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## Section 1 Understanding geodiversity

### What is geodiversity?

Geodiversity may be defined as the variety of rocks, fossils, minerals, natural processes, landforms and soils that underlie and determine the character of our landscape and environment. It is fundamental to almost every aspect of life. Britain's geodiversity is the bedrock of our environment, it is the source of much of our wealth, an important factor in our cultural identity, and will play a vital role in our future development. Geological resources provide the raw materials for civilisation, be they fuels, water supply, metal ores or bulk and industrial minerals and building materials. A clear understanding of geology is vital to the design and siting of buildings, roads, railways and airports as well as to the safe disposal of waste, and the management of a wide range of natural and man-made hazards.

Geodiversity links people, landscape, biodiversity and culture, and is a vital natural resource. An appreciation of geodiversity is important to a full understanding of many aspects of biodiversity, in particular it has a profound influence on where habitats and species are found. It also has an important impact on the economic activities and history of settlement in any given place. It is fundamental to how our natural environment works and, consequently, to the way we live and work. The geodiversity of a region is as important a facet of its natural heritage as its wildlife interests and it can be one of the most significant areas of heritage interest, especially in regions in areas of high landscape value, or those previously or currently affected by significant mineral extraction. Conservation, sustainable management, educational use and interpretation of geodiversity are thus as important as those of biodiversity or archaeology, and geodiversity interests need to be integrated into the management and conservation strategies for such related or parallel interests. Geodiversity issues may contribute significantly to informing a wide range of planning and environmental policies.

English Nature (now incorporated in Natural England) has been instrumental in advancing geodiversity and in encouraging strategic initiatives such as the preparation of Local Geodiversity Action Plans (LGAPs). A variety of their publications relating to geodiversity are listed in the bibliography (p. 126). BGS has been at the forefront of geodiversity studies in northern England and this Geodiversity Audit and Action Plan builds upon and complements work carried out in County Durham and the North Pennines Area of Outstanding Natural Beauty.

A fundamental starting point in understanding an area's geodiversity is an appreciation of the most up-to-date available knowledge of its geological deposits and features, together with the processes and phenomena that have formed them and continue to influence them.

### An area's geodiversity includes

- The broad bio-geographical, geological and geomorphological character of the area
- Key natural systems and processes within the area, such as fluvial processes
- Main landscape features, including those which, due to their linear or continuous nature, are important for the migration, dispersal and genetic exchanges of plants and animals
- Sites where representative examples of the area's geological deposits and features may be seen
- Sites which are deemed worthy of some form of designation or protection for the quality of the earth science features displayed
- The whereabouts and nature of past and present working of mineral products
- Sites and features currently employed in interpreting earth science
- The influence of earth science in shaping the built and man-made environment. The inter-relationship and inter-dependence between earth science and other interests
- Materials collections and site and other records relating to the district
- Published literature and maps
- The historical legacy of research within the area

## The scope of this Geodiversity Audit and Action Plan

This Audit and Action Plan is intended for all those interested in the geodiversity of Northumberland National Park and the surrounding area (called the district for the purpose of this publication) and seeks to address geodiversity in its very broadest sense. It is a collaboration between BGS, Northumberland National Park Authority and Natural England, and forms part of the MIRO-funded project Implementing a sustainable geodiversity framework in an area of aggregate extraction – the Northumberland National Park and adjoining area, which was designed to examine the geodiversity resource and identify ways of exploiting it within the co-ordinated framework of the National Park strategy. Although dealing with a varied, and sometimes complex, range of issues relating to earth heritage, it is not targeted solely at practitioners in earth science, but is intended as a source of information and guidance for a wide range of planning, management, conservation and interpretation interests. This publication and associated GIS information will help to provide a strong environmental evidence base for adoption of good practice in the planning system. Additional details will be available as BGS internal publications complementary to this report.

It does not seek to offer a detailed geological description of the district, or provide detailed technical advice, but introduces those aspects of the geology that are essential to appreciating their importance in the district and beyond. The use of technical language has been kept to a minimum, though the use of some geological terms is unavoidable. To assist readers unfamiliar with such terms a glossary is provided.

