

10. Geology and natural resources

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Summary of changes

Note of changes following final comments from the Kent Downs AONB Joint Advisory Committee/ Jan/ Feb 2021

KCC minerals and waste team further minor adjustments to improve/clarify the narrative have been included.

Principle GNR 3has been tightened and now reads:

*GNR3 In the light of potential planning for future mineral supplies a careful approach will be taken to reduce the likely pressure for new minerals sites in or affecting the Kent Downs AONB including **including promoting re-use and recycling and ensuring the support for the further provision and safeguarding of existing mineral importation wharfs and rail depots to enable alternative sources, from less sensitive areas, to be provided to meet identified needs in Kent.***

Reference made to preliminary findings of the PROWATER project emphasising the co-benefits of conservation-based landscape management for aquifer recharge.

Our vision for the geology and natural resources of the Kent Downs AONB

In 2031... great care is taken to conserve and manage the natural resources of the Kent Downs particularly soil, air, ground and river water. New and innovative ways to both reduce resource use and enhance the existing natural capital have been adopted which support landscape character and qualities, the economy and communities. 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 and underpin the quality of the landscape. 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.

Natural Capital and the provision of ecosystem services

This plan is strongly informed by a 'natural capital' approach; natural capital includes the air, water, soil and ecosystems that support all forms of life, as this approach is overarching for the plan more details are included in section 3.

Geology

The AONB encompasses several geological layers each following the broad east-west sweep of Kent. The folded and undulating Chalk, Greensand, Gault Clay and Ragstone have intricate overlying layers of Clay with Flint, sand, river gravels and alluvium together these determine the nature and pattern of the land and soil, and the plants and animals they support.

The geology of the Kent Downs means that mineral winning has been a long run activity, from historic dene holes used to source chalk used to dress acid soils to sand and gravel extraction particularly on the northern edge of the Greensand. Some previous workings have revealed exposures which have been left uncovered and reveal strata of important rocks, minerals and fossils. The Kent Downs AONB and its setting contain important remaining resources of sharp sand, gravels and building sands, many of the less constrained sites across Kent containing these resources have been exploited in the past, are currently being worked or have been allocated in the Kent Mineral Sites Plan, meaning that pressure to exploit the resources in or in the setting of the Kent Downs is expected to potentially increase, where justified by policy, in the future.

The approach of the National Planning Policy Framework to mineral winning is reflected in the Kent Minerals and Waste Strategy Local Plan 2013-30 which in-turn recognises the

importance and sensitivity of the landscapes of the AONB and its setting in its narrative and policies.

Soil

Soil is an irreplaceable and often overlooked natural resource, a vital component of our natural capital and an ecology in its own right. The pattern and quality of soil is a key determinant of the AONB's natural vegetation and is fundamental to land uses choices. 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 and carbon management but overall soil quality has been declining at a UK level. Soil erosion can occur on ploughed steeper slopes of the AONB and where crops are harvested in wet conditions, for instance maize, the soil eventually being washed into adjacent watercourses – adding to the flooding risk. Innovations in farming practice including minimal and zero tillage and regenerative farming provides opportunities to increase soil fertility, carbon storage and reduce emissions.

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. Improving and restoring soil health is a high priority in Governments 25 Year Environment Plan.

Water

The quality and quantity of the ground water aquifer, surface, river and coastal water is determined in no small part by landscape management and other activities. The quantity and quality of ground and surface water is becoming a more critical issue as Kent is set to accommodate very significant population growth (see sections 2 and 3). 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 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.

Nutrients are a continued risk to our important groundwater sources and also to our surface water systems. The Environment Agency estimates that only about 50% of applied Nitrate is used by crops, of the rest, half goes into our aquifers and half goes into our air as Nitrous Oxide – a significant contributor to greenhouse gases. Nitrate can take over 40 years to penetrate our aquifers so we have a long-term legacy to deal with. Phosphate is often a reason that surface waters in the Kent Downs do not meet Water Framework Directive standards. Poor soil management can also result in increased silt in our chalk streams.

Water supply is at the forefront of issues being addressed by water companies through Water Resource Management Planning. There is an increasing coherence of interests between the needs of sustainable landscape management and water resource management providing the opportunity for collaboration between landscape and water resource managers.

The prevalence of fruit farming in Kent and the Kent Downs AONB, along with increasingly uncertain climatic conditions creates a strong demand for irrigation; this creates an additional

significant pressure in an already stressed water environment. The creation of water storage reservoirs can be at odds to the character of the landscape of the Kent Downs AONB. Abstraction licence reforms are expected to help manage and mitigate the pressures on stressed water environments in the Kent Downs.

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 fit comfortably with the AONB management approach.

Within the Chalk and Greensand domes, percolated water forms the groundwater aquifer, which provides 75% of Kent's drinking water, there is an increasing concern about increased demand for ground-water, over-abstraction, levels of aquifer re-charge and the emergence of nitrates (applied historically) emerging in the aquifer-based water supply. Water quality and availability is one of the biggest issues facing the UK water sector with pressures on availability already evident, especially in southern and eastern England; there are particular pressures in Kent given the substantial growth trajectory and high levels of water usage.

