

# **West Sussex Mineral Sites A Biodiversity Action Plan**

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**March 2004**

Front Cover Images:

All images by Graham Roberts, West Sussex County Council.

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1. Former Beeding/Shoreham Cement Works, May 1998
2. Common tern chicks on the Sussex Ornithological Society's tern rafts, New Lake, June 1994
3. New Interpretation Board installed at Ivy Lake, Chichester Gravelpits by the Sussex Ornithological Society, Feb 2004
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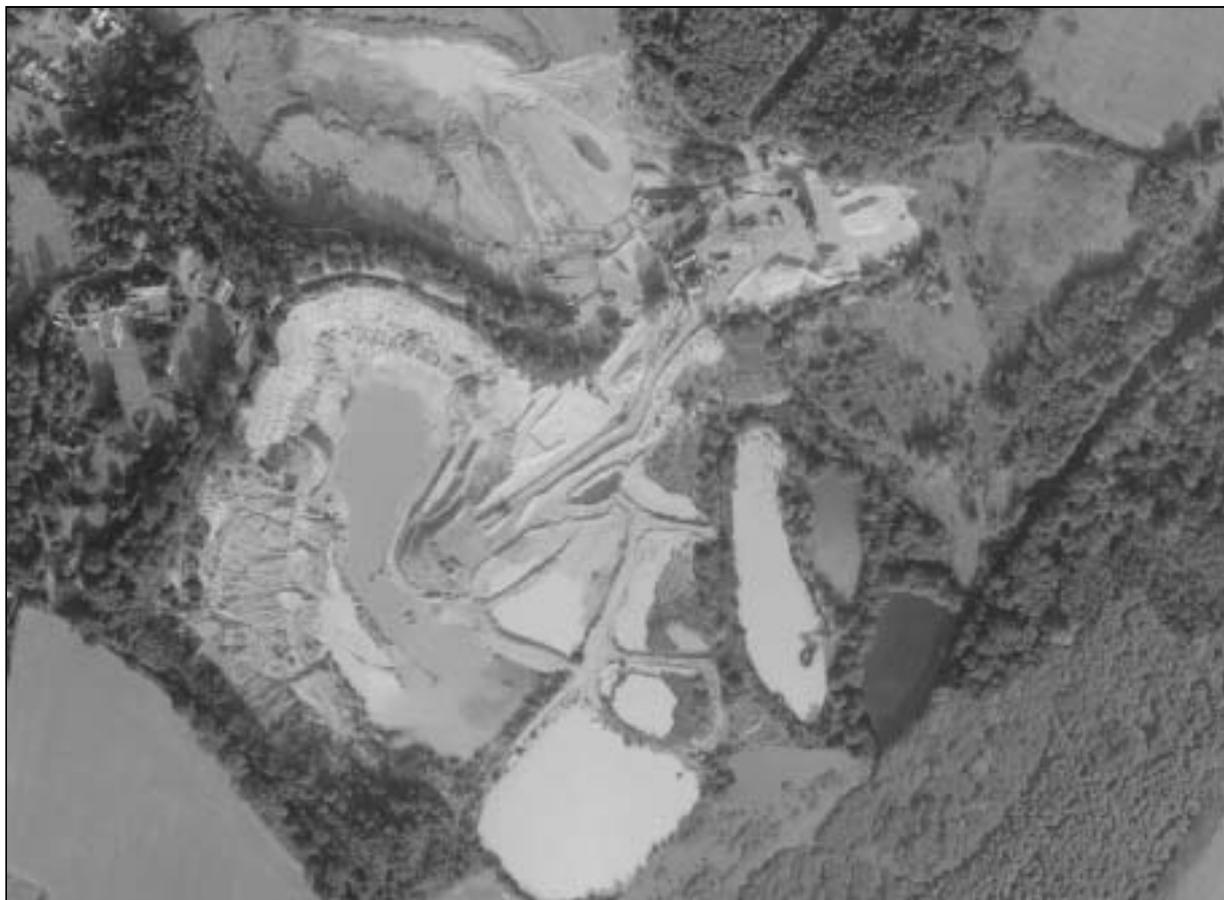
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# 1. MINERAL SITES DEFINITION

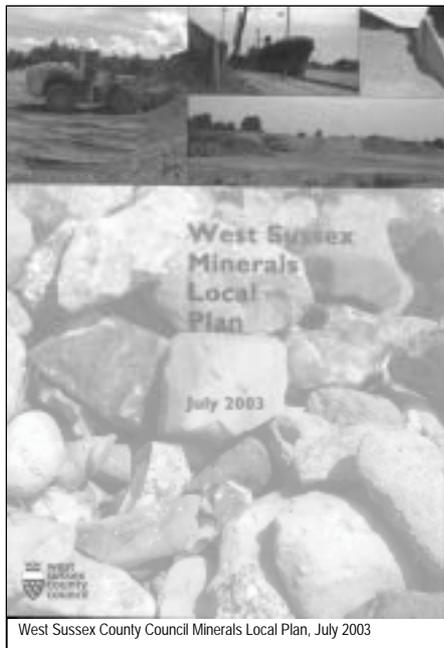
The aim of the West Sussex Mineral Sites Biodiversity Action Plan (BAP) is to guide the conservation, enhancement and management of biodiversity and geodiversity on the full range of terrestrial mineral extraction sites in West Sussex. This includes proposed sites, sites that are active, those that are in the process of being restored after extraction has ceased and sites that have already been restored and have some features of biodiversity and/or geodiversity interest.

The BAP is intended to provide a framework to help members of the West Sussex Mineral Sites Working Group (comprising representatives of mineral site operators, local authorities and non-governmental organisations) work together to achieve this aim by a variety of means, the most important of which are site audit, survey and the production of site-specific BAPs.

Mineral sites can be defined as land from which any mineral has been commercially extracted. In West Sussex there are quarries for gravel, sand, clay, chalk and sandstone. Of the aggregates (sand and gravel), it is those that are land-won that are considered in this BAP although it is acknowledged that marine dredged aggregates make a significant contribution to the county production totals. The production of aggregates is a major part of the mineral industry in the County, whilst extraction of other minerals such as chalk, stone and especially clay play a significant economic role.



