

Biodiversity and Geodiversity: A Guide for Mineral Operators



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Introduction

This note provides a concise guide to the requirements relating to biodiversity and geodiversity in connection with the winning and working of aggregate minerals in England. The two subjects are treated in parallel because they have much in common, in terms of legislation, policy and practice. The note briefly identifies the relevant legislative requirements, strategies, national policies and published good practice guidance sources which are currently applicable to these subjects in England¹. It then summarises the key practical aspects of dealing with each subject during the pre-operational, operational and post-operational phases of mineral development.

Definitions

Biodiversity is defined in the former PPS9 as *"the variety of life in all its forms"*. A more comprehensive definition is given in the Convention on Biological Diversity: *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"* - CBD Article 2. UNEP 1992.

A widely accepted definition of **Geodiversity** is: *"the variety of geological (rocks, minerals, fossils), geomorphological (landform, processes) and soil features. It includes their assemblages, relationships, properties, interpretations and systems"*.

Information Sources

The information presented here is drawn from the following primary sources. Reference should always be made to the original sources (or to more recent equivalents where they have been superseded) for full details.

National and International Primary Legislation

Key legislation relating to the Planning System in England comprises the **Town and Country Planning Act 1990** (as amended), the **Planning and Compensation Act 1991**, the **Planning and Compulsory Purchase Act 2004** (as amended) and the **Localism Act 2011**. In addition to these principal planning Acts, the following National and European legislation is of particular relevance to the issue of biodiversity and geodiversity in connection with the winning and working of aggregate minerals in England.

- **The National Parks and Access to the Countryside Act 1949**. This made provision for National Parks, nature reserves and Sites of Special Scientific Interest (**SSSIs**). Subsequent legislation has provided additional protection for SSSIs (Section 28 of the Wildlife and Countryside Act (WCA) 1981 as amended by the Countryside and Rights of Way (CROW) Act 2000) (*see below*).
- **European Directive 79/409/EEC** on the conservation of wild birds (known as the *'Birds Directive'*). This provided for the establishment of Special Protection Areas (**SPAs**) for wild birds, mainly in estuarine and coastal areas, but which are also found (sometimes covering extensive areas) in inland areas, especially in the uplands.
- **The Wildlife and Countryside Act 1981** as amended by the CROW Act 2000 (*see below*). This provides the current basis for the notification and protection of **SSSIs**, covering geological and geomorphological features as well as animals, plants and habitats. Section 34 relates specifically to the protection of designated limestone pavements.

¹ These various requirements and expectations will inevitably change over time. This note deals only with requirements (including draft national policy) that were in place in May 2012. In detail, some of the requirements will also vary from one area to another, reflecting the detailed policies within individual Local Development Frameworks. This note deals only with national requirements and generic guidance.

- **European Directive 85/337/EEC** on the 'Assessment of the Effects of Certain Public and Private Projects on the Environment' (known as the '*Environmental Impact Assessment*' or '*EIA*' Directive). This introduced requirements for the systematic consideration of potential impacts on the environment, for certain types of development (including most quarrying proposals) and for specific mitigation measures to be identified (as necessary) prior to the determination of planning applications.
- **The Water Resources Act 1991**. This covers water resource management, licensing, pollution control, drought and flood defence. It is of relevance to biodiversity insofar as it influences both the abstraction and discharge of water within rivers and underground strata, which in turn may influence the condition of wetland ecosystems and water-dependent habitats and species.
- **European Directive 92/43/EEC**, on the conservation of natural habitats and of wild fauna and flora (known as the '*Habitats Directive*'). This initiated the setting up of Special Areas of Conservation (**SACs**). Together with the Special Protection Areas (**SPAs**) designated under the earlier Birds Directive, these make up the EU-wide '*Natura 2000*' network and are commonly referred to as 'European sites'. To prevent the deterioration of such sites an '*appropriate assessment*' is required to be carried out of any plan or project which is likely to have a significant adverse effect on the site. These requirements are transposed into UK law through the *Conservation (Natural Habitats etc.) Regulations 1994*. Internationally designated 'Ramsar' wetland sites, though not strictly covered by these Regulations, are given similar protection.
- **The Convention on Biological Diversity (CBD) 1992**. This convention, signed by 150 government leaders at the 1992 Rio Earth Summit, is dedicated to promoting sustainable development and has influenced subsequent legislation and policy. It also introduced the **Ecosystems Approach** (see below).
- **The Environment Act 1995**. This introduced requirements for the monitoring of areas with ecological value; for ensuring the maintenance and restoration of essential ecological processes; and for preserving and preventing any loss of biological diversity. Of particular importance to quarrying activity, it also introduced requirements for the Review of Old Mineral Permissions (ROMPs), requiring these to be brought up to date with modern planning conditions, and for subsequent periodic reviews of all mineral permissions at intervals of 15 years.
- **The Countryside and Rights of Way Act 2000** (known as the '*CRoW*' Act). This amended the Wildlife and Countryside Act 1981 to give improved control over potentially damaging operations and to secure the proper management of protected sites. Among other things, this encouraged mineral operators to identify and make best use of opportunities to improve the condition of existing SSSIs located within their operational and restoration areas. The CRoW Act also placed a new statutory duty on all public bodies and statutory undertakers to take reasonable steps to further the conservation and enhancement of SSSIs consistent within the proper exercise of their functions; and required public bodies to notify the appropriate statutory nature conservation agency if they propose to carry out (or consent to the carrying out of) operations likely to damage the interests of a SSSI. Section 74 of the Act contained lists of habitats and species for which conservation measures should be promoted in accordance with the Convention on Biological Diversity 1992 (see above). However, Section 74 has since been superseded by the Section 41 list in the NERC Act 2006 (see below).
- **European Directive 2000/60/EC** on establishing a framework for Community action in the field of water policy (known as the '*Water Framework Directive*'). This introduced a requirement for characterising and monitoring changes within 'river basin districts', in the interests of protecting and improving water quality, with the aim of ensuring that all aquatic ecosystems achieve a 'good' ecological status by 2015. Specific aims of relevance to nature conservation include: the promotion of sustainable water use based on a long-term protection of available water resources; enhanced protection and improvement of the aquatic environment; reduction of pollution of groundwater; protecting, enhancing and preventing any deterioration of the ecological status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly dependent on the aquatic ecosystems. The Directive is implemented through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003
- **European Directive 2001/42/EC** on the 'Assessment of the Effects of Certain Plans and Programmes on the Environment' (known as the '*SEA Directive*'). This defines the requirements for Strategic Environmental Assessment (SEA) and reinforces the need to consider '*the ecological dimensions of policy at the same time as economic and other dimensions*' (Brundtland Commission, 1987).
- **The Water Act 2003**. This amends the Water Resources Act 1991 and, among other things, removes the exemptions from abstraction licensing that have hitherto applied to quarry dewatering (subject to the eventual publication of transitional regulations to bring the dewatering operations at existing quarries into the new licensing regime).
- **The Environmental Liability Directive (2004/35/EC)**. This is based on the "Polluter Pays" principle and has two distinct but complementary liability regimes. The first is that operators that conduct risky activities will be liable for damage to the environment, encompassing water, land and air pollution. The second applies to operators who cause damage to species and natural habitats that are protected at EU level under the 1992 Habitat and 1979 Birds Directives.
- **The Natural Environment and Rural Communities Act 2006** (known as the '*NERC*' Act). Section 40 of the Act places a duty upon all local authorities in England to promote and enhance biodiversity in

