

10. Geology and natural resources

Our vision

In 2034... great care is taken to conserve and manage the natural resources of the environment particularly soil, ground and river water. New and innovative ways to reduce resource use have been adopted which support landscape character and the economy. Important areas of tranquillity have been identified, protected and expanded and provide 'oases of calm'. The need to conserve and enhance natural beauty means mineral resource winning occurs away from the AONB, except in exceptional circumstances, and worked out quarry sites have been restored to enhance local landscape character.

10.1 Overview

The natural and cultural features that create the Kent Downs' sense of place and special character have in large part been governed by the physical environment. Kent Downs natural resources provide vital ecosystem services to the population of Kent and beyond. With significant changes predicted in the natural environment along with

substantial new demands placed on our natural resources, positive action and management is an important priority for the conservation and enhancement of the Kent Downs.

10.2 Geology and natural resources - special characteristics and qualities

◆ Geology

The Kent Downs are valued as a place of spectacular views, changing scenery and landscape diversity. The underlying geology is quite literally the foundation of this natural beauty.

The AONB encompasses a complex band of geological layers, each following the broad east-west sweep of Kent. The folded and undulating chalk, Greensand, Gault clay and Ragstone, with intricate intermittent overlying layers which include washed flint beds, boulder clay, wind-blown loess, sand, river gravel and alluvium. All are of glacial origin emanating from the northern ice sheets and outwash torrents, they determine the nature of the land and soil, and the plants and animals which are supported.

The AONB contains a number of nationally and regionally important geological or physiographical features, eight of which have been designated as geological Sites of Special Scientific Interest (SSSIs) –

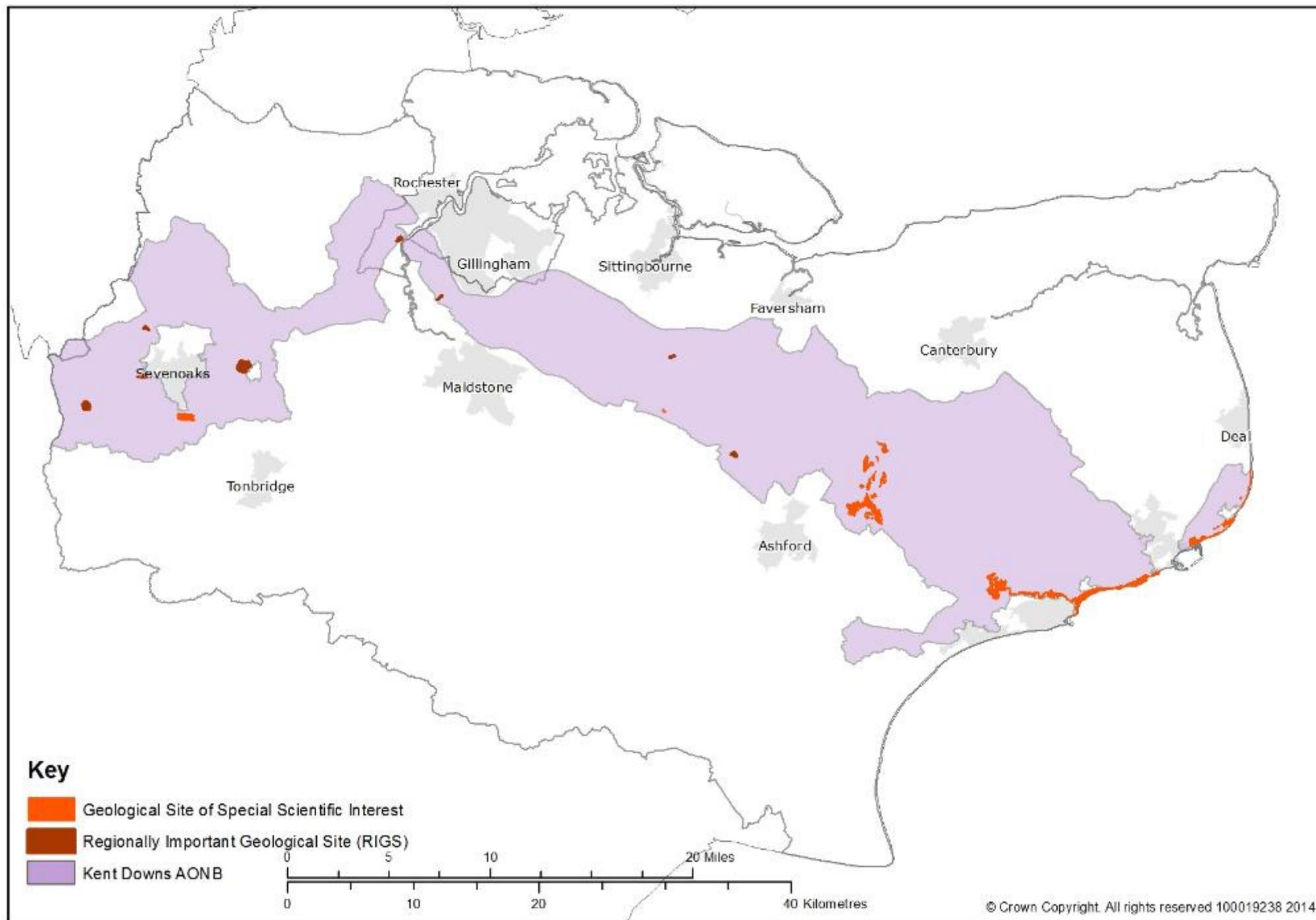
including the full extent of the Chalk cliffs of the Heritage Coasts, where the exposures are of international significance. Where they are not statutorily designated, some sites have been selected as Regionally Important Geological Sites (RIGS) which are sometimes referred to as Local Geological Sites.