Pendean Sandpit (1:3500) SU890 200, (39.2ha) RMC plc. © UK Perspectives Aerial Survey 2001.



Policies and guidelines for the extraction of minerals and targets to meet future demand are set by national government and are published as Mineral Planning Guidance (MPG) to be implemented locally by the Mineral Planning Authorities (MPAs). In West Sussex the MPA is the County Council and is responsible for all planning matters that relate to mineral extraction and the restoration of land afterwards. The MPA has produced a Minerals Local Plan (MLP) that sets out detailed policies and identifies where in the County mineral extraction is likely to be permitted in future. The West Sussex MLP was published in 2003 and is due to be reviewed in 2006.

In addition to the MPGs that directly guide mineral planning, Planning Policy Guidance PPG9 (Nature Conservation) also refers to mineral matters, especially where mineral applications are likely to affect Natura

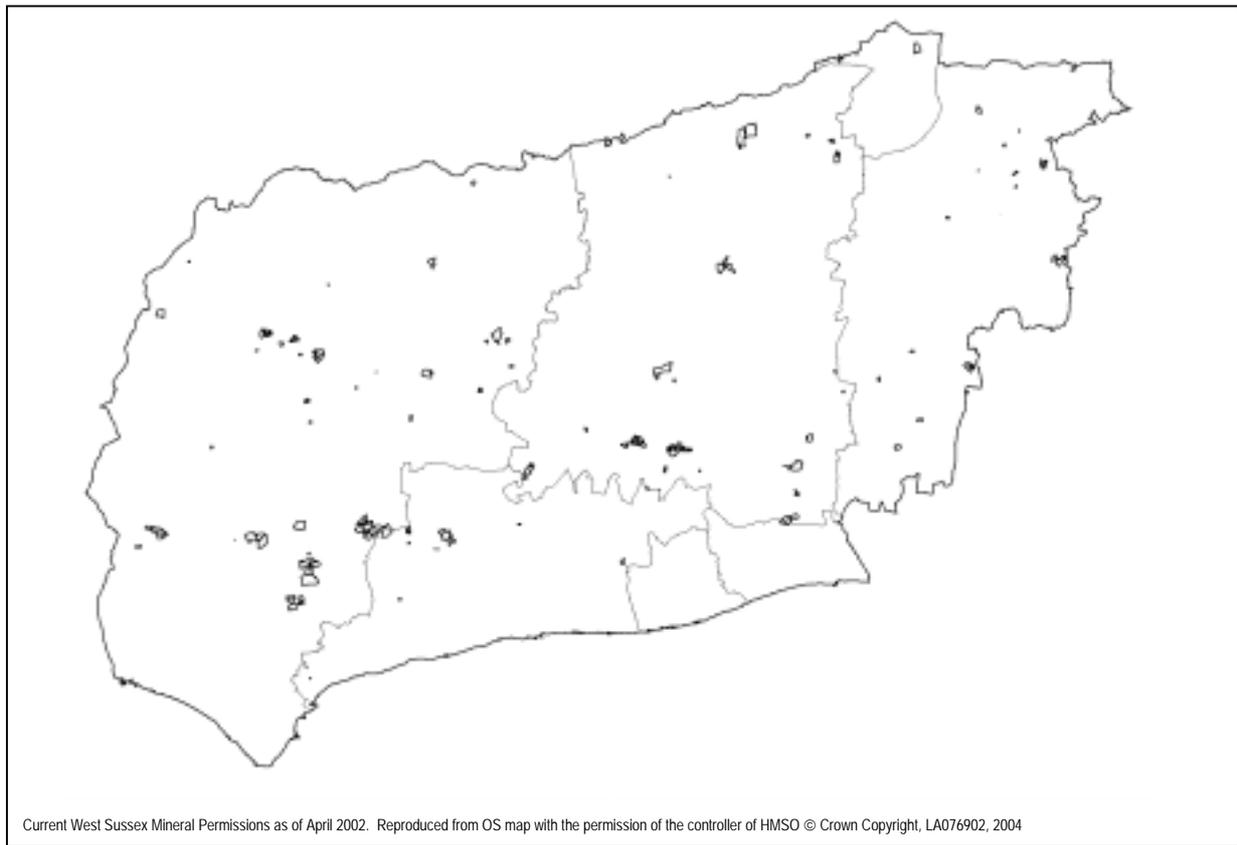
2000 sites (those sites protected under European legislation such as Special Areas for Conservation and Special Protection Areas). This advises operators to bear in mind opportunities for habitat creation and enhancement even when nature conservation is not the primary end use of a site. The way in which any mineral site is to be restored after the minerals have been extracted is an integral part of the original planning permission.

A major purpose of this BAP is to ensure that the maximum benefit for biodiversity and geodiversity is obtained through appropriate site restoration schemes. In addition it seeks to promote best practice management during extraction and provide guidance on the biodiversity and geodiversity elements of future planning permissions.