all of their functions. A key purpose of this duty is to embed consideration of biodiversity as an integral part of policy and decision making throughout the public sector. Section 41 lists habitats and species of principal importance to the conservation of biodiversity in England.

Secondary Legislation

The primary legislation outlined above is implemented in England through a much longer list of secondary legislation, mostly comprising Regulations, commencement orders etc. Details of these can be found on relevant Government Websites.

National Strategies

In England, legislation is supported by national planning policy and practice guidance on individual topics, as outlined in the following section. In some cases the policies themselves are guided by over-arching national strategies which extend beyond the planning system. Particular examples of relevance to this topic include:

- *Working with the Grain of Nature: A Biodiversity Strategy for England*² (2002);
- *The UK Biodiversity Action Plan (UK BAP)*³ (2004);
- *Natural Foundations: geodiversity for people, places and nature*⁴ (2006);
- *Securing a Healthy Natural Environment: An Action Plan for Embedding an Ecosystems Approach*⁵ (2007);
- *England Biodiversity Strategy: Climate Change Adaptation Principles: Conserving biodiversity in a changing climate*⁶ (2008);
- *Delivering a Healthy Natural Environment: An Update to "Securing A Healthy Natural Environment: An Action Plan For Embedding An Ecosystems Approach"*⁷ (2010); and
- *The UK Geodiversity Action Plan (UK GAP): A Framework for Action*⁸ (2011).

The UK BAP was established as a requirement of the international **Convention on Biological Diversity (CBD)**⁹ (1992). It forms a national strategy for the conservation and enhancement of biological diversity and the sustainable use of biological resources. It contains a list of priority species and habitats where attention is required to be focused, and which is periodically updated to reflect the findings of new surveys (most recently in 2007). Action plans for the most threatened species and habitats have been set out to aid recovery, and reporting rounds show how the UK BAP has contributed towards a significant reduction of biodiversity loss, as called for by the CBD. The shared vision for UK Biodiversity conservation adopted by both the devolved administrations and the UK Government is set out in the framework: *Conserving Biodiversity – the UK Approach*¹⁰. This sets out the future priorities for UK conservation, including a more holistic view of ecosystem conservation, protection, and sustainable use of the UK's biological resources.

The UK GAP provides a framework for planning and recording the delivery of geoconservation across the UK. In contrast to the UK BAP, it has developed from an initial impetus provided by Local Geodiversity Action Plans (LGAPs – see below), rather than in response to a 'top-down' European requirement. Nevertheless, the increasingly accepted notion that geodiversity is not just about designated sites but includes the wider landscape as well as individual rock outcrops, landforms and geomorphological processes within it, now finds resonance with the Council of Europe's **European Landscape Convention**¹¹ (ELC). This requires all types of landscape,

² www.defra.gov.uk/environment/biodiversity/documents/biostrategy.pdf

³ www.ukbap.org.uk/

⁴ <http://naturalengland.etraderstores.com/naturalenglandshop/product.aspx?ProductID=1c1c69d4-0c37-445f-ad89-8855f87680aa>

⁵ www.defra.gov.uk/environment/policy/natural-environ/documents/eco-actionplan.pdf