## National Parks

Britain's National Parks contain some of the nation's finest and most dramatic landscapes. The UK's 14 National Parks are part of a global family of 6555 protected areas, covering one million square kilometres or 12% of the Earth's surface. They are linked to Europe through the EUROPARC Federation – a network of European protected areas with 360 member organisations in 37 countries. In 1949, government passed an Act of Parliament to establish National Parks to preserve and enhance their natural beauty and provide recreational opportunities for the public. Lewis Silkin, Minister for Town and Country Planning, described it as "...the most exciting Act of the post-war Parliament."

Each UK National Park is administered by its own National Park Authority. They are independent bodies funded by central government to:

- conserve and enhance the natural beauty, wildlife and cultural heritage; and
- promote opportunities for the understanding and enjoyment of the special qualities of National Parks by the public

In carrying out these aims, National Park Authorities are also required to seek to foster the economic and social well-being of local communities within the National Park.

## Northumberland National Park

Northumberland National Park stretches from the Cheviot Hills on the Scottish border, to the spectacular central part of Hadrian's Wall in the south. It is a place of wild and sweeping landscapes, whose character is profoundly influenced by the underlying rocks and landforms. These seemingly wild and natural landscapes are also a product of human activity over time.

Northumberland National Park was designated in 1956 and since then work to achieve National Park purposes has been carried out by local government, first by Northumberland County Council and, since 1997, by the free-standing Northumberland National Park Authority. The Authority works with people and communities in and around the National Park to achieve its National Park Purposes and Vision:

"...Northumberland National Park Authority will be proactive, innovative and forward-looking, working towards a National Park with thriving communities and a sustainable local economy grounded in its special qualities, including a richness of cultural heritage and biodiversity, a true sense of tranquillity and a distinct character associated with a living, working landscape, in which everyone has an opportunity to understand, enjoy and contribute to those special qualities."

Through its four Action Areas – Hadrian’s Wall, North Tyne and Redesdale, Coquetdale, and The Cheviots – the Authority works to encourage local initiatives connecting people and businesses with their environment.

The Northumberland National Park includes a wealth of biodiversity including some within protected sites. There are a number of Special Areas of Conservation (SACs), which have been given special protection under the European Union’s Habitats Directive. They provide increased protection to a variety of wild animals, plants and habitats and are a vital part of global efforts to conserve the world’s biodiversity. The National Park Biodiversity Action Plan highlights in particular the importance of Upland Heathland, Blanket Bog, Upland Hay Meadows, Semi-Natural Woodland and Rivers and Burns as well as some special species such as the black grouse and red squirrel.

Northumberland National Park has some of the finest multi-period archaeological landscapes in Europe, and they are largely unstudied and unspoiled. The World Heritage Site of Hadrian’s Wall in the south is of prime importance but there are several hundred Scheduled Ancient Monuments and Listed Buildings throughout the Park and the northern uplands can boast upstanding settlement evidence going back to the Bronze Age. The Park’s landscape is testimony to the impact of generations of settlers and farmers over several millennia.

## **The aim of this Geodiversity Audit and Action Plan**

The principal aim of this plan is to provide the framework necessary for informing the sustainable management, planning, conservation and interpretation of all aspects of the geodiversity of the Northumberland National Park and surrounding area well into the future. As the first comprehensive plan for a National Park it is intended to serve as an example of good practice for National Parks and other protected areas in Great Britain.

The Government’s Policy and Planning Statement 1: *Delivering Sustainable Communities* requires that plan policies and planning decisions should be based on up-to- date information about the environmental characteristics of an area. These characteristics include the relevant biodiversity and geological resources (geodiversity). Recommendations and action points for any aspect of geodiversity can only be meaningful and credible if they are devised in the light of a sound, modern understanding of the areas earth science. Accordingly, the key elements of the area’s geology are outlined here in sufficient detail to inform and underpin specific recommendations and action points. They also enable a user, who may not be a trained geologist, or who may be unfamiliar with the area, to appreciate the relevance and contribution each element makes to its geodiversity.