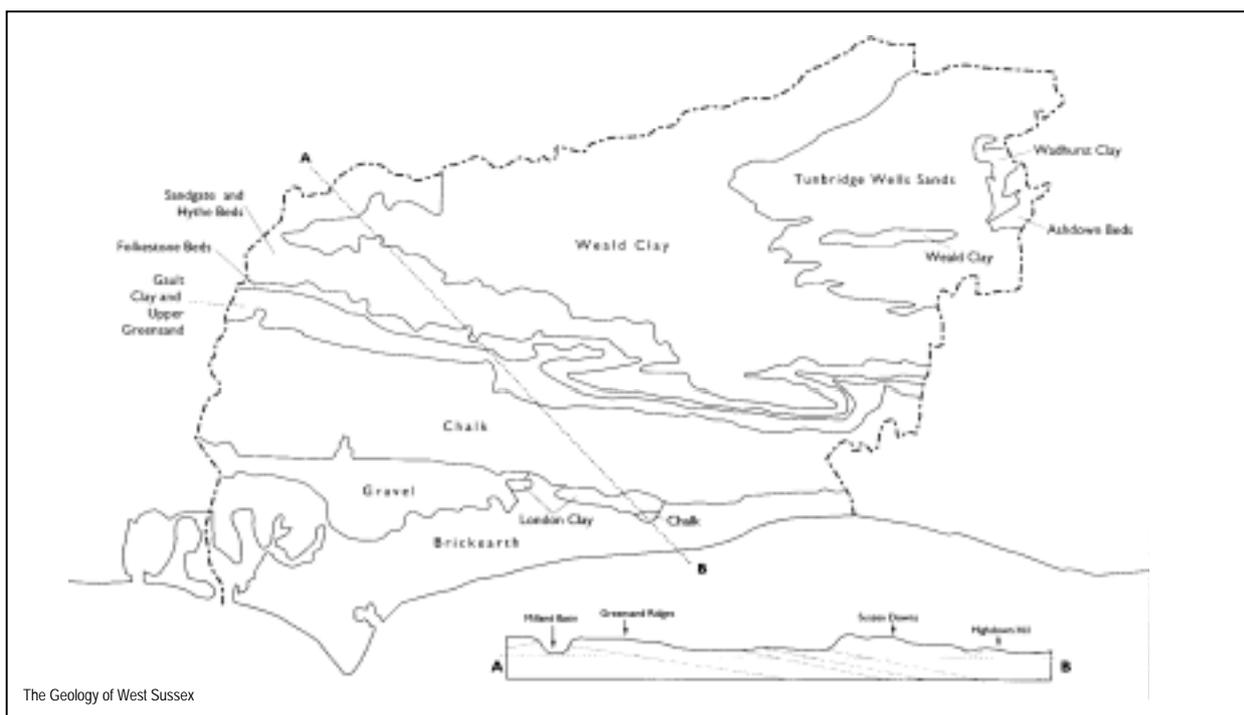
## **2. CURRENT STATUS AND DISTRIBUTION**

Mineral sites can be owned by the operating company that is responsible for extracting the minerals or, as is becoming more frequent, can be leased by the operators from private landowners for the duration of the extraction licence. In West Sussex the minerals industry includes some very large, multi-national companies as well as some much smaller mineral operators.

There are in the region of 50 mineral sites in the County (including both active and restored sites) that are likely to have at least some interest for biodiversity or geodiversity. They range in size from less than 1ha to almost 150ha and encompass a huge variety of habitats, features and conditions. In 2003 over 700ha of land was under active extraction.



The distribution of different types of mineral sites across the County naturally reflects the characteristics of its geology. Gravel pits are concentrated in the coastal plain around Chichester, clay pits are found in the central and northern parts of the County in the Weald and sand extraction takes place within the narrow band of the Lower Greensand (especially the Folkestone Beds) that runs from west to east across the middle of the County. Chalk pits occur on the South Downs, but the potential to extract chalk is now very restricted because of the importance of the chalk hills as an aquifer and a principal source of water supply in West Sussex.



A preliminary, desk-based audit of the biodiversity of West Sussex mineral sites was carried out in 2001 (Dolphin Ecological Surveys 2001). Despite incomplete data, the study confirmed that these sites represent a very important reservoir of habitats, species and geological exposures.

Several national BAP priority habitats can be associated with mineral sites and they may also support high priority species, including species that are legally protected and others of particular conservation concern (see section 3).

The diversity of habitats and species potentially found on mineral sites illustrates their strategic importance for biodiversity and the reason why a BAP for mineral sites is needed in addition to the plans that apply to the individual habitats and species.

Some mineral sites in West Sussex are already subject to statutory and non-statutory designation for their biological or geological features of interest, including Sites of Special Scientific Interest (SSSI), Sites of Nature Conservation Importance (SNCI) and Regionally Important Geological and Geomorphological Sites (RIGS) as well as Country Park status on one restored clay pit site.

In addition many of the mineral sites fall within one of the three Areas of Outstanding Natural Beauty (AONBs) in the County; the Sussex Downs AONB, Chichester Harbour AONB and the High Weald AONB. There is a proposal to designate the South Downs as a National Park and should this be accepted there will be an impact on planning control within the National Park boundary.

### 3. IMPORTANCE OF MINERAL SITES



Eartham Gravel Pits new sand face with Sand Martin nest holes June 2001. SU928 082, 143.5ha. Operators: Arc Ltd, Geological SSSI, RIGS. Extraction, ARC Ltd; Amey Roadstone Corporation Ltd Backfill, SL Gamble & Sons Ltd. Picture: Graham Roberts

Mineral sites can be of importance for a wide variety of wildlife during the active, extraction phase and after extraction has finished. Mineral extraction can also uncover important geological exposures and archaeological features.

#### 3.1 Habitats in active sites

Some of the most valuable features that are present on mineral sites during the

active phase are bare ground habitats, vertical sand exposures and shallow waterbodies.

Areas of bare, sandy ground can provide a warm microclimate that is especially important to tunnelling invertebrates such as bees, wasps and spiders. When bare sandy ground adjoins heathland vegetation other specialist insects, such as the silver-studded blue butterfly *Plebeius argus*, can occur.

The pioneer vegetation of all kinds of bare ground can be very rich in nectar and pollen so is of value to invertebrates as well as sometimes comprising uncommon, ephemeral or pioneer higher and lower plant species. Areas of bare shingle around gravel pits make good nesting habitat for little ringed plover.

Large vertical sand faces can provide nesting sites for sand martins, whilst smaller south and east facing sand cliffs are valuable to many species of bees and wasps.

The often shallow, temporary ponds and pools that occur in active mineral workings, especially clay pits, can be a rich habitat for amphibians, particularly great crested newt *Triturus cristatus*, and may also be colonised by a variety of dragonflies and damselflies.

Other, less common, features that may be important in active sites include nest sites in quarries for cliff nesting birds, such as peregrines and ravens, and chalk caves and crevices that can be used as hibernation or maternity roosts by bats.

Some areas of mineral sites may remain unworked for part or all of the active phase and can thus retain their original vegetation and be important refuges for wildlife as well as being sources of plant and animal colonists once extraction is over. Management of these unworked areas can be crucial to biodiversity on active sites.



Drayton (North), SU882 042 (Tarmac Ltd). Extraction of sand/gravel with phased restoration to landscaped lake for nature conservation. Picture: Graham Roberts (Oct 03)

### 3.2 Habitats that develop in mineral sites

As natural succession or planned habitat restoration takes place, the variety of different habitats present on mineral sites is potentially huge and can accommodate a wealth of different wildlife.