Some of these are exposures created during mineral workings or cuttings for transport infrastructure, which have been left uncovered and reveal strata of important rocks, minerals and fossils.

The geology of the Kent Downs means that mineral winning has been a long run activity, particularly on the northern edge of the Greensand.

The underlying geology is quite literally the foundation of the Kent Downs' natural beauty.

Figure 14 - Geological Sites of Special Scientific Interest (SSSIs) and Regionally Important Geological Sites (RIGS) in the Kent Downs



◆ Soil

Soil is an irreplaceable and often overlooked natural resource. It is a key determinant of the AONB's natural vegetation and is fundamental to all land uses. In semi-natural habitats, an undisturbed soil structure is a vital ecosystem component. On cultivated land, careful soil management is a primary principle of good farming but overall soil quality has been declining at a UK level. Soil erosion can occur on ploughed steeper slopes of the AONB, the soil eventually being washed into adjacent watercourses – adding to the flooding risk.

Pollution or contamination of soil can occur through pesticide and other chemical misuse, which can accumulate over time, and can leach into surface and groundwater supplies. Soil husbandry is increasingly understood to be important for carbon management. The UK Climate Risk Assessment has identified that drier summers leading to increased soil moisture deficits may result in the increased release of greenhouse gases such as carbon dioxide and methane. Heavy rainfall, especially following a dry period, may increase soil erosion.

◆ Water

The Kent Downs AONB is a comparatively dry landscape; rain water permeates easily through the porous Chalk and Greensand bedrock with generally few areas of standing water, except where Clay-lined dew ponds are present. Where the permeable Chalk and Greensand layers meet impermeable Gault Clay, water seeps out in spring lines. The lower scarp slopes are characterised by historic settlements that have developed around these water sources (e.g. Postling, Hollingbourne and Underriver). These springs flow into the main river catchments, flowing out of and sometimes through the AONB.

Within the Chalk and Greensand clean percolated water forms the groundwater aquifer, which provides 75% of Kent's drinking water. Water availability is one of the biggest issues facing the UK water sector with pressures on availability already evident, especially in southern and eastern England. The quality and quantity of the ground water aquifer and the surface river water is determined in no small part by landscape management and other activities. The quantity of groundwater and surface water is becoming a more

critical issue as Kent is set to accommodate significant population growth in the next twenty years. Abstraction already occurs throughout the AONB and has been linked to low summer river flows particularly of the Rivers Darent and Little Stour. This situation will be exacerbated by the predicted effects of climate change. Not only will these factors have a profound effect on Kent's potable water supply, but also may impact on the AONB's physical and ecological character over time.

Water supply is at the forefront of issues being addressed by water companies through Water Resource Management Planning. There is an emerging potential coherence of interests between the needs of sustainable landscape management and water resource management.

The Government is promoting locally focussed decision making and action at the heart of the debate about the future direction of improvements to the water environment. The Catchment Based Approach (CaBA) aims to generate more effective stakeholder engagement in order to tackle environmental problems at a more local scale. It is thought that this will particularly help tackle pollution from diffuse sources, by their diffuse nature, local. The collaborative ways of working to consider the needs of the water environment and acting to enhance it in a truly collaborative way fit comfortably with the AONB management approach.