### Objectives of this Geodiversity Audit and Action Plan

- To raise awareness of the fundamental importance of geodiversity in the sustainable management of the district
- To improve knowledge and understanding of the geodiversity resources within the district
- To provide non-specialists with an easy-to-use guide to the geodiversity of the district
- To identify the main geological formations and features, and to evaluate their contribution to geodiversity within the district
- To place these geological formations and features in their regional, national and, where appropriate, international context
- To evaluate those geological sites within the district which currently enjoy statutory or non-statutory protection and to identify any elements of the district’s geodiversity not represented in these sites and to make suggestion for how this might be addressed
- To inform and contribute to the process of maintaining or bringing geological SSSIs in the district into favourable condition
- To identify links between the district’s geodiversity and its landscape character, biodiversity and economic and cultural history
- To identify threats to geological features
- To identify opportunities to enhance the value of geological features
- To recommend strategies to conserve geological features

- To identify a network of representative sites which encapsulate the essential features of the district's geology
- To identify features and topics which can contribute to sustainable 'geotourism'
- To engage industry, local communities and voluntary groups in the district's geodiversity and encourage them to become involved in understanding and celebrating geodiversity
- To 'embed' geodiversity into future planning, management and interpretation policies
- To recommend strategies for continued monitoring of the district's geodiversity
- To comment on geodiversity issues relevant to planning, development, mineral extraction and environmental monitoring and management
- To provide a sound expert basis for framing specific recommendations and action points for the district's geodiversity
- To inform elected members sitting on regional or local planning committees about ways their activities will be able to promote geodiversity and geological conservation
- To assist individuals and community groups with an interest in how consideration of geodiversity can improve their environment. The report will help guide expectations about what can be delivered in geological conservation and interpretation and how they might be involved
- To help developers and their agents address geodiversity considerations in planning applications and in the design of development

A number of different approaches have been adopted nationally to assess the contribution of geodiversity to a region. The most recent, the Geodiversity Profile, has been developed "...as an independent, standardized, quantitative procedure for describing and valuing the knowledge and contribution of geodiversity at geological sites, particularly quarries". It is important to note that in the geodiversity profile, as in this audit, it is the nature of the geodiversity at a site and its wider significance that are of prime concern, rather than any prior designation or access considerations.

## **Geodiversity and the planning system**

Although the parallel concept of biodiversity has long been established as an essential element in sustainable planning and management strategies, until relatively recently geodiversity was commonly taken for granted or ignored, despite its fundamental importance in underpinning biodiversity. However, the publication in 2005 of Planning Policy Statement (PPS) 9: *Biodiversity and Geological Conservation*, which sets out the Government's national policies on the protection of biodiversity and geological conservation, introduces the concept of geodiversity into the planning process. It is now stated clearly that both Regional Spatial Strategies and Local Development Frameworks must have regard to the national guidance on geodiversity set out in PPS9. Complementary to PPS9, *Planning for Biodiversity and Geological Conservation – A Guide to Good Practice* (2006) provides guidance, via case studies and examples, on the ways in which regional planning bodies and local planning authorities can help deliver the national policies in PPS9 and comply with legal requirements. The key principles in PPS9 require that planning policies and decisions not only avoid, mitigate or compensate for harm, but seek ways to enhance and restore biodiversity and geology. The guidance suggests ways in which these principles might be achieved. These include identifying the geodiversity value of previously developed sites and the opportunities for incorporating this in developments, as well as recognizing areas of geological value, which would benefit from enhancement and management.