The development of new habitats on mineral sites can be spread over a considerable time, with worked-out parts of a site being restored whilst other areas are still in the active phase. In contrast some sites will have little semi-natural habitat present at the end of the active phase.

Where mineral workings have extended below the watertable, as is often the case in clay, sand and gravel extraction sites, restoration to open water and wetland habitats is common. Carefully designed wetland

restoration schemes can provide rich habitats for scarce and threatened wildlife, such as otter, water vole, bittern and wading birds, as well as more widespread wetland species.



Mineral sites on the greensand ridge have the potential to support heathland, acid grassland and woodland habitats with their associated species of conservation interest such as nightjar, woodlark, Dartford warbler, adder *Vipera berus* and many invertebrates including the very rare field cricket *Gryllus campestris*.

Chalk pits can develop a variety of habitats of high biodiversity, including chalk grassland and scrub mosaics. Some invertebrates of special conservation interest are associated with chalk pits, including the Adonis blue *Polyommatus bellargus* and small blue *Cupido minimus* butterflies, glow-worm *Lampyrus noctiluca* and several species of mollusc.

Woodland and scrub habitats will develop on almost any inactive mineral sites if natural succession is allowed to continue. The value of these habitats to wildlife will depend on a number of factors, including the species of trees and shrubs, the structural diversity of the habitat and whether other, complimentary habitats are also present in the vicinity of the site. At one West Sussex clay pit the rare wood white butterfly *Leptidea sinapis* has been recorded on the wooded margins of the site, but this insect requires sunny glades and rides so will not persist in dark, unmanaged woodland. Dormice can also be associated with mineral workings where there are woodland areas with abundant old hazel coppice and other suitable food sources.

Where sites are restored to agricultural use there is still potential to incorporate features and habitats of value to wildlife, for example planting new native hedgerows, carrying out spring sowing with over-wintering stubbles and retaining uncultivated margins on arable fields. Such extensive farming practices can potentially benefit declining farmland species such as the brown hare, linnet, bullfinch, grey partridge and skylark.

### 3.3 Habitat creation strategies

A multitude of opportunities for habitat creation exist during the active and restoration phases of mineral sites (RSPB 2003). The potential benefits to biodiversity are largely determined by the choices made before restoration even begins (see section 7 Potential).

There are four basic strategies for habitat creation:

- Hands off – allowing natural succession to occur without intervention. This is likely to be particularly effective when there are valuable semi-natural habitats nearby from which plants and animals can colonise naturally.

- Allow natural succession but with some management input or change at a predetermined point of development, for example allow natural grassland to develop but then mow or graze it to maintain that vegetation. Alternatively bare ground habitats can be maintained by regular disturbance.
- Initial intervention followed by unmanaged habitat development, for example planting trees and shrubs then allowing woodland to develop naturally, or re-profiling gravel pit margins to create shallows and islands then allowing a mosaic of wetland and open water habitats to develop.
- Full intervention and management to produce a target habitat, for example creating and managing heathland or chalk grassland.



A volunteer work party at Coates Sandpit SNCI, Fittleworth, Chichester SU998 176, Feb 2001 (2.7ha). Dormant and may not be worked further, no formal restoration scheme.

### 3.4 Mineral site biodiversity in West Sussex

A brief summary of the existing and potential biodiversity of mineral sites in West Sussex is given below, but is far from comprehensive.

The habitats, assemblages and species listed include examples associated with all phases of mineral workings - active, restored and long abandoned sites.

#### Key habitats associated with mineral sites

- Semi-natural woodland
- Scrub
- Open water, including ponds, lakes and temporary waterbodies
- Reedbed, fen and carr
- Heathland – wet and dry
- Grassland – neutral, acid, calcareous and floodplain
- Bare ground
- Ancient and species rich hedgerows
- Cereal field margins (a potential habitat where sites are restored to agricultural use)
- Saline lagoon (a habitat that could possibly be created in some of the gravel workings near Chichester)
- Shingle
- Cliffs and caves (exposures)

## Species assemblages

It is often the combinations of species, or assemblages, that occur or develop on mineral sites that are of particular nature conservation significance. For example:

- Reed nesting birds
- Passage and wintering waders and waterfowl
- Bees and wasps
- Dragonflies and damselflies
- Plants of chalk grassland, heathland, acid grassland, bare or sandy ground
- Lower plants such as acid lichen turf species, bare ground communities, epiphytic bryophytes and chalk bryophytes and lichens.

### Some examples of locally and nationally significant species that can be associated with mineral sites (especially UK BAP shortlist species)

The species identified in this table are examples that illustrate the diversity of species potentially found on active and restored mineral sites. Not all of them have been recorded in West Sussex mineral sites.

Many of the species, and sometimes their habitats too, are protected under the Wildlife and Countryside Act 1981 (as amended) and under the Countryside and Rights of Way Act 2000.

For the birds listed B = Breeding, W = Wintering, P = Passage  
RDB = Red Data Book species

Species	Latin name	Key habitat requirements
Otter	<i>Lutra lutra</i>	Watercourses and wetlands
Water vole	<i>Arvicola terrestris</i>	Open water and lush vegetation. Absence of mink
Badger	<i>Meles meles</i>	Varied, but including woodland and farmland
Brown hare	<i>Lepus europaeus</i>	Open farmland
Dormouse	<i>Muscardinus avellanarius</i>	Woodland, especially hazel coppice
Bats (all species)		
Sand martin (B)	<i>Riparia riparia</i>	Vertical sand exposures for nesting
Bittern (B/W)	<i>Botaurus stellaris</i>	Reed beds
Nightjar (B)	<i>Caprimulgus europaeus</i>	Heathland/woodland interface
Woodlark (B)	<i>Lullula arborea</i>	Short acid turf/young heather and bare ground matrix
Little ringed plover (B/P)	<i>Charadrius dubius</i>	Bare ground for nesting
Dartford warbler (B)	<i>Sylvia undata</i>	Heathland with gorse scrub
Terns (B/P)	<i>Sterna spp.</i>	Open water and bare ground
Lapwing (B/W/P)	<i>Vanellus vanellus</i>	Wet grassland and arable farmland
Peregrine (B)	<i>Falco peregrinus</i>	Cliffs and outcrops for nesting and roosting
Raven (B)	<i>Corvus corax</i>	Cliffs and outcrops for nesting
Adder	<i>Vipera berus</i>	Dry heathland or chalk grassland
Sand lizard	<i>Lacerta agilis</i>	Coastal dunes and sandy heaths
Common toad	<i>Bufo bufo</i>	Open water and terrestrial habitat mosaic
Great crested newt	<i>Triturus cristatus</i>	Small ponds without fish and terrestrial habitat
Field cricket RDB	<i>Gryllus campestris</i>	Mosaic of short turf and bare ground on acid soils
Stag Beetle	<i>Lucanus cervus</i>	Deadwood
Glow-worm	<i>Lampyris noctiluca</i>	Tall grassland and scrub, usually on chalk substrates