The Kent Downs AONB partnership has led on developing new, landscape-based approaches to the management of flood and drought in a way that supports landscape character and qualities, particularly in the Darent Valley. At the same time, the PROWATER project will report during the plan period; this will provide new information covering the sustainable management of landscapes to support aquifer recharge and water quality in the AONB and elsewhere in Kent. Preliminary findings clearly show that climate changes are expected to decrease aquifer recharge in the coming years. At the same time the conservation-based landscape management highlighted in this plan (e.g. regenerative farming, creation of chalk grassland habitat, slowing overland flow, careful siting of woodland establishment sites and re-establishment of hedgerow patterns) not only increase landscape quality but can enhance aquifer recharge bringing positive co-benefits for the management of natural resources.

The Water Framework Directive and Catchment Abstraction Management Strategies

Currently the Management Plan operates within the context of the Water Framework Directive's (WFD), and it is expected that the provisions of the framework will remain in place for some time following the UK exit from the EU. The main objectives of the WFD 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. From the context of the

AONB landscape it is essential that investments in achieving the WFD and (CAMS) and their successors are taken forward in ways that supports the conservation and enhancement of the special characteristics and qualities of the AONB landscape.

The Kent Downs AONB is covered by two River Basin Management Plans (RBMPs): the Thames and the South East. The RBMPs set out how organisations, stakeholders and communities will work together to improve the water environment. RBMPs are reviewed and revised every 6 years with the next RBMPs expected in 2021.

Air

Clean air is one of the top priorities of the 25 Year Environment Plan and important to the health and well-being of us all as well as the ecosystems around us. It has become increasingly apparent that agriculture, transport and industry are important contributors to air pollution, agriculture being responsible for ammonia and nitrogen emissions as well as carbon dioxide. The Kent Downs is close geographically to several highly trafficked motorways, some pass through the AONB. The Office for National Statistics working with the Centre for Ecology and Hydrology researched the extent of removal of harmful pollutants; the findings show that the vegetation of Mid Kent is the 4th highest area in Britain in removing pollution; this particularly significant given the proximity of nearby urban (beneficiary) populations.

10.2 Geology and natural resources - special characteristics

Geology

The Kent Downs are valued as a place of spectacular views, dramatic scenery and landscape character and quality. The underlying geology is quite literally the foundation of this natural beauty; the, quality pattern and hues of the landscape. The Chalk in particular is an ever-present component of much of the Kent Downs.

The AONB contains a number of special 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.