Geodiversity must be considered at every stage of the planning and development process, and at all scales (local, regional and national), following clear policy guidelines on the best ways to conserve it. Perhaps the greatest threat to geodiversity is inappropriate development. New developments often destroy or conceal valuable geological exposures and disrupt the natural processes that helped form them. When any development – large or small – is proposed, planners should assess its potential impacts on geodiversity, take steps to mitigate any damage that cannot be prevented, and identify opportunities that might benefit geodiversity. For example, some developments might allow the creation of more rock exposures, or offer an opportunity to re-establish natural systems; in others, planning permission may insist on mitigation, such as future monitoring and maintenance work. Road improvement works may require the construction of new cuttings and such operations offer opportunities to reveal hitherto unexposed geological sections, either temporarily during construction, or as permanent features. Geodiversity is not and should not be regarded merely as concerned with conservation of geological sites or features. As an essential part of natural heritage it influences fields as varied as

economic development and historical and cultural heritage.

## **Protecting geodiversity**

In the past, many geologically important sites have been conserved on an individual basis, but it is now recognized that in the future it will be important to work together with others to conserve geodiversity in the wider landscape and not just as isolated pockets. Although it is not easy to develop a coherent, integrated approach to the protection of geodiversity, there are now many examples of good practice to follow, and the rewards of co-operation – arriving at better solutions for the environment while meeting social and economic objectives – are clear.

An understanding of the nature and scope of existing conservation measures is an essential basis for informing proposals and recommendations for future sustainable management, conservation and interpretation of the district's geodiversity. The Government circular: *Biodiversity and Geological Conservation – statutory obligations and their impact within the planning system* provides administrative guidance on the application of the law in England relating to planning and nature conservation.

Geological conservation has traditionally had a lower profile than wildlife conservation, but continues to grow in both profile and practical involvement of official bodies and voluntary organisations. This is due partly to an increased recognition of the importance of geology to society, science and education, and as a recreational and inspirational resource. It is also a reflection of the increasing threat of damage and destruction faced by the natural environment, including geological sites.

The varied natural, economic and cultural landscape of the district includes a wealth of earth science features and sites which not only define and contribute to its distinctive character, but which have interest and importance which extend beyond its confines. Such features may be recognised in a number of ways. They may enjoy some form of legal protection through scheduling as Sites of Special Scientific Interest (SSSIs), or through some form of non-statutory designation, for example, as Sites of Nature Conservation Importance (SNCIs) or as Regionally Important Geological or Geomorphological Sites (RIGS).

It is a common misconception that geological and landscape features, other than those already afforded some measure of protection, are sufficiently robust not to require active management or action planning. All geological features are potentially vulnerable. In addition to obvious threats posed by inappropriate site development, the encroachment of vegetation, natural weathering and general deterioration with time may threaten to damage or obliterate important geological features. This situation would not be tolerated in wildlife or archaeological sites of comparable scientific or educational value.

## **Geological conservation in England**

### **Statutory designations**

#### **Sites of Special Scientific Interest (SSSIs)**

A representative sample of the best of the Country's wildlife and geological sites enjoy legal protection through their designation as SSSIs. The designation was introduced as one of the provisions of the 1949 National Parks and Access to the Countryside Act and has been maintained through subsequent legislation. The term SSSI is used today to denote an area of land notified as being of special nature conservation interest under the Wildlife and Countryside Act 1981. The Countryside and Rights of Way (CRoW) Act 2000 greatly strengthened the legislation relating to the conservation of geology and wildlife in England and Wales by placing emphasis on management rather than just conservation of SSSIs. It requires that all public bodies should conserve and enhance SSSIs. The CRoW Act also makes it an offence for anyone to knowingly or recklessly damage an SSSI, including by irresponsible mineral or fossil collecting. The network of SSSIs in England is the responsibility of Natural England. Designation as an SSSI does not imply any right of access for third parties. Neither does it follow that the site is necessarily appropriate for public interpretation.

In 2000 the government published a series of Public Service Agreements, which included for the Department for Environment Food and Rural Affairs (Defra), an objective to enhance opportunity in rural areas, improve enjoyment of the countryside and conserve and manage wildlife resources. This included the target of bringing into favourable condition, by 2010, 95% by area of all SSSIs.