Species	Latin name	Key habitat requirements
Bee Wolf RDB	<i>Philanthus triangulum</i>	Preys on honeybees
A notable spider hunting wasp	<i>Arachnospila wesmaeli</i>	Ground nesting in light sandy heaths and dunes
RDB solitary wasp	<i>Crossocerus exiguous</i>	Ground nesting
RDB solitary wasp	<i>Ectemnius borealis</i>	Dead wood nesting
RDB bee	<i>Nomada hirtipes</i>	Cleptoparasite of a rare mining bee
Solitary blue carpenter bee RDB	<i>Ceratina cyanea</i>	Nests and overwinters in dead bramble stems
Silver-studded blue	<i>Plebeius argus</i>	Short heathland vegetation and bare areas
Small blue	<i>Cupido minimus</i>	Chalk grassland
Adonis blue butterfly	<i>Polyommatus bellargus</i>	Short turf on chalk substrate
Wood white butterfly	<i>Leptidea sinapis</i>	Sunny woodland rides and clearings with leguminous larval food plants
Brown hairstreak butterfly	<i>Thecla betulae</i>	Ancient hedgerows or scrub containing blackthorn and woodland edges
Short turf mollusc	<i>Abida secale</i>	Short turf on chalk substrate
Broad-leaved spurge nationally scarce	<i>Euphorbia platyphyllos</i>	Sparsely vegetated clay soils
White mullein nationally scarce	<i>Verbascum lychnitis</i>	Sparsely vegetated chalk
Red-tipped cudweed RDB	<i>Filago lutescens</i>	Bare sandy ground
A county rare lichen	<i>Steinia geophana</i>	Bare sandy soil
A nationally scarce moss	<i>Bryum pallescens</i>	Bare chalky ground
A county rare moss	<i>Weissia tortilis</i>	Bare chalky ground
A rare moss	<i>Atrichum angustatum</i>	Damp sand/gravel often in woods
A rare moss	<i>Ulota coarctata</i>	Epiphyte on trees
A county rare moss	<i>Blasia pusilla</i>	Damp tracks, moist rocks and banks in heathland

#### 4. IMPORTANCE FOR PEOPLE, LOCAL COMMUNITY AND CULTURAL SIGNIFICANCE



New interpretation board at Ivy Lake, Chichester (SU871 034). Restored gravel quarry. Placed by Sussex Ornithological Society. Picture Graham Roberts (Feb 2004)

**Impacts of mineral sites on surrounding communities during extraction (mostly negative).** These can include dust, noise and traffic generated by extraction activities.

**Importance of restored sites for local communities (potentially mostly positive).** Sites restored in a sensitive manner, where possible with regard to the wishes, needs and demands of local people, can provide sites of great benefit for biodiversity, geodiversity, recreation, amenity and education. Some restored

sites have the potential to become Local Nature Reserves and Country Parks that contribute to the quality of life of local people.

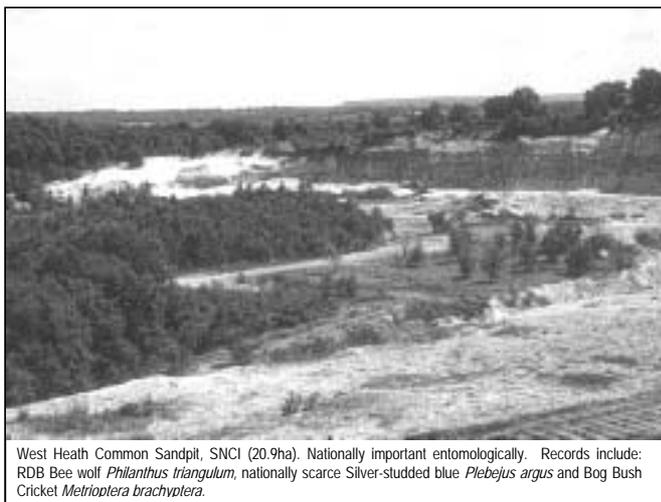
**Features of geological and archaeological importance.** Conserving such features, especially in restored sites that are suitable for public access, can be of educational benefit and contribute to an understanding of local culture and development.

## 5. BENEFITS TO LOCAL BUSINESS

- Mineral sites may provide some local employment and increased local business (for example in shops, pubs, accommodation etc.) during the extraction and restoration phases.
- Locally distinctive materials may be derived from stone and clay sites, such as construction stone, bricks and tiles. These in turn may support associated industries.
- Mineral sites under restoration may be able to support suppliers of local provenance material such as trees and shrubs or wildflower and grass seed.
- There is the potential to develop training and education courses, both during and after restoration of suitable site(s), demonstrating best practice to mineral industry employees and nature conservation managers.
- Recreational opportunities on restored sites range from water skiing to off-roading.

## 6. TRENDS AND THREATS

### 6.1 The dynamic nature of mineral sites and the habitats on them



Mineral extraction sites are by their very nature dynamic. Their vegetation, topography and sometimes their water levels all change over time and the reason they exist is so that material can be removed permanently from them. The process of extraction can take a relatively short time or can be prolonged over decades and even the method of extraction varies between different sites and different minerals. This property of change can be one of the most valuable features of mineral sites for wildlife as it

creates ephemeral habitats that are exploited by specialised plants and animals.

