given for the Chilterns' streams failing to reach WFD objectives by 2015 is low flows. Abstraction has either been identified, or is currently being investigated as a causal factor for low flows in seven of these streams.
3. Of the other water bodies assessed under WFD, only the Grand Union Canal south of Tring Summit is currently assessed as achieving either GES or GEP.
4. The 2009 baseline assessment also showed that the status of the Chilterns' groundwater resource is 'Poor' in quantitative terms and that only the Chilterns Chalk Scarp groundwater unit is assessed as achieving 'Good' chemical status. All groundwater units are subject to rising trends in groundwater pollution.

<sup>1</sup> Chiltern Hills Pond Survey 1996 (The Chiltern Society)

## 2009 baseline Water Framework Directive status for Chilterns surface water bodies



5. Abstraction from the underlying aquifer for public water supply is a major issue. The Chilterns is designated as an area of serious water stress. With demand for public supply predicted to increase over the next 25 years, in part due to plans for new development, the Chilterns' aquifer remains under severe and increasing pressure.
6. Increased climatic variation and, in particular, increased variability of rainfall during October to March, the period essential for aquifer recharge, has increased both the frequency of droughts and high groundwater events in the last 40 years. There have been five severe droughts since 1975 and two 1 in 150 year winter rainfall events in the last 13 years. Heavy, persistent summer rainfall has also led to two rare summer groundwater recharge events in the last ten years.
7. Severe droughts combined with environmentally unsustainable levels of abstraction combine to reduce the functioning length of chalk streams and severely degrade their ecology. In the severe drought of 2011/12, 57% of the total length of chalk stream in the AONB was dry by March 2012. It may take ten or more years of continuous flow for the ecology of drought-impacted reaches to be restored.
8. Heavy, persistent rainfall can lead to both surface and groundwater flooding particularly in river valleys and urban areas. Urbanisation of catchments has reduced the effective land area available to contribute to groundwater recharge and has also increased the incidence of surface water flooding.
9. Improved drainage of roads in river catchments has increased flood risk in river valley settlements by increasing both the amount of surface water that reaches watercourses and also the speed at which it is conveyed. Flow rates are consequently more variable and rivers increasingly prone to flooding as a result.
10. There is pollution from a wide range of sources including industry, agriculture, sewage effluent, and urban drainage. Pollution from urban and sewage effluent have the greatest impact on the quality of the area's chalk streams but diffuse agricultural pollution is an important factor affecting groundwater quality and silt loading of rivers.
11. All chalk streams have been heavily modified through a wide variety of activities such as milling, agriculture, urban development and landscaping. These activities have fragmented habitats, degraded the natural channel and created barriers for fish and invertebrates. Some modified sections - watercress beds for example - can provide the specific habitat requirements for particular species such the water shrew (*Neomys fodiens*).
12. The spread of non-native species such as Himalayan balsam, Japanese knotweed, signal crayfish and North American mink have had an impact on the ecological structure of the AONB's chalk streams. The introduction of the American signal crayfish, for example, has led to the extinction of the native white-clawed crayfish in the AONB and is affecting the base of the aquatic food chain. The North American mink has also been partly responsible for the dramatic decline in water vole numbers within the AONB<sup>2</sup>.
13. Disturbance and loss of wildlife habitats can result if the river and its banks are insensitively managed for recreational purposes. Riparian land in urban areas can become degraded through heavy recreational use or mismanagement of banks and vegetation.
14. In common with the national trend, the number of ponds in the AONB has declined significantly since the Second World War. Intensification of agriculture and changes in land use have been the major factors driving this decline.

<sup>2</sup> R. Chess water vole surveys 2001 and 2003 (Chilterns Chalk Streams Project)

15. Many of the Chilterns' ponds have low biodiversity caused either through many years of neglect or, conversely, through over-management.

## Policies

### **WE1 The restoration of chalk stream river flows through the reduction of abstraction to environmentally-sustainable levels should be sought.**

Low flows are the key issue affecting the rivers as a major landscape feature and the quality of chalk stream habitat. The Chilterns groundwater resource, on which these streams rely, has been increasingly overexploited over recent decades. The reduction of abstraction to environmentally sustainable levels through the Environment Agency's Restoring Sustainable Abstraction programme and a new abstraction licensing regime which provides adequate protection of the water environment is essential for the long-term health of the area's chalk streams.

### **WE2 a) Public awareness of the link between water demand and abstraction and their impact on flows and the environmental quality of chalk streams should be increased.**

**b) Awareness of how the actions of owners and occupiers can affect the quality of the water environment should be increased.**

There is generally poor understanding of how actions in the home and by businesses such as water use and waste disposal can impact on the quality of the water environment. High water use can lead to environmentally unsustainable levels of abstraction and resultant low flows in the area's chalk streams. The disposal of fats and oils down drains and misconnection of wastewater services can lead to chronic pollution of watercourses. Commercial activities such as vehicle washing, incorrect storage of materials and disposal of waste can also

have a potentially significant impact on the water environment. Increasing public awareness of these issues and what role they can play in reducing the impact of their actions is key to improving the quality of the area's water environment.