### **Geological Conservation Review (GCR) sites**

The Geological Conservation Review (GCR) was initiated by the Nature Conservancy Council in 1977 to identify, assess, document and eventually publish accounts of the most important parts of Great Britain's rich and varied geological heritage. Sites were selected in consultation with experts, including BGS geologists, in the various topics covered. Large numbers of sites were considered but, in general, only one site was selected as the best example of each aspect of geology under consideration. GCR sites were selected on the basis of their scientific value rather than their educational or historical importance. Three criteria were applied in selecting the GCR sites:

- sites of international geological importance
- sites that are scientifically important because they contain exceptional features
- sites that are nationally important because they are representative of a geological feature, event or process which is fundamental to understanding Great Britain's geological history

Once selected, a GCR site was then proposed as a potential SSSI. In England, it is only when a site is approved as an SSSI by Natural England's Council that it receives full legislative protection. Publication of descriptions of GCR sites is being undertaken by the Joint Nature Conservation Committee in a series of 45 thematic volumes due to be completed in 2007.

### **National Nature Reserves (NNRs)**

A number of the best SSSIs are declared as National Nature Reserves, many of which are important in an international context. These are managed to conserve their habitats and geology and to provide special opportunities for appreciation of nature and scientific study. Almost all NNRs have some form of access provision.

### **Heritage designations**

#### **Scheduled Ancient Monuments (SAMs)**

As well as the ancient monuments associated with historical periods of occupation, some more modern sites of former extractive industries within the district have the statutory designation of Scheduled Ancient Monument. SAM status imposes certain legal restrictions on activities which may be permitted at a site. Focussing upon archaeological considerations, the scheduling does not take into account the often intimately associated nature conservation interests, including geodiversity.

A number of SAMs encompass features of some geodiversity interest or importance.

#### **The Hadrian's Wall World Heritage Site**

Stretching from the coast of West Cumbria to the North Sea, Hadrian's Wall survives today as a ruined but authentic structure. Hadrian's Wall was inscribed as a World Heritage Site (WHS) in 1987. It met the criteria for outstanding universal value set by UNESCO's World Heritage Convention as the most complex and best preserved of the frontiers of the Roman Empire. The initial definition of the WHS included only the Scheduled Ancient Monument. The boundaries are currently under review and it is likely to be proposed that the whole area between the Wall and the Vallum should be included within the WHS. A buffer zone, known as the 'Setting', is mapped as the inner and medium visual envelope of the WHS, extending up to 6 kilometres north and south of the site. A Management Plan for the site was published in July 1996, the first to be written for any of the 24 UK World Heritage Sites. A revised plan was published in 2002. A new management plan is currently in preparation. One purpose of the Plan is to balance and accommodate the differing, and potentially conflicting, interests of those who manage and conserve the site with those who wish, or need, to use and

enjoy it. The classic, central section of the Wall is within the district under consideration and this Geodiversity Audit and Action Plan will serve to aid and complement the implementation of the Management Plan for the Hadrian's Wall WHS. The Hadrian's Wall World Heritage Site includes SSSIs designated for their geology.

## **Non-statutory designations**

### **Wildlife sites**

Local authorities for any given area may designate certain areas as being of local conservation (including geological) interest. The criteria for inclusion, and the level of protection provided, if any, may vary between areas. Most individual counties have similar schemes.

These sites, which may be given various titles such as *Listed Wildlife Sites (LWS)*, *Local Nature Conservation Sites (LNCS)*, *Sites of Importance for Nature Conservation (SINCs)*, or *Sites of Nature Conservation Importance (SNCIs)*, together with statutory designations, are defined in Local Development Frameworks under the Town and Country Planning system and are a material consideration when planning applications are being determined.