On many mineral sites there are some sections that will not be part of the worked area and thus retain their original vegetation and may be of high nature conservation value. The juxtaposition of long-established and temporary habitats is also likely to be of special value



to some wildlife. But the dynamic nature of habitats, especially during the active phase of a mineral site's life, is not a deliberate attempt to benefit wildlife; it is a by-product of a commercial activity without which the sites would not exist.

It is very important to make the most of opportunities on active mineral sites and to ensure that best practice is used to promote wildlife throughout the whole life of a site. It is, however, during the restoration phase and beyond that commercial pressures are

reduced and biodiversity and geodiversity are more likely to be considered of high priority by the site operators.

An added incentive for operators to promote biodiversity and geodiversity on restoration sites is presented where the cost of restoration can be minimised without compromising the outcome. Examples could be by allowing natural succession to take place rather than intervention management, although only where this option will result in the best outcome for biodiversity, or by leaving geological exposures visible rather than covering them over.

The concept of "restoration led" mineral extraction is still in its infancy, but is potentially of huge importance to biodiversity and geodiversity conservation and will play a much greater role in the minerals industry of the future. This BAP should be seen as an important step towards adopting the restoration led approach to mineral planning in West Sussex.

## **6.2 Restoration for intensive agricultural use rather than for nature conservation**

Government policy is to protect the "best and most versatile" agricultural land and mineral extraction is normally not permitted on high-grade agricultural land when lower grade land is available. There is also a presumption of restoration to agricultural use after extraction on such sites. This needs to be questioned for two reasons; firstly the lower grade agricultural land (on which mineral extraction is favoured) may be of greater nature conservation value than the high-grade land. Secondly the best agricultural land in West Sussex is likely to occur over gravel deposits on land of low ecological interest but which has the potential to be restored to wetland habitats of very high biodiversity value.

In a changing agricultural environment where farming is no longer always economically viable, even on high grade land, the MLP should rely less on the replication of previous conditions after extraction of minerals and instead look for opportunities for biodiversity and geodiversity gain combined with community and amenity benefits. This need not exclude the restoration of mineral sites to agricultural use provided that the subsequent farming system is extensive and designed to maximise farmland biodiversity.



### 6.3 Inappropriate restoration schemes

Even where nature conservation is the planned outcome of restoration schemes there is currently no guarantee that the proposals will deliver the best result for wildlife. In particular, many schemes pre-date modern thinking on habitat creation and may now be considered less appropriate than they once were, for example proposals to plant conifers on sandy soils or broadleaved woodland where open habitats might be more beneficial. The use of non-native origin wildflower and grass seeds has also been common in

restoration schemes and not only creates habitats of lower wildlife value than if local provenance seed was used but is also a missed opportunity to demonstrate best practice.

There is great potential to improve the quality of site restoration schemes on mineral sites by undertaking a strategic review of all the existing schemes in the context of the Sussex BAP and seeking ways in which mineral site restoration can contribute to the County and UK BAP habitat and species targets. The mechanism for reviews of older workings already exists under the Review of Old Mineral Permissions (ROMP) prescribed by the Environment Act 1995.

### 6.4 Limited aftercare period

The usual, statutory aftercare period for restored mineral sites required by most MPAs and detailed in restoration schemes is 5 years. Whilst this is likely to be enough time in most cases to carry out any habitat creation work such as tree planting, seeding or other landscaping work, it makes little allowance for the ongoing management that may be needed to sustain many habitats, for example mowing or grazing heathland vegetation, thinning trees, control of invasive species and regularly clearing sand exposures for sand martins.

WSCC normally promote a minimum 10 year aftercare period and recommend that a Management Committee is established to review the implementation of the restoration and aftercare scheme for each site.

The full potential biodiversity benefit of many restored mineral sites is probably never achieved because of the relatively short-term nature of aftercare schemes. It may not be reasonable to expect the mineral operators to take indefinite responsibility for restored sites in their control, but a mechanism is required for transferring them to appropriate owners, such as the County Wildlife Trust, RSPB or local authority, who could undertake their management in the long term.

## 6.5 Landfill

There is a chronic shortage of landfill sites in the County and inevitably the opportunity to use inactive mineral sites for landfill is considered by the MPA. There will always be some sites where this is not an option, for example where the water table is near the surface of the working and there is a risk of groundwater pollution via leachate from landfill. In other cases the biodiversity and geodiversity of the sites will need to be assessed against the pressure to use sites for landfill. In order to do this effectively site biological and geological surveys will be essential.

## 7. POTENTIAL

### 7.1 Habitat creation and restoration schemes

The natural development and assisted creation of new habitats on mineral sites has



New Lake, Chichester Gravel Pits SU877 028. Installation of a large Tern Nesting Raft by Sussex Ornithological Society with funds from the Aggregates Levy Sustainability Fund.

enormous potential to mitigate for the loss and fragmentation of existing natural habitats caused by mineral extraction. Indeed, a carefully planned restoration scheme can ultimately result in a net biodiversity gain on the original site, for example where gravel is extracted from below intensively managed farmland of low nature conservation value and the gravel pit is subsequently restored to a diverse wetland habitat.

The new MLP (due in 2006) should consider a change of emphasis on site restoration schemes such that nature conservation after-use is given preference over restoration to intensive agricultural land wherever possible and appropriate. The use of old mineral sites for landfill should also be reconsidered in the light of their potential biodiversity and geodiversity interest.

Habitat creation on mineral sites can also act to link fragmented habitats within an intensively farmed landscape and provide wildlife stepping-stones or to buffer existing valuable semi-natural habitat. Where mineral sites adjoin important habitats their restoration can be designed to expand the habitat and make management of the whole area more practical or economically viable.

Conducting basic feasibility studies into the practicalities of a range of habitat creation options for proposed mineral sites would narrow down the choices and would help the MPA judge the strategic biodiversity contribution of the proposed schemes. Sometimes it will be appropriate to incorporate aspects of the restoration scheme into the active phase of extraction, so it is vital to have plans in place from the beginning of the process. Turf, topsoil, seed and even individual plants can be kept from the initial stages of extraction and

used during phased restoration when storage times can be minimised to prevent deterioration.

Flexibility in implementing the restoration plan and carrying out habitat creation and management is very important because biological systems are not always predictable and the unexpected colonisation of a site by an important species may need a novel response. For example, sand martins taking advantage of a nesting opportunity on an exposed sand face at a West Sussex gravel pit were accommodated by a simple change in the working schedule.