### **WE3 Water efficiency measures to reduce per capita demand should be promoted.**

A major driving force behind environmentally unsustainable abstraction of the chalk aquifer is high domestic water consumption in the Chilterns and surrounding area. Hertfordshire, for example has the highest per capita demand in the UK of 176 litres per person per day (unmetered consumption) which is significantly above the Government's per capita use target of 130 litres per person per day. In addition, less than 50% of households in the area have a water meter. With demand for water is projected to increase in the future, there is an urgent need for greater uptake of water efficiency measures such as water metering, to maximise available water resources for both public supply and for the aquatic environment.

### **WE4 Improvements to the water environment through implementation of the Water Framework Directive should be sought.**

Currently, no water bodies in the AONB meet the ecological standards set out in the European Union Water Framework Directive (WFD). All water bodies must attain these standards by 2027. River Basin Management Planning is the delivery mechanism through which WFD objectives will be obtained. The second cycle of River Basin Management Plans (RBMP), covering the period 2015 - 2021, is currently being developed. There is a need for the next cycle of RBMPs to be more ambitious in their objectives to ensure significant improvement of the Chilterns' water environment by 2027.

*River Thames  
at Marlow*



**WE5 A catchment-based approach to the enhancement and sustainable management of the Chilterns' water environment should be supported.**

The catchment-based approach is a new way of working which brings stakeholders together to identify shared aspirations for their local water environment, to form partnerships and to work in new ways to bring them to fruition. The development of catchment plans through Defra's catchment-based approach will be key to identifying and addressing the issues affecting the water environment at a local scale and will feed into the development of the next cycle of River Basin Management Plans, driving significant improvement to the water environment.

**WE6 Best practice in management of rivers and their valley landscapes should be promoted.**

Chalk streams and their valley landscapes are characteristic features of the AONB. Best practice management of both river and the wider valley environment is key to maintaining the quality of these features and the habitats they support. Habitat degradation is a key factor in many of the AONB's rivers currently

failing to reach Good Ecological Status or Potential. Working with partners to promote and deliver best practice riparian management methods such as invasive non-native species control will be key to enhancing the quality of rivers and their valley landscapes.

**WE7 Long-term sustainable management of rivers and their catchments, to reduce flooding and secure aquifer recharge, should be supported.**

The long-term management of water resources is best achieved at a catchment scale. Appropriate management of the wider river catchment can have significant beneficial impacts in reducing downstream flood risk. Opportunities to reduce flood risk, where appropriate, should be identified and implemented. Proposed schemes should be sympathetically designed and seek to work with water and natural fluvial processes.

**WE8 Development and long-term management of sustainable drainage systems should be promoted.**

Urbanisation of river catchments leads to increased runoff, flood risk, and pollution. Further development in river

catchments must be sensitive to these issues and seek to minimise their impact. The incorporation of sustainable drainage systems in all new development from the outset, as set out in the Flood and Water Management Act 2010, will be essential in minimising flooding and pollution as well as maximising groundwater recharge and enhancing biodiversity. Targeted promotion of SuDs to homeowners, developers and farmers/landowners will be important in stimulating greater uptake.

**WE9 Priority habitats, including chalk streams, ponds and other wetlands, and species such as water voles, water crowfoot and water shrews should be maintained, enhanced, protected and monitored.**

Water bodies are relatively sparse in their distribution within the Chilterns. Their continued health is essential for sustaining a diverse range of plants and animals. Many of the water bodies in the Chilterns are home to UK priority species. Protection of these species is important both from a local and national perspective.

**WE10 Restoration of natural flow conditions and improved connectivity of rivers and their riparian corridors should be promoted.**

The River Thames and the Chilterns chalk streams have a long history of management and modification by man. This has led to degradation and fragmentation of habitat. Schemes which 'naturalise' river channels and improve flow continuity through techniques such as daylighting or removal or modification of impoundment structures, will enhance habitat, restore natural drainage regimes and create more sustainable river systems.

**WE11 Appropriate management on all sites designated for nature conservation (statutory and non-statutory) should be safeguarded and promoted, and the need for greater protection of chalk streams promoted.**

The conservation of sites which possess quality habitat is essential to prevent further degradation of the AONB's rivers. Despite their global rarity, none of the Chilterns chalk streams have any statutory designation. Without such protection, these rivers remain vulnerable to environmentally unsustainable abstraction, pollution and habitat degradation.

**WE12 Public awareness of the impact of climate change on the environmental quality of the water environment should be increased.**

The influence of increased climatic volatility on chalk stream flows and environmental quality is generally poorly understood. Increased public awareness will assist in introducing appropriate management to reduce low flows and cope with flooding.

**WE13 The involvement of local communities in the conservation and enhancement of the water environment should be increased.**

The public is particularly interested in rivers and water quality. A sense of community ownership and responsibility is important in the protection of the AONB's rivers, particularly in urban areas where they often flow through land in public ownership and close to residential areas.

**WE14 Greater public enjoyment of the water environment of the AONB should be encouraged and sustainable access to it promoted.**

Chalk rivers are an important and beautiful part of the Chilterns' landscape. It is important to enable the public to experience and interact with them. Encouraging the public to engage with chalk streams is key to instilling a sense of value of these important and beautiful components of the Chilterns' landscape.