⁶ www.defra.gov.uk/wildlife-countryside/biodiversity/biostrat/index.htm

⁷ www.defra.gov.uk/environment/policy/natural-environ/documents/healthy-nat-environ.PDF

⁸ www.geoconservation.com/GCCdocs/UKGAP/UKGAP1Oct08.doc

⁹ www.cbd.int/convention/

¹⁰ www.ukbap.org.uk/library/UKSC/DEF-PB12772-ConBio-UK.pdf

¹¹ www.coe.int/t/dg4/cultureheritage/heritage/Landscape/default_en.asp

whether they are outstanding, ordinary or degraded to be valued, and advises that the characteristics of different areas be identified and assessed and landscape quality objectives identified for them. Ideally, the landscape objectives for a particular area need to recognise the contributing importance and requirements of geodiversity and also their potential links with biodiversity, especially in terms of maintaining or restoring the connectivity of habitats (*'landscape features which are of major importance for wild flora and fauna'*, as referred to in Article 10 of the Habitats Directive¹²).

The **Ecosystems Approach** is a concept for promoting and delivering sustainable development and originated following the 1992 Earth Summit in Rio de Janeiro. It is defined, under the **CBD**, as: *"a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way."* Its implementation in England is being led by Defra. **'Ecosystem Services'** are an essential aspect of the Ecosystems Approach. These are the various aspects of an ecosystem which have value to people. They are typically grouped into four main categories:

- **Supporting services:** those which are necessary for the functioning of all other ecosystem services e.g. nutrient cycling, soil formation and primary production;
- **Provisioning services:** products that can be obtained from ecosystems e.g. food, fresh water, wood and fibre, fuel and minerals (including aggregates);
- **Regulating services:** benefits obtained from the regulation of natural processes e.g. climate regulation, flood regulation and water purification; and
- **Cultural services:** including the availability of land suitable for development but also non-material or intrinsic benefits e.g. educational and recreational opportunities, aesthetic and spiritual values.

A case study example of how the balanced consideration of Ecosystem Services can contribute to long term minerals planning is given in the research report for MIRO and Defra by Thompson *et al*, (2010)¹³.

National Policy

National planning policy has traditionally dealt with individual planning topics, including biodiversity, geodiversity and a range of minerals planning issues, as well as the rules which govern the operation of the planning system itself. Following the Kate Barker Review (2006) and the Killian Pretty Review (2008) the Government has progressively streamlined National Policy, reducing this to more concise, overarching requirements, as currently set out within the **National Planning Policy Framework (NPPF)**, published in March 2012.

The NPPF emphasises, in paragraph 6, that the purpose of the planning system is to contribute to the achievement of sustainable development. It quotes Resolution 24/187 of the United Nations General Assembly which defined sustainable development as *'meeting the needs of the present without compromising the ability of future generations to meet their own needs'*. It is made clear (in para.7) that sustainable development incorporates protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity and to use natural resources prudently.

Paragraph 109 notes that, with respect to the natural environment, the planning system should (*inter alia*) help to: protect and enhance valued landscapes, geological conservation interests and soils; to recognise the wider benefits of ecosystem services; minimise impacts on biodiversity; provide net gains in biodiversity (e.g. by establishing coherent and resilient ecological networks); and address issues relating to land instability. Whilst biodiversity is specifically mentioned here, geodiversity is also directly relevant, in terms of landscape, geological conservation, soils, ecosystem services and those natural processes which may be associated with land instability.

Paragraph 113 notes that *'Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites.'*

¹² http://ec.europa.eu/environment/nature/ecosystems/docs/adaptation_fragmentation_guidelines.pdf

¹³ www.sustainableaggregates.com/strategic_research/sr_keyarea3.htm

NPPF policy on landscape, as detailed within paragraphs 114 to 116 places particular emphasis on national designations and the undeveloped coast, but the above requirement for criteria-based policies allows for the commensurate protection of wider landscapes - for example based on landscape character assessments.

The policies on biodiversity and geodiversity, as detailed within paragraphs 114 and 117 to 119, emphasise local ecological networks and areas identified by local partnerships for habitat restoration or creation, as well as designated sites. They require local authorities to adopt a strategic approach, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure. They also highlight the need to plan for biodiversity at a landscape-scale across local authority boundaries and to prevent harm to geological conservation interests.

Paragraphs 165 to 168 of the NPPF require that planning policies and decisions should be based on up-to-date information about the natural environment and other characteristics of the area, drawing on evidence contained in documents such as River Basin Management Plans, Flood Risk Assessments, assessments of physical constraints on land use and Shoreline Management Plans.

Good Practice Guidance

Although the NPPF has replaced all pre-existing National policy on biodiversity and geodiversity, the Practice Guides which supported former Planning Policy Statements (PPS) and Minerals Planning Statements (MPS) still provide useful information and guidance.

*Planning for Biodiversity and Geological Conservation: A Guide to Good Practice*¹⁴, was published in March 2006 to accompany PPS9. Chapter 5 of this document relates to development control and thus has the most direct relevance for mineral operators in preparing planning applications for new quarrying proposals. It points out that some of the core principles embodied within PPS9, including the five point approach to decision-making (information, avoidance, mitigation, compensation and new benefits) derive from the earlier (1999) RTPI publication: *Good Practice Guide: Planning for Biodiversity*¹⁵.