Further use should be made of existing mechanisms to secure the long-term management and maintenance of restored mineral sites beyond the statutory 5 or 10 year period. Section 106 agreements as part of the planning permission or section 39 agreements under the Wildlife and Countryside Act 1981 can be set up between the operator, local authority and a wildlife body.

## 7.2 Building effective partnerships

The minerals industry has an important role to play in meeting national and local BAP targets and the recent proliferation of biodiversity initiatives within the industry shows that many mineral operators are already aware of their responsibilities and are willing to commit staff time and money to enhancing nature conservation on their sites.

Hanson and English Nature (EN) have developed a Memorandum of Understanding (MoU) that guides their working relationship particularly where SSSIs are involved. Together EN, the Quarry Products Association (QPA) and the Silica and Moulding Sands Association (SAMSA) have established the Minerals and Nature Conservation Forum and signed a joint

Statement of Intent that is aimed at achieving environmentally sustainable development in the mineral industry.



The West Sussex Mineral Sites BAP Working Group, (Oct 03). This association of Mineral Planners, Mineral Operators, ecologists and geologists established the basis of the BAP.

These industry initiatives are mostly set at a national level, but can be implemented on a county level by operators working with local nature conservation partners to improve working practices to benefit wildlife and by making sure restoration plans are based on full information, gathered prior to extraction, and developing appropriate restoration and aftercare schemes.

Partnership working between the minerals industry and nature conservationists at a county level will act as an example for others to follow. Such partnership must not be perceived as conservationists trying to impose biodiversity solutions and a further layer of bureaucracy on site operators, but instead must be an equal relationship with give and take on both sides.

The West Sussex Mineral Sites Working Group will provide an opportunity to communicate the mineral industry's interest in biodiversity and geodiversity to a wider audience and enhance their credibility as partners in promoting biodiversity and geodiversity. To date minerals operators have sometimes been seen as agents of countryside destruction who undertake site restoration reluctantly simply as mitigation for the habitats lost through extraction.

Mineral operators could benefit from conservationists' knowledge and experience of the potential to attract grant aid for conservation management of restored sites in the longer term.

The opportunities offered by nature conservation and amenity restoration schemes are a part of developing good working partnerships between mineral operators and local communities.

### 7.3 Research and data sharing

Research into the habitat creation techniques used on mineral sites should be promoted wherever possible to ensure that the lessons learnt are shared as widely as possible. Both successes and failures add to our knowledge of what is feasible on different sites and by collecting even basic data it is possible to avoid repeating costly mistakes.



A simple methodology for monitoring the progress of operational practices and restoration schemes needs to be developed as a priority so that valuable experience is not wasted. The results of such research can be used to help demonstrate operational and restoration best practice to other operators, both locally and nationally.

Some operators are already advancing schemes to improve their working practices and produce site specific BAPs and management plans as well as making corporate commitments to partnership working with nature conservation bodies (for example the Hanson BAP and RMC partnerships with County Wildlife Trusts). Full credit and support should be given to these schemes and the experience gained should be shared.

The Working Group provides a unique opportunity to work together for biodiversity and geodiversity in the County and accomplish more than could be achieved by either conservationists or operators working alone.

## 7.4 Recreation, amenity and education

Consideration of the potential for recreation, amenity and education should be incorporated into all restoration plans, although not all sites will be suitable for such after-uses. Providing new areas for amenity, recreation and education on restored sites could help to reduce the pressure on more fragile habitats nearby. Restored sites also have the potential to be designated as Local Nature Reserves (LNRs) and be an asset to local communities. Declaring mineral sites as LNRs will maximise and celebrate their wildlife, educational and amenity value.

The educational potential of restored sites in the County is currently only exploited at the Southwater Country Park near Horsham, where the education and recreation centre is a very well used local amenity. Elsewhere in the country restored mineral sites have been developed to provide environmental education centres in partnership with RSPB, County Wildlife Trusts and local authorities, for example The Wetland Centre in London, Needingworth Quarry in Cambridgeshire, the Cotswold Water Park and Lydd Quarry at Dungeness in Kent.

An important action included in this BAP is for the Working Group to select and promote at least one demonstration site in the County for a project of this nature. This kind of demonstration site would help to illustrate the potential positive impact of restored mineral sites on the access/recreation/tourism industry in the long term via early planning opportunities.

## 8. CURRENT ACTION

### Minerals Local Plan

The MLP is the primary policy document on mineral extraction in the County. Written by the Minerals Planning Authority (WSCC), the MLP follows guidelines set out by government in Minerals Planning Guidance notes.



### Mineral site biodiversity audit

A preliminary biodiversity audit of mineral sites in the County was carried out in 2001 and sets an outline schedule for further survey and monitoring (Dolphin Ecological Surveys 2001).

### Publications

Nationally there is considerable interest in the potential contribution of mineral sites to nature conservation and the BAP process, particularly from EN, RSPB and the Royal Society for Nature Conservation (RSNC). English Nature has published two relevant research reports entitled Good Nature Conservation Practice in the Minerals Industry (EN 1995) and The Potential Contribution of the Mineral Extraction Industries to the UK Biodiversity Action Plan (EN 1998). EN together with SAMSA and

QPA have produced guides to planning, operating, restoring and managing mineral sites for

biodiversity and geodiversity called Biodiversity and Minerals – Extracting the Benefits for Wildlife (EN, SAMSA, QPA 1999) and Geodiversity and the Minerals Industry – Conserving our geological heritage (EN, SAMSA, QPA 2003). The most recent habitat creation publication is from the RSPB and is the Habitat Creation Handbook for the Minerals Industry (RSPB 2003). There are also several other publications available that set out habitat restoration guidelines and case studies from across the country.

### **ALSF**

The Aggregates Levy Sustainability Fund supports a variety of projects related to biodiversity on mineral sites (including production of this BAP) and will continue to provide funding for such schemes in the future.

### **Website**

The Mineral Industry Research Organisation (MIRO) has launched a website to promote good environmental practice in the UK aggregate industry. It aims to “establish a single



reference point for the large volume of information that is currently dispersed across many locations [and be] a repository for current and future information on environmental good practice in the aggregate sector”. The website covers a wide range of environmental topics in addition to biodiversity and restoration, including air pollution, noise, waste, traffic and water.