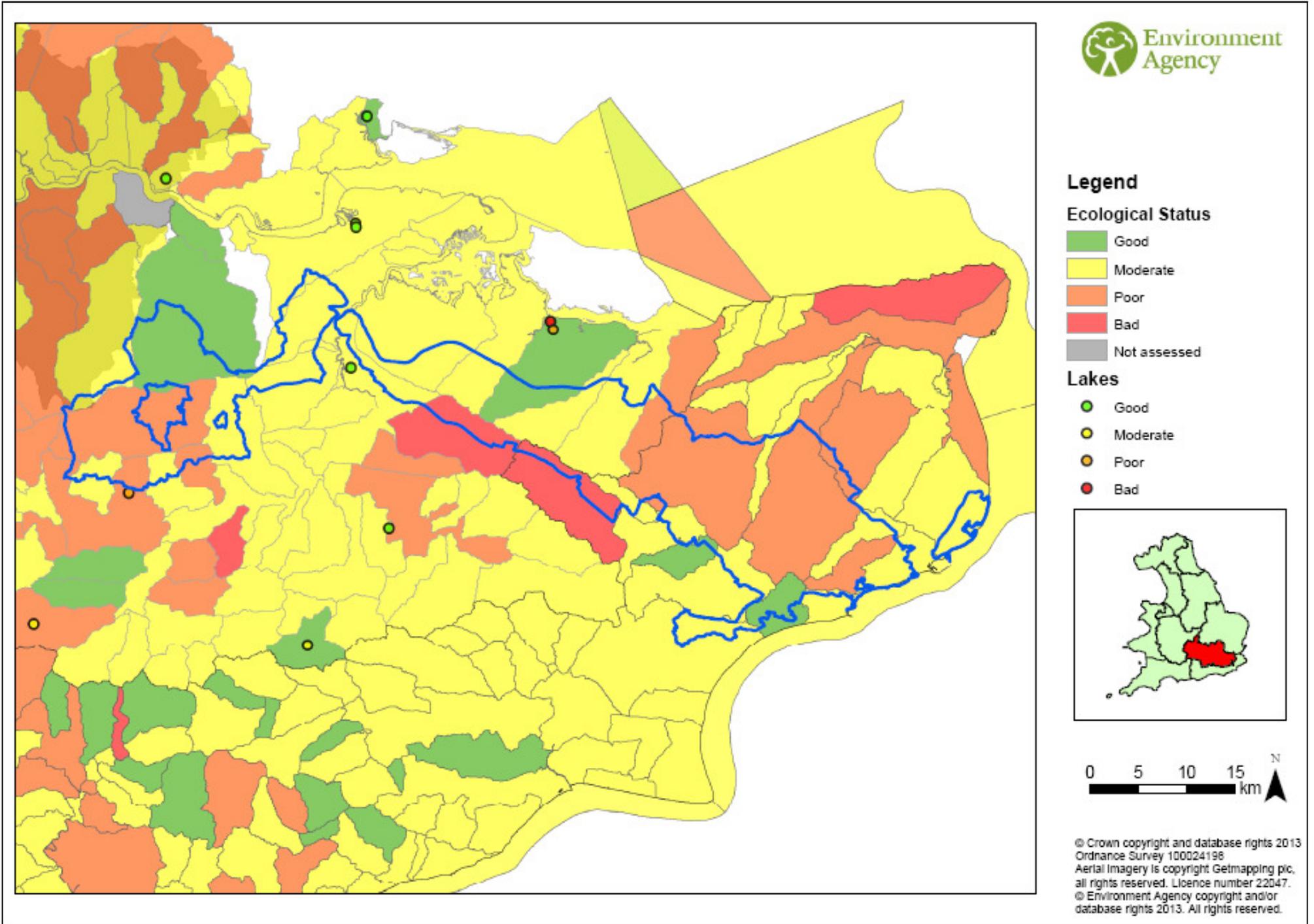
Dew pond



Stour Valley

Dan Tuson

Figure 15 - water quality in the Kent Downs



◆ **The Water Framework Directive and Catchment Abstraction Management Strategies**

The Water Framework Directive's (WFD) main objectives are to protect and enhance the water environment and ensure sustainable water resource use for economic and social development.

The scope of the framework is wide, covering lakes, streams, rivers, groundwater, groundwater dependent ecosystems, estuaries and coastal waters out to one mile from the low-water mark. The Environment Agency is the lead authority for implementing the WFD. Whilst the Agency will focus on the appropriate application of regulations and using an evidence-based approach to ensure the most cost-effective actions are taken; improving the health of our natural water environment will require collaborative working across many sectors and making use of local knowledge.

Catchment Abstraction Management Strategies (CAMS) set out how catchment water resource management can contribute to WFD implementation.

◆ **The provision of ecosystem services**

The UK government has recognised that 'people benefit from processes or structures within ecosystems that give rise to a range of goods and services called 'ecosystem services'. This is essentially a description of how natural resources and the ecosystems they create and support provide for the needs of society. The services described

range from the relatively simple, such as crop pollination to the highly complex, such as soil fertility maintenance, waste sinks or climate regulation. Ultimately all human life depends on ecosystem services for fundamental necessities such as clean air, clean water and food production. Services have been grouped into four categories:

- Supporting services, such as nutrient cycling, oxygen production and soil formation. These underpin the provision of the other 'service' categories.
- Provisioning services, such as food, fibre, fuel and water.
- Regulating services, such as climate regulation, water purification and flood protection.
- Cultural services, such as education, recreation, and aesthetic value.