Guidance to local authorities on their statutory obligations relating to biodiversity and geodiversity (including, but not limited to features within designated sites) is contained within the Government Circular 06/2005: *Biodiversity and geological conservation – statutory obligations and their impact within the planning system*¹⁶. This provides guidance on the application of the law relating to planning and nature conservation as it applies in England, and was issued to accompany PPS9. Although aimed at Local Planning Authorities, once again the obligations involved have clear implications for decision-making with respect to development proposals, and therefore need to be understood by developers and reflected in their planning applications.

More general advice, not limited to statutory obligations, is contained within two earlier Defra publications: *Guidance for Local Authorities on Implementing the Biodiversity Duty*¹⁷ (2007), and *Local Sites. Guidance on their Identification, Selection and Management*¹⁸ (2006). The latter provides specific information on the conservation of both biodiversity and geodiversity through non-statutory designated sites, including Local Nature Reserves, Local Geological Sites (including Regionally Important Geological and geomorphological Sites (RIGS)) and other Sites of Importance for Nature Conservation. Further general guidance on geodiversity is provided within the former English Nature's 2006 publication: *Geological conservation: a Guide to Good Practice*¹⁹.

A further source of practical guidance can be found in a wide range of research reports commissioned either directly by central Government in support of policy development or (more commonly in recent years), through the Aggregates Levy Sustainability Fund (ALSF). Of particular relevance here are the ALSF 'benchmark' reviews carried out in 2008 on various topics including:

¹⁴ www.communities.gov.uk/documents/planningandbuilding/pdf/143792.pdf

¹⁵ www.rtpi.org.uk/download/777/Planning-for-Biodiversity.pdf

¹⁶ <http://www.communities.gov.uk/documents/planningandbuilding/pdf/147570.pdf>

¹⁷ www.defra.gov.uk/environment/biodiversity/documents/la-guid-english.pdf

¹⁸ www.defra.gov.uk/rural/documents/protected/localsites.pdf

¹⁹ <http://naturalengland.etraderstores.com/NaturalEnglandShop/product.aspx?ProductID=712db525-75de-4079-862e-5b654546ea56/>

- *Creating Environmental Improvements through Biodiversity*²⁰
- *Creating Environmental Improvements through Geodiversity*²¹
- *Creating Environmental Improvements through Restoration*²² and
- *Reducing the Environmental Effect of Aggregate Quarrying on the Water Environment*²³

Each of these reviews highlights important aspects of good practice and provides cross references to a much larger range of relevant research publications on the topic concerned.

Local and Company-wide Biodiversity and Geodiversity Action Plans

In addition to the national (UK-wide) action plans referred to above, local and company-wide biodiversity and geodiversity action plans are also being developed in many areas. In all cases, the 'Action Plan' process defines both long-term objectives and short-term targets and seeks to identify the human and financial resources necessary to achieve these. For both biodiversity and geodiversity, these plans provide a basis for developing and implementing actions which encourage interest and involvement by local people in the natural environment resources within their local area.

Local Biodiversity Action Plans²⁴ (LBAPs) in England work on the basis of partnership to identify local priorities for biodiversity conservation, and seek to deliver agreed programmes for continuing action which contribute to the delivery of the national Species and Habitat Action Plan targets set out in the UK BAP. They provide a focus for local initiatives and are important elements of the Community Strategies prepared by Local Strategic Partnerships to further the wellbeing of their local areas. LBAPs are delivered through wide local partnerships that involve wildlife organisations, local authorities, businesses and other interested parties. Often, but not always, LBAPs conform to county boundaries.

Local Geodiversity Action Plans²⁵ (LGAPs) in England have been developed as a geological equivalent of LBAPs and, in part, are based on a similar model. The main difference is that, in most cases, they have preceded the development of a national strategy or action plan, and are therefore largely based on local geodiversity 'audits' (assessments of locally available and accessible geodiversity resources). LGAPs set out actions to conserve and enhance the geodiversity of a particular area. They set out clear aims and objectives with measurable targets for local conservation. Currently there are more than 40 LGAPs in progress, focusing on county or other administrative areas. Further information can be found in *Local Geodiversity Action Plans – Setting the context for geological conservation*²⁶ (English Nature, 2006).

Company Biodiversity Action Plans (cBAPs) and **company Geodiversity Action Plans** (cGAPs) have begun to emerge in recent years, demonstrating corporate commitment to the protection, enhancement and beneficial use of biodiversity and geodiversity resources. Quarry operators have been closely involved with these developments, highlighting the important contributions that quarrying can make in creating new (or replacement) habitats and landforms, and in providing access to geological exposures and discoveries for the purposes of amenity, education and research. Detailed guidance for aggregate companies (equally applicable to other mineral operators) on the preparation of cGAPs is provided in *Geodiversity Action Plans for Aggregates Companies: A Guide to Good Practice*²⁷ (Thompson *et al*, 2006), whilst further information on cBAPs can be found at the Business and Biodiversity Research Centre²⁸. The latter is not specific to the minerals sector, but a useful overview of the UK mineral industry's achievements and opportunities with respect to biodiversity is provided in the Mineral Product

²⁰ http://www.sustainableaggregates.com/library/docs/mist/10093_t3a_biodiversity.pdf

²¹ http://www.sustainableaggregates.com/library/docs/mist/10099_t3b_geodiversity.pdf

²² http://www.sustainableaggregates.com/library/docs/mist/10115_t3c_restoration.pdf

²³ http://www.sustainableaggregates.com/library/docs/mist/10084_t1b_water.pdf

²⁴ www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/localbiodiversity.aspx

²⁵ www.naturalengland.org.uk/ourwork/conservation/geodiversity/protectandmanage/lgaps.aspx

²⁶ www.mineralsandnature.org.uk/downloads/localgeodiversity.pdf

²⁷ www.cgaps.org.uk/docs/cGAPs%20GGP_Capita%20Symonds_2006.pdf

²⁸ www.businessandbiodiversity.org/action_company_bap.html

Association's publication: *Building on our legacy ... realising our potential: the MPA Biodiversity Strategy*²⁹, launched in January 2011.