### **Regionally Important Geological and Geomorphological Sites (RIGS)**

RIGS are locally or regionally important sites, usually identified within a county or region, that are considered worthy of protection for their geological or geomorphological importance. RIGS are selected and managed by RIGS groups, sometimes called trusts. Designation of sites as RIGS is the responsibility of RIGS committees which bring together professional geologists, planners, representatives of local organisations and enthusiastic amateurs. Although RIGS have no statutory protection, the details of many RIGS have been passed to local planning authorities and these sites receive some protection through planning policies. Potential RIGS are identified using four nationally agreed criteria:

- The value of a site for educational purposes in life-long learning
- The value of a site for study both by professional and amateur earth scientists
- The historical value of a site in terms of important advances in earth science knowledge, events or human exploitation
- The aesthetic value of the site in the landscape, particularly in relation to promoting public awareness and appreciation of earth heritage

RIGS are broadly analogous to non-statutory wildlife sites and are often referred to locally by the same name. They can include important teaching sites, wildlife trust reserves, Local Nature Reserves and a wide variety of other sites. RIGS are not regarded as 'understudy' SSSIs, but as sites of regional importance in their own right.

### **Earth Science Conservation Classification**

The Earth Science Conservation Classification (ESCC) was originally devised as a conceptual classification for geological sites by the Nature Conservancy Council (NCC) in 1990. Since then, the ESCC has been used extensively by all of the UK statutory conservation agencies as a primary tool in the conservation and management of geological sites. The ESCC uses site type as the basic unit of classification. The classification allows generic threats and conservation strategies to be defined for the different site types and forms the basis for monitoring and condition reporting on geological sites, paralleling the Biodiversity Action Plan Broad Habitat Type for biological conservation. The ESCC has 16 different site types in three main categories: exposure or extensive (E), integrity (I) and finite (F). The distinctions between the three main categories are important, reflecting fundamental differences in conservation strategies.

**Exposure or extensive (E)** sites contain geological features which are relatively extensive beneath the surface. The basic principle is that removal of material does not cause depletion or damage to the resource, as new material of the same type is being exposed as material is removed. The main management aim is to achieve and maintain an acceptable level of exposure of the interesting features.

**Integrity (I)** sites are geomorphological and are characterised by the need for holistic management. Damage to one part of a site may adversely affect the site as a whole. In the case of active process sites, the fundamental principle is to

maintain the active processes by non-interference as far as possible.

**Finite (F)** sites contain geological features that are limited in extent so that removal of material may cause depletion of the resource. The features are often irreplaceable if destroyed. The basic management principle is to permit responsible scientific usage of the resource while conserving it in the long term. Hence, it is often necessary to implement controls over removal of material.

Further information, including the complete classification and criteria and methods for the monitoring of sites can be found in *Geological conservation: a guide to good practice*.

## **Geological conservation in the district**

### **Geological SSSIs**

The district includes 16 SSSIs notified primarily for their geological importance, all of which are GCR sites. In addition, many of the SSSIs notified for other reasons include features of geological significance.

### **RIGS**

There are currently no RIGS sites designated within the district. A Northumbria RIGS Group has formed recently and a number of opportunities for involvement of the group within the district have been identified in the Action Plan. Some sites identified during the audit may be candidates for RIGS.

### **Sites of Nature Conservation Importance (SNCIs)**

Within Northumberland, an SNCI is defined as a discrete area of land that is considered to be of significance for its wildlife and/or geological/geomorphological features in at least a county context. Northumberland Wildlife Trust (NWT) designates geological SNCIs primarily so that the local authorities (County and District councils) and other organisations, including landowners, may be aware of their location and of the need to consider the conservation of such sites when developments are proposed. Such sites are recorded as part of Local Development Frameworks. The management of SNCIs is not currently co-ordinated as a whole, but individual sites may be under specific management for conservation.

The geological SNCIs serve a similar function to RIGS within the planning process. However, they have been selected according to different criteria, most notably with less emphasis on access than is usual for RIGS, and generally do not benefit from the practical care that an enthusiastic RIGS group might bring.

The process of designating geological sites in Northumberland started in the early 1960s when a list of 26 quarries was proposed for submission to the County Planning Officer for inclusion in an 'interesting sites' record. In the 1970s, geological information, now held at the Hancock Museum, was gathered as part of the 'Draft National Scheme for Geological Site Documentation'. The sites so identified were accorded no protection. However, following further examination of sites by two geologists in the late 1970s, NWT had recorded over 60 geological sites throughout

Northumberland as SNCIs by 1983. Formal designation by NWT is based on confirmation by a panel of experts.

### **Do protected sites adequately represent the geodiversity of the district?**

Sites which currently afford statutory or non-statutory protection to geological features have generally been selected to reflect the regional or national importance of the features exposed. It is important to appreciate that whereas most of these sites are identified or described in the geological literature, their listing implies no rights of access. Most lie on private land and access to them is entirely at the discretion of the relevant landowner.

Apart from some of the SNCIs, sites have not in general been chosen for the purpose of representing the main elements of the district's geodiversity. One purpose of this geodiversity audit is to examine whether this representation is adequate and, if appropriate, to identify additional sites to achieve more complete and comprehensive coverage.



## **Features of earth science importance within sites currently designated for protection of their biodiversity or archaeological interest**

In addition to those designated primarily for their earth science importance, the district includes a substantial number of SSSIs, SNCIs and NWT Reserves designated primarily for their wildlife interest. Some parallel earth science interest may be identified at a number of these, for example, where distinctive plant communities are related to particular rock types. Such sites offer excellent opportunities for an integrated approach to conservation and interpretation of natural heritage. Access arrangements exist for NWT reserves, generally free to the public, although occasionally requiring a written permit to be obtained.

### **Potential conflict of interest**

Sites or features selected for any form of protection can rarely, if ever, be satisfactorily regarded as 'single interest' sites. Statutory designation of sites, as SSSIs or SAMs, offers a powerful means of protecting the most important sites and features, though even here failure to take account of other interests can lead to misunderstandings and potential conflict. In some instances scheduling without adequate multi-disciplinary consultation may result in these related interests being put at risk. Non-statutory designations, whilst offering no legal protection, may nevertheless be extremely useful in highlighting a site's importance. However, here again the 'claiming' of such a site by one interest group, without an awareness of other likely interests, may act against the best conservation interests of that site.

In some instances the legal restrictions associated with SAMs may be detrimental to the conservation and use of the site's earth science interest. For example, a mine or quarry site selected for conservation and restoration of its archaeological interest may also include extremely important geological features. Failure to take these into account may result in them being compromised or even destroyed. Similarly, an abandoned quarry which displays extremely important geological sections may also support interesting or important plant communities, may be a bat roost, or may be associated with historically interesting buildings such as limekilns. Thus, there is a need to resolve the potential for conflict of conservation interests and it is hoped that this audit will help to identify such conflicts and opportunities to combine interests.

### **Enhancement of interest**

A multi-disciplinary approach to conservation of all features is not only highly desirable, but offers enormous potential to enhance the value and interest of many individual sites. Whereas this may seem obvious, often the underlying principle seems to have been overlooked, or even ignored, in many previous conservation initiatives.

## **Figures**

(Figure 2) Yeavinger Bell hill fort built on high ground formed by rocks of the Cheviot Volcanic Formation © Graeme Peacock [www.graeme-peacock.com](http://www.graeme-peacock.com).

(Figure 3) Whittingham village with houses constructed of local sandstone, the Cheviots in the background.

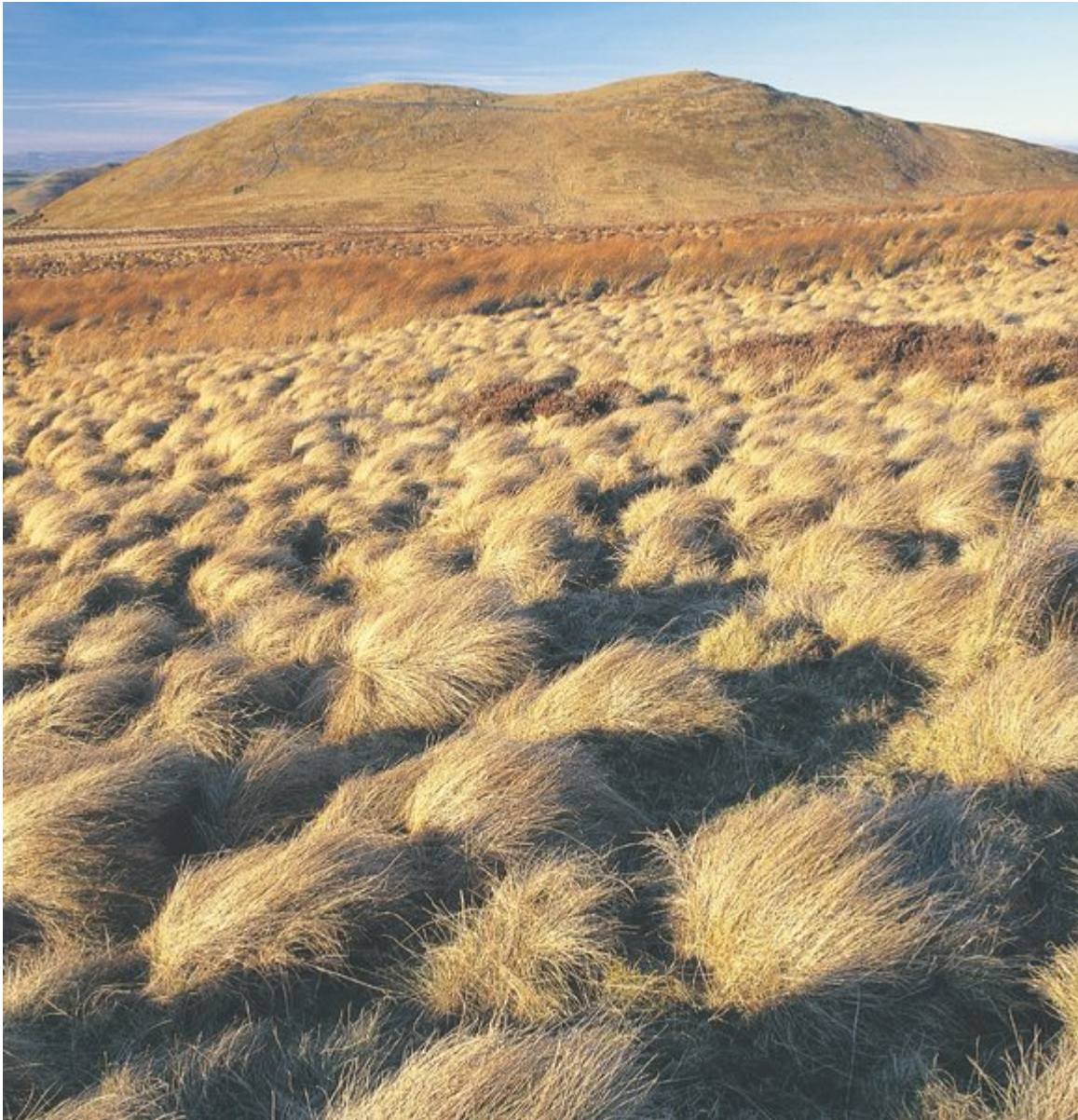
(Figure 4) A guided walk at the Drake Stone, Harbottle © Roger Coulam.

(Figure 5) View south-east to Echo Crags from Ramshope Burn.

(Figure 6) Rounded hills formed by rocks of the Cheviot Volcanic Formation in upper Coquetdale, looking north-west from Barrowburn towards Mozie Hill. © Graeme Peacock [www.graeme-peacock.com](http://www.graeme-peacock.com).

(Figure 7) Hadrian's Wall following the line of the Great Whin Sill west towards Cawfields © Graeme Peacock [www.graeme-peacock.com](http://www.graeme-peacock.com).

(Figure 8) Climbing on the Fell Sandstone at Simonside © NNPA.



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