Kent Downs ecosystem services are identified in detail in Natural England's National Character Assessment for the North Downs and Wealden Greensand and are therefore not repeated here.



A workee landscape in the Kent Downs

10.3 Geology and natural resources - main issues, opportunities and threats

◆ **Geology**

- a. Lack of awareness about the importance of AONB geology and landform.
- b. There are important mineral resources in the Kent Downs and its setting. Mineral workings can have a serious impact on landscape quality. Restoration plans may be affected by the deficit of inert materials which were once more easily obtainable.
- c. The importance of geological sites and features tends to be overlooked due to lack of information, interpretation, poor management, development, landfill and dumping.

◆ **Soils**

- d. Soil erosion, especially on the steeper slopes and under 'open' arable crops, such as maize and potentially some biomass crops; climate change enhances this risk.
- e. Maintaining and improving agricultural soil quality and promoting the relationship between good soil management and climate change mitigation.

◆ **Water**

- f. Pollution of rivers and springs from point sources, including public and private sewerage systems, agriculture and fish farms.
- g. Diffuse pollution from agricultural sources leading to nutrient enrichment, reduced water and elevated levels of silt and pesticides.
- h. The expected increase in water demand for public use and irrigation in already over abstracted catchments presents major challenges for water resource management and potentially the installation of significant new water infrastructure in the landscape.

- i. Predicted increase and volume of flooding events. Rivers flooding in the Kent Downs affects localised areas.
- j. Need to understand the relationship between landscape management and aquifer recharge.
- k. The water companies' Water Resources Management Plans process provides an opportunity for collaborative working to secure a more resilient water supply at the same time as landscape management which supports landscape character.
- l. The opportunity to collaborate with the Catchment Based Approach to secure the conservation and enhancement of landscape character as well as delivery of Water Framework Directive objectives – and also ensuring that AONB policies and projects support the WFD.
- m. The significant benefits of Kent Downs ecosystem services are insufficiently recognised and valued and the opportunities to secure payment for them is not yet developed.
- n. The need to establish and secure the Kent Downs as a vital component of Kent's green infrastructure provision.



The River Stour at sunset

10.4 Geology and natural resources - aims

A landscape in which:

1. A safe, clean environment is protected, conserved and enhanced, where residents and visitors alike benefit from essential ecosystem services and increased well-being and quality of life.
2. Important geological sites and exposures of the Kent Downs are recognised, conserved and enhanced.
3. The natural resources of soil, water and air will be conserved, enhanced and managed in a way which enhances landscape character.
4. Local sources of pollution indigenous to the AONB are minimised, reduced or controlled.
5. The Kent Downs AONB landscape provides vital services and green infrastructure for Kent and the south east.

10.5 Geology and natural resources - policies

The Sustainable Development section (3) identifies guiding and recurrent themes for the management of the Kent Downs AONB. These themes and the Management Plan policy responses should be considered before referring to specific policies set out below.

- GNR1 Activities designed to protect, conserve and enhance the important geological exposures of the Kent Downs will be encouraged.
- GNR2 Careful management and sensitive restoration of existing minerals and waste sites affecting the Kent Downs will be pursued.
- GNR3 Allocations and permission for new mineral extraction are likely to be major development proposals and within the AONB will be opposed, except in the exceptional circumstances identified in paragraph 116 of the National Planning Policy Framework (NPPF). Where permitted in accordance with the provisions of the NPPF, exceptional site management, working and restoration conditions which support landscape character will be expected, conditioned and enforced.
- GNR4 Advice to farmers and land managers which seeks integrated environmental land and natural resource management in the Kent Downs will be encouraged.
- GNR5 Threats to the conservation of the natural resources of soil, water and air will be opposed.
- GNR6 A strategic collaborative Catchment Based Approach will be taken to the management of the water environment in the Kent Downs AONB to secure a more resilient water supply, achieve good ecological status in the water bodies and the conservation and enhancement of the landscape.
- GNR7 Additional water abstraction particularly in the Darent and Great Stour river catchments will be resisted unless it can be demonstrated that there will not be any harmful impacts upon the special character and qualities of the Kent Downs. Support for Water Resource Management Planning which seeks to secure the conservation and enhancement of the Kent Downs AONB will be pursued.
- GNR8 A collaborative approach will be pursued to secure the provision of appropriate ecosystems services and green infrastructure, which supports the special character and qualities of the Kent Downs, for the benefit of the community and economy.