Pre-Operational Requirements

The following text provides a brief summary of the key requirements relating to biodiversity and geodiversity which need to be taken into account by mineral operators at the pre-operational stage (that is, prior to submitting applications for planning permission or other development consents for a new quarry or an extension to an existing site).

In detail, the requirements relating to a particular site will be dictated (either directly or by implication) by individual policies within Development Plan Documents (DPDs) in Local Development Frameworks, including Minerals and Waste Development Frameworks. Existing DPDs have been prepared (to various stages in different local authority areas), in line with national policies which have since been superseded by the NPPF, and in general conformity with Regional Strategies, which have since been abolished. It is therefore both difficult and inappropriate to summarise these detailed requirements here.

Instead, the following more generic (and thus more widely applicable) observations on current and future requirements have been gleaned from existing legislation, current national policy, and available good practice guidance, as outlined in the preceding sections. The observations are divided into general requirements and those relating specifically to statutory obligations.

General Requirements

As an ongoing background activity – not a formal requirement and not necessarily linked to individual applications, but often of considerable benefit to them – mineral operators may find it useful to consider developing, or progressing further with, company Biodiversity Action Plans (cBAPs) and/or company Geodiversity Action Plans (cGAPs), in line with the guidance referred to above. These may (but need not) include site-specific action plans for the location of intended future applications, though such plans will generally be easier to produce for existing sites that are being extended or deepened, than for new greenfield applications. cBAPs can usefully include links with the relevant Local and National Biodiversity Action Plans and can give detailed advice to site personnel on managing species that are using active parts of the site, as well as those in adjoining areas and on restored land.

At the outset of the application process, operators should carry out a thorough review of the legislation, policies and guidance which are applicable to the site in question, ranging from those in the Local Development Framework (or Minerals and Waste Development Framework) to higher level, national requirements. This will allow detail to be added to the information presented earlier in this review and to the outline requirements set out below.

Operators will almost always find it useful to hold pre-application discussions with the local Mineral Planning Authority (MPA) and with other relevant regulators – e.g. Natural England, English Heritage and the Environment Agency, as far in advance of the application as possible. This will help to ensure that they understand all of the relevant regulatory requirements. As well as discussing the normal sequence of procedures involved in the preparation of a planning application (such as EIA screening, scoping and submission), pre-application discussions enable the operator and regulators to discuss the options available for such things as:

- location,
- baseline surveys and monitoring,
- information requirements,
- excavation design,
- impact mitigation,
- compensation,
- operational monitoring,
- restoration design and

²⁹ www.mineralproducts.org/sustainability/pdfs/MPA_Biodiversity_Strategy.pdf

- post-closure monitoring.

All of these may have a bearing on the scale and detailed design of the proposal and may also affect the economic viability of the project. In some cases, early consultation and reference to relevant background material may influence the precise location of the proposed excavation, depending on the extent of available resources and the operator's access to them. Ideally this should form part of the Site Allocations process when the Minerals Development Framework is being prepared or revised, but fine tuning of locational details may still be required as an individual application begins to emerge. From a biodiversity and geodiversity perspective this may be to ensure that the scheme avoids certain impacts (such as the destruction of important landforms or habitats) and/or that it is better able to contribute to the creation of wildlife corridors by linking new and existing habitats together.

Baseline surveys and consultation, to understand the existing biodiversity and geodiversity within the area likely to be affected by the proposal, are fundamental requirements, and will help to inform both the need for avoidance, mitigation or compensation of potential impacts and also the scope for the optimal creation of new benefits. In the case of ecology, the baseline surveys will often be time-dependent, with different seasons being appropriate for different species. In the case of the water environment, baseline monitoring will often be needed over a prolonged period of time (typically at least 1 year) in order to gain a good understanding of the processes involved, including the interactions between groundwater, surface water and dependent ecosystems and seasonal variations. This is a vital pre-requisite to the assessment of potential effects. Moreover, there will often be a need to integrate the water environment monitoring requirements for biodiversity, archaeology and water resource purposes. There will often be benefits to be gained from investigating existing sources of monitoring data and linking the new monitoring schemes into a wider network. This not only contributes to wider knowledge but it can help to differentiate the subsequent effects of quarrying from the general background trends associated with climatic and environmental change. This concept of 'dynamic baseline monitoring' was introduced in the policy recommendations for the 'water' annex³⁰ to MPS2, but is equally applicable to biodiversity in general.