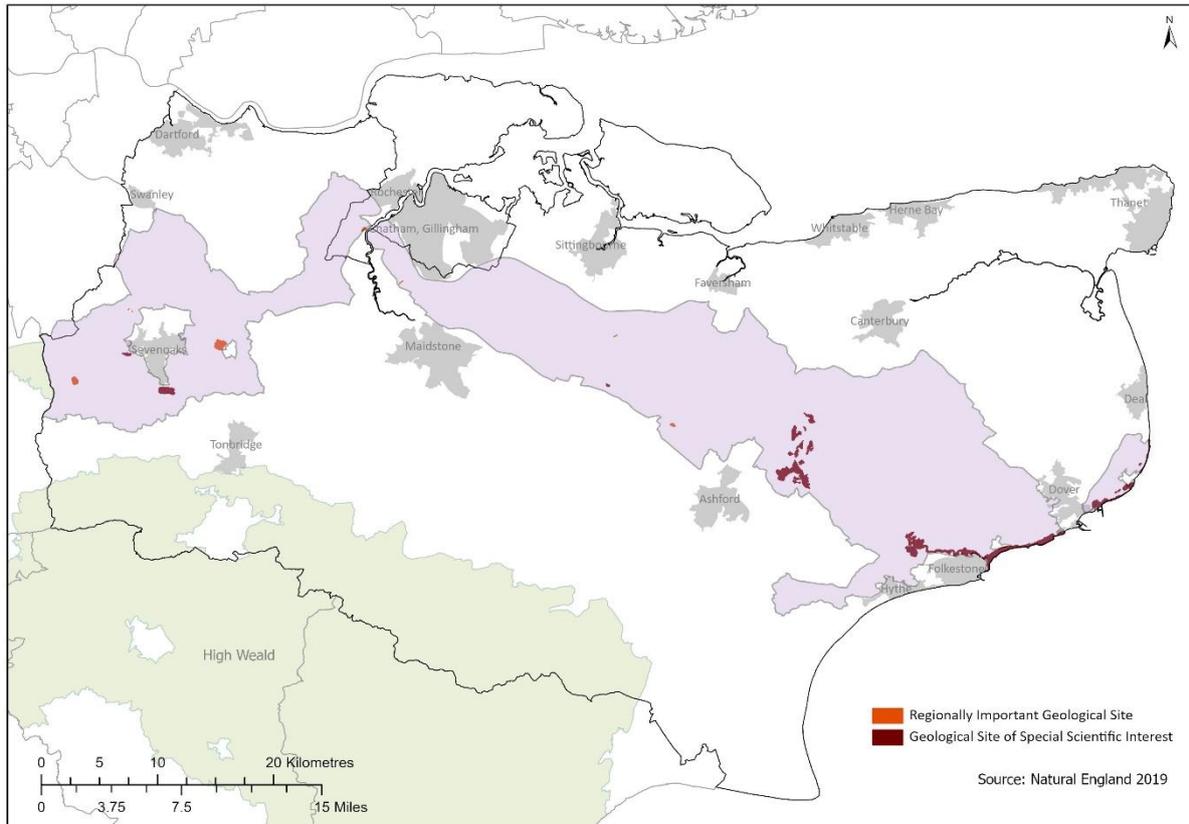


Figure 10.1 Important geological sites in the Kent Downs AONB

Soil

The irreplaceable nature of soils, their colour, scents and texture as well as their connection with the pattern of natural vegetation, settlement and land use is a fundamental determinant of the character and qualities of the AONB. An undisturbed soil structure is a vital ecosystem component in woodlands and other semi-natural habitats and soil function is crucial in the Kent Downs AONB landscape contribution to biodiversity loss climate mitigation and adaptation.

Water

Water helps define the landscape we see today, the pattern of settlement, landform, agriculture and wildlife are in part determined by the water environment. The Kent Downs AONB is a comparatively dry landscape; rainwater 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 including in the three main river valleys of the Darent, Medway and Stour. Our chalk streams and rivers are of international importance because of their nature, beauty and rarity.

Air

The Kent Downs offers the opportunity to experience the 'open air' clean, fresh air is an

important natural and perceptual quality of the Downs; it adds to the health and wellbeing that the AONB provides to residents and visitors. The landscape and vegetation pattern of the Kent Downs is particularly important in the air pollution reduction it achieves close to beneficiary populations.

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 which are expected to come under further pressure for development as less constrained sites are worked out and as a result of the UK leaving the EU. Future development will be decided within the framework of the NPPF and Kent Minerals and Waste Plan. 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 soil quality is an important priority, for instance through minimal and zero tillage and regenerative agricultural methods, cover and spring crops (with winter stubble) 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 or affecting the landscape.
- i. Predicted increase and volume of flooding and drought events. River flooding in the Kent Downs affects localised areas, there is an opportunity to adopt natural flood and drought management approaches which support landscape character and reduce risk.

- j. Need to understand the relationship between landscape management, aquifer recharge and water quality.
- 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 (or its successors) objectives – and also ensuring that AONB principles and projects support the WFD.

Air

- m. The important benefits of clean air are increasingly understood whereas the role of the Kent Downs landscape in providing these services is not well understood and at risk, for instance from tree disease.
- n. There is a need to reduce air pollution from transport and agriculture in the Kent Downs.

Ecosystems services and green infrastructure

- o. 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.
- p. The need to establish and secure the Kent Downs as a vital component of Kent's green infrastructure provision.

10.4 Geology and natural resources - aims

A landscape in which:

1. A safe, clean environment is protected, conserved and enhanced, where residents, visitors and nearby populations 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 capital resources of soil, water and air will be conserved, enhanced and managed in a way which enhances landscape character and quality as well as delivering co-benefits for carbon and nature management.
4. Local sources of pollution indigenous to the AONB are minimised, reduced or controlled.
5. The Kent Downs AONB landscape provides vital ecosystems services, functioning ecosystems and green infrastructure for Kent and the south east.

10.5 Geology and natural resources - principles

GNR1 Activities designed to protect, conserve and enhance the important geological exposures of the Kent Downs will be encouraged. To recognise the importance of the

geology of the Kent Downs the opportunity to secure Geopark status for the Kent Downs will be explored.

GNR2 Careful management and sensitive restoration of existing minerals and waste sites in or affecting the Kent Downs will be pursued.

GNR3 In the light of potential planning for future mineral supplies a careful approach will be taken to reduce the likely pressure for new minerals sites in or affecting the Kent Downs AONB including promoting re-use and recycling and ensuring the support for the further provision and safeguarding of existing mineral importation wharfs and rail depots to enable alternative sources, from less sensitive areas, to be provided to meet identified needs in Kent.

GNR4 Advice to farmers and land managers which seeks integrated environmental land and natural resource management in the Kent Downs will be encouraged.

GNR5 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, use natural solutions to mitigate flooding and secure the conservation and enhancement of the landscape.

GNR6 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 landscape will be pursued through collaboration with water companies, authorities and regulators.

GNR7 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, effort will be pursued to secure new Payments for Ecosystems Services (PES) that might benefit the conservation and enhancement of the Kent Downs AONB.

GNR 8 Ensure that projects, proposals and plans as well as future public agricultural payments recognise and seek to protect, conserve enhance the extent, quality and functions of the soil.

GNR 9 Ensure that landscape management practice, plans and policies seek to enhance the clean air benefits that the Kent Downs AONB offers recipient populations.