### **Mineral operators’ initiatives**

Some individual mineral operators have their own BAP initiatives, for example the Hanson draft BAP, RMC’s Environment Reports and Practical Guide to Restoration and the Aggregates Industries BAP and Sustainability report.

### **RSPB/EN/ALSF workshops**

During the summer of 2003 a series of workshops on the restoration of mineral workings took place.

See Appendix 1 for a glossary of acronyms used in the text.

## **9. EXISTING INCENTIVE SCHEMES**

### **Environmentally Sensitive Area scheme (ESA)**

Sites that fall within a designated part of the County (the South Downs) could be eligible for land management payments under the ESA scheme, an agri-environment scheme administered by Defra. Different management agreements attract different levels of payment, and some could apply to restored mineral sites, for example where restoration of chalk grassland is involved.

## Countryside Stewardship Scheme (CS)

This is another agri-environment scheme, administered by Defra and applicable throughout the County, apart from in the ESA scheme area, under which 10-year management agreements can be made. Payments are available for both ongoing management and capital works. The scheme could be useful to help secure funding for the long-term management of habitats such as heathland on restored sites. However, in early 2005 a new higher-level agri-environment scheme is due to be launched that will replace CS and ESA, so the future of CS as an incentive on mineral sites is probably limited.

## Woodland Grant Scheme (WGS)

The Forestry Commission (FC) administers the WGS under which grant aid is available for some kinds of woodland creation and management. This could potentially provide some funding for restoration sites where woodland forms a significant element or where there is woodland on unworked areas.

## English Nature grants

These include Community Action for Wildlife, Reserve Enhancement Scheme (for sites with a nature conservation designation) and the Wildlife Enhancement Scheme. EN grants could be available for biodiversity, geodiversity or amenity schemes on mineral sites in specific circumstances.



## Heritage Lottery Fund

## Aggregates Levy Sustainability Fund

Administered by English Nature, Countryside Agency, English Heritage and Mineral Industry Research Organisation.

## Countryside Agency grants

## Various environmental award schemes

For example The QPA have an award scheme and the Royal Town Planning Institute (RTPI) National Award for Planning Achievement, which was won in 2000 by Hanson for the Needingworth Wetland Project.

## 10. OBJECTIVES AND TARGETS

### KEY OBJECTIVES

1. Optimise biodiversity opportunities on mineral sites in West Sussex within the relevant strategic frameworks, for example the Minerals Local Plan and the Sussex and UK BAPs
2. Ensure there is sufficient biological, geological and archaeological survey information covering mineral sites on which to base decisions
3. Promote sympathetic operational procedures and best practice management for biodiversity and geodiversity on mineral sites during the working and restoration phases and into the future
4. Support closer working practices between nature conservation bodies, mineral operators and the planning authority
5. Improve the public perception of the minerals industry and its potential contribution to biodiversity and geodiversity
6. Integrate biodiversity and geodiversity objectives with other restoration objectives for a site, for example recreation, access and education

### KEY TARGETS

1. 50% of all proposed, working and restored mineral sites to have had biological, geological and archaeological audit and surveys carried out by 2009 and 100% of all sites to be audited and surveyed by 2014. Establish a rolling programme of audit and survey as new sites are identified
2. At least 50% of all proposed, working and restored mineral sites to have site BAPs prepared by 2009. 100% of all sites to have site BAPs by 2014. Work on actions contained in the individual site BAPs should be started immediately
3. The principles enshrined in the West Sussex Mineral Sites BAP to be incorporated into the revised Minerals Local Plan in 2006

## 11. SUMMARY OF ACTIONS

<p style="text-align: center;"><b>KEY ACTIONS</b></p> <p style="text-align: center;">Audit and survey Site BAPs Linking MLP and BAP Enhanced restoration schemes Fact sheets for site managers Promoting best practice Demonstration site Strengthening links Local Nature Reserves Environmental award scheme</p>
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### 11.1 Audit and survey

In association with mineral operators, full biological, geological and archaeological audits of all proposed, active and restored sites should be undertaken, including those sites no longer owned by mineral operators, to allow;

- Assessment of the nature conservation, geological and archaeological resource present on the sites and identify key habitats, species and features
- Strategic assessment of the County mineral site biodiversity resource
- Preparation of site BAPs
- Revision of existing and proposed restoration plans where necessary

Full use should be made of existing geological and archaeological data to inform site restoration plans. Suggested preliminary priorities for survey and assessment of mineral sites are already set out in the 2001 mineral sites audit (Dolphin Ecological Surveys 2001).

### 11.2 Site BAPs

All mineral sites should have a site BAP prepared giving succinct details of the species and features of importance, maps showing key features including any sensitive areas that should be protected for ecological, geological or archaeological reasons. Concise but long term management prescriptions should be included.

Site BAPs should encourage flexibility in extraction methods and restoration schemes. Periodic re-assessment of ongoing operations is essential to maximise biodiversity and geodiversity gain. They should also ensure that any existing important semi-natural habitats on mineral sites are not degraded or worked wherever possible without sterilising mineral reserves for which valid planning permission exists.

The dynamic nature of mineral sites and their biodiversity must be given adequate consideration during the extraction and restoration phases.

Appendix 2 shows the suggested process for preparing a site BAP.

### **11.3 Linking MLP and BAP**

Revision of the Minerals Local Plan (due in 2006) should include strong links with the Mineral Sites BAP and incorporate new, stronger biodiversity targets.

There should continue to be a strong presumption against mineral extraction on designated sites and preparation of site specific BAPs could be made mandatory as part of the planning application. The MLP should also make reference to the wider national and local BAP process.

Greater transparency in the minerals planning process and its contribution to biodiversity is needed and there is scope to share experiences between interested parties via the Working Group.

### **11.4 Enhanced restoration schemes**

Restoration schemes should be assessed by the MPA against a series of County nature conservation priorities, set by the Working Group, which would include high priority habitats for creation, the degree of habitat linkage and continuity of habitat within and outside the site and the timescale of the aftercare plan.

The whole range of options for restoration outcomes for each site should be considered strategically both for mineral site restoration schemes