Though not yet a mandatory requirement, there are advantages to be gained (in terms of both impact reduction and optimising potential benefits) by adopting an holistic 'Ecosystems Approach' to quarry and restoration design, and by ensuring that this considers the full 'lifetime' of the development from initial planning and excavation to final restoration, aftercare and proposed after-use. The Ecosystems Approach allows biodiversity and geodiversity issues to be considered in parallel with all other ecosystem services (including mineral extraction), so that an acceptable overall balance is achieved, by comparison with alternatives that may be included in the analysis (see Thompson *et al*, 2010³¹ for a detailed methodology for comparative analysis and hypothetical worked examples for major hard rock quarries in the Mendips). The process can also be integrated with the MPA's requirements for consultation with both local communities and other stakeholders, so that the final proposal is likely to have a much greater chance of being approved.

Whether or not an ecosystems approach is used, the avoidance of impacts, the need for mitigation and/or compensation, and the opportunities for creating environmental benefits should be fully integrated into the design concepts for both the excavation itself and for its restoration and after-use. An important aspect of this will be to link biodiversity aspects in with company, local and/or national Biodiversity Action Plans, so that optimal benefits can be achieved in terms of creating the most appropriate, and most sustainable, priority habitats for the site in question. Cripps *et al*, 2004³² have noted that natural recolonisation of abandoned quarries often results in some of the best local biodiversity, though this may not necessarily be the best contribution to BAP priority targets. The benchmark review on biodiversity and minerals³³ advocates that, where habitat creation is the main focus of mineral reclamation schemes, the creation of large areas of the most suitable habitat is generally preferable to creating an intricate mosaic of different ones designed by

³⁰ Thompson, A., Howarth, C.L., Goodwin, A., Buckley, C., and Harris, K. (2007): **Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England. Recommendations for Draft Policy for Annex 3: The Water Environment.** Research report to the Department of Communities and Local Government. Capita Symonds Limited, East Grinstead.

³¹ www.sustainableaggregates.com/strategic_research/sr_keyarea3.htm

³² Cripps, J. C., Roubos, V., Hughes, D., Burton, M., Crowther, H., Nolan, A., Travis, C., Nettleton, I. M., Czerewko, M. A. and Tonks, D. (2004): **Reclamation Planning in Hard Rock Quarries: A Guide to Good Practice.** Sustainable Land-Won and Marine Dredged Aggregate Minerals Programme.

³³ www.sustainableaggregates.com/library/docs/mist/t3a_biodiversity.pdf

landscape architects. It also advises that specific consideration should be given to the less obvious species, particularly invertebrates. Even where habitat creation is not the principal goal of a reclamation scheme, there will usually be scope for enhancing biodiversity on a smaller scale within other types of after-use, including agriculture, forestry and commercial or residential development. Reference, in all cases, should be made to the detailed information and guidance available in publications such as the RSPB good practice guide on habitat creation³⁴, the Nature after Minerals Website³⁵ created by RSPB and Natural England, including the publication on how mineral site restoration can benefit people and wildlife³⁶, and to the advice available from organisations such as Buglife – for example its online information on managing priority habitats³⁷.

In developing the proposals, consideration should also be given to the design of effective operational monitoring schemes. In the case of biodiversity and the water environment (in particular), these should preferably be linked to trigger levels or values and to the implementation of appropriate mitigation measures which help to achieve the performance requirements likely to be stipulated in planning conditions.

As explained earlier, Environmental Impact Assessment will almost always be required for mineral extraction proposals. This may apply not only to planning applications but also to other forms of development consent, such as environmental permits and water abstraction licences. Here again there may be scope for incorporating the Ecosystems Approach – particularly in the consideration of alternatives. More generally, the EIA will need to rely on the prediction of potential adverse effects and on demonstrating the likely efficacy of proposed mitigation and/or compensatory measures. Both of these rely fundamentally on a sound understanding of the environment within the area affected, emphasising the importance of collecting adequate baseline information at the outset. Assessments which rely on inadequate data or unconvincing predictions are likely to give rise to requests for additional information before an application can be determined. Further information on statutory EIA requirements is given within the following section.

The various sources of Good Practice Guidance referred to earlier contain detailed advice on all of the issues outlined above and should be consulted for further information.

Statutory Requirements

Statutory requirements relating to biodiversity and geodiversity are those which relate to the statutory obligations on local authorities in respect of:

- Internationally Designated Sites;
- Nationally Designated Sites;
- Habitats and Species outside Designated Sites;
- Conservation of Species Protected by Law;
- Statutory Powers relating to Environmental Impact Assessment, Strategic Environmental Assessment and the Water Framework Directive

Details of these five sets of obligations are set out in parts I to V, respectively, of the Government Circular: *Biodiversity and geological conservation – statutory obligations and their impact within the planning system*³⁸. Some of the key implications for mineral developers are outlined below, but reference should in all cases be made to the Circular for full details.

Internationally Designated Sites

The provisions of the Habitats Directive, together with those of the earlier Birds Directive, place major constraints on any form of ongoing or proposed development which is likely to have a significant effect on the integrity of a designated European Site. Before a planning authority can decide whether to grant permission for a project which may be likely to have such an effect, it must ensure that an ‘*appropriate assessment*’ is carried out of the implications for the site, taking account of the site’s conservation objectives. The planning authority can then only grant permission if it is satisfied that the integrity of the site will not be adversely affected by the

³⁴ White & Gilbert, 2003: Habitat creation handbook for the minerals industry.

³⁵ www.afterminerals.com/

³⁶ www.afterminerals.com/docs/operators/Nature%20After%20Minerals%20report.pdf

³⁷ www.buglife.org.uk/conservation/adviceonmanagingbaphabitats

³⁸ <http://www.communities.gov.uk/documents/planningandbuilding/pdf/147570.pdf>

proposed development. If that cannot be demonstrated, a project may *only* be permitted if there are no other alternatives *and* if there are 'imperative reasons of overriding public interest' why the proposed (or ongoing) development should go ahead (or continue). In such circumstances, Article 6 also states that "*the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected*". In practice, this means that, where these conditions are satisfied, a new area of habitat, comparable to the one which would be affected, needs to be created elsewhere to prevent any net loss of that habitat within the Natura 2000 network. A step-by-step guide to these requirements is given in the draft statutory obligations document referred to above.

All of these requirements need to be understood by the developer before submitting any application that might adversely affect an internationally designated site, preferably through discussions with the local authority's ecologists. The onus in all cases is on the developer to demonstrate (by supplying the detailed information needed by the local authority for the appropriate assessment) *either* that there will not be any adverse effect *or* (where the developer can demonstrate an overriding public interest and no alternatives) that acceptable compensatory arrangements can be put in place.

In many cases, there will also be a need to consider areas beyond the designation boundaries if these are important for the welfare of particular protected species within the designation. In Somerset, for example, the County Ecologist has identified 'Ecological Zones of Influence' (EZIs) surrounding SACs which relate to foraging areas for protected bat species. Any disturbance of a EZI which would adversely affect the protected species associated with a particular designation would be regarded as an infringement of the Habitats Directive.

Nationally Designated Sites

The Wildlife and Countryside Act 1981 imposes an important general duty on local authorities when exercising functions which are likely to affect Sites of Special Scientific Interest (SSSIs). This general and overarching duty requires an authority to take reasonable steps, consistent with the proper exercise of its functions, to further the conservation and enhancement of the features for which sites are designated. It applies at every stage from the formulation of plans, to the making of decisions. As well as this general duty, additional provisions of the Act ensure that Natural England is able to provide full advice and information about the likely effects on a particular SSSI and any steps that might be required to mitigate them. They also ensure that, where Natural England's advice is not complied with, the decision taker must inform Natural England so that it has sufficient time to consider any further steps it may wish to take.

All of this supports the policy within the NPPF that MPAs should not normally grant planning permission for a proposed mineral development on land within or outside a *Site of Special Scientific Interest* (SSSI), if it is likely to have an adverse effect on a SSSI (either individually or in combination with other developments).

In preparing their development proposals, and in preparing associated Environmental Statements, mineral operators need to take account of this policy and of the level of scrutiny that will be imposed in accordance with the Wildlife and Countryside Act.

Habitats and Species outside Designated Sites

To comply with the requirements of section 41 of the NERC Act 2006, the Secretary of State has published a list (which is periodically updated) of the habitat types and species in England which are of principal importance for biodiversity conservation. Local authorities are required to take steps to further the conservation of the species and habitats found on the list, and this requirement will need to be anticipated by developers in preparing and assessing their proposals for mineral extraction.

Similar requirements apply in respect of 'features of the landscape that are of major importance for wild flora and fauna', as referred to in Article 10 of the Habitats Directive. These features are those that, because of their linear and continuous structure or their function as stepping-stones, are essential for the migration, dispersal and genetic exchange of wild species. Local authorities are required to encourage the management of such features with a view to improving the ecological coherence of the Natura 2000 network.

Special requirements also apply to Limestone Pavement Orders, Tree Preservation Orders, Hedgerows and Local Wildlife and Geological Sites (for which separate guidance has been issued by Defra³⁹).

Conservation of Species Protected by Law

Particular species of flora and fauna within England are subject to special protection, normally because they are endangered or suffering a decline in numbers or range, either within the UK or elsewhere within the European Union. The species concerned are generally protected under the Wildlife and Countryside Act 1981, or the Habitats Directive, although some are also protected under more specific legislation, for example the Protection of Badgers Act 1992. The presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. In such circumstances, planning authorities are required to consult Natural England before granting planning permission. Where there is a reasonable likelihood of a protected species being present and affected by the proposed development, these details need to be properly investigated before an application can be determined. This places an obligation on developers, under those circumstances, to carry out appropriate ecological surveys. Such surveys are normally required to be completed and any necessary measures to protect the species put in place, through conditions and/or planning obligations, before the permission is granted.

In the case of species that are protected under the Habitats Regulations, much stricter controls apply, including licensing under Regulation 44 of the Habitats Regulations.

Environmental Impact Assessment

Environmental impact assessment (EIA) under EC Directive 85/337/EEC is mandatory for projects that are 'EIA development' within the meaning of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, as amended (the EIA Regulations). The amending Directive (97/11/EC) made the EIA process mandatory for all quarrying operations exceeding 25ha. Smaller quarries may also be subject to EIA requirements if they are thought likely to have significant environmental effects.

The EIA Directive (as amended) requires that, where a project is considered likely to have significant effects on the environment:

- an Environmental Statement (ES) must be prepared, describing the likely effects of the development on the environment and (where relevant) any proposed mitigation measures. The statement must be publicised and consulted upon;
- the ES (and any other environmental information obtained as a result of consultation) must be taken into account before development consent is granted; and
- where development consent is granted, the decision-maker must publish their decision and the reasons on which it is based.

The ES should include all the information set out in Part II of Schedule 4 of the EIA Regulations, and such of the information in Part I as is reasonably required to assess the environmental effects of the development.

Strategic Environmental Assessment

The SEA Directive relates to the preparation of Plans and Strategies, rather than to individual development proposals. Mineral operators will frequently wish to get involved with Plan preparation, since this may influence their future prospects (e.g. by identifying mineral safeguarding areas, preferred areas for future working and specific site allocations; and by setting out development control policies). To this extent, operators will need to engage in statutory consultation processes relating to Plan development and, as part of this, may wish to contribute to the process of Sustainability Appraisal which, in England & Wales, is used within the planning system to implement the SEA requirements.

Water Framework Directive

The Government Circular on statutory obligations advises that planning decisions should take into account the impact of the development on the water environment and on the environmental objectives of the Water Framework Directive (WFD), as set out in the river basin management

³⁹ www.defra.gov.uk/rural/documents/protected/localsites.pdf

plans (RBMPs). In particular, the Circular highlights the requirement to prevent deterioration in status of any water body (subject to the application of Article 4.7 of the WFD). In order to do this, public bodies are required to have regard to Environment Agency advice and standing guidance.

Operational Requirements

Once a planning permission and/or other development consent has been obtained to proceed with quarrying operations, the operator has to comply with a range of site-specific requirements, most of which will be expressed in the form of conditions attached to planning permissions and environmental permits or licences pertaining to the site in question, and or in 'Section 106' legal agreements (also known as Planning Obligations). As with the pre-operational requirements outlined above, these will be very specific to the site in question, but some generic observations can still be made.

With respect to biodiversity and geodiversity, the key points to consider (whether or not they are identified in conditions or obligations) will be those relating to:

- implementation of the agreed design, including phasing arrangements, restoration and aftercare;
- implementation of agreed operational monitoring schemes for habitats, species and the water environment, including timely submission of monitoring results to the appropriate authorities and liaison with other data holders;
- responding as appropriate to monitoring results which suggest the need for action, including implementation of agreed or additional mitigation measures (as necessary);
- protection of existing habitats and species (especially but not only those which are formally protected) in accordance with the agreed design;
- enhancement of biodiversity through landscaping, natural regeneration, planting and progressive or final restoration, optimising the potential for the schemes to contribute to national and local Biodiversity Action Plan targets and/or to the development or improvement of 'wildlife corridors' to promote increased continuity between habitats;
- protection and enhancement of the water environment through good control of dewatering operations and of water quality and rate of discharge from the site;
- protection or enhancement of geodiversity, including ongoing liaison with local interest groups and researchers, responding where possible to important and / or unexpected discoveries, allowing these to be investigated and 'rescued' where possible or retained as conservation faces at the margins of the excavation.

In each case, the various guides to good practice referred to earlier should be consulted for further details of the issues which need to be considered and the options available for dealing with them. Specialist advice on particular issues and often on individual sites can be obtained through consultation and ongoing liaison with Natural England, The Environment Agency, local authority ecologists, RSPB, Buglife, local Wildlife Trusts and local RIGS groups. In all cases, particular importance is likely to be attached to the continued involvement of appropriate specialists (ecologists, hydrologists, hydrogeologists, geologists, geomorphologists and landscape professionals) in order to ensure that the agreed monitoring, mitigation and restoration works are implemented as intended. This is a key aspect of fulfilling the requirements of a modern planning permission and will often be enshrined in planning conditions or 'Section 106' planning obligations.

Post-Operational Requirements

Once again, these requirements will usually be dictated by conditions and/or legal obligations attached to planning permissions and environmental permits or licences pertaining to the site in question, but the following generic requirements will usually be appropriate (whether or not they are reflected in conditions):

- Completion of the agreed restoration scheme, subject to any modifications that have been agreed with the local planning authority and other stakeholders during the period of extraction. Such modifications may be necessary, for example to take account of improved knowledge and techniques, changed priorities and/or the implications of climatic and environmental change since the scheme was originally proposed (as informed by dynamic baseline monitoring).

- Implementation of the required aftercare, including (where appropriate) handing over of the management of the site to new owners, making sure that they are aware of the biodiversity and geodiversity features in need of ongoing management;
- Continuation of agreed post-closure monitoring schemes for habitats, species and the water environment, including submission of monitoring results to the appropriate authorities, liaison with other data holders, and liaison with / handover to the new owners of the site. Long term monitoring is of fundamental importance in judging the success or otherwise of habitat creation and other biodiversity improvement schemes, providing the feedback needed to improve best practice guidance and to measure the contribution to Action Plan targets;
- Responding as appropriate to monitoring results which require the need for action, including implementation of any further mitigation measures that may be necessary;
- Continued protection of the water environment following the cessation of dewatering and other site operations, through careful monitoring of water levels and water quality until new equilibrium conditions are established;
- Provision of permanent safe access, where possible, to any features of geodiversity interest, so that these can be visited and inspected by interest groups after the quarry has closed (subject to permission of the new site owners).

Once again, the various guides to good practice and organisations referred to earlier should be consulted for further details of the issues which need to be considered and the options available for dealing with them. The observations made earlier, regarding the importance of continued involvement by appropriate specialists to ensure that planning conditions and obligations are properly implemented, applies equally to the restoration and aftercare periods of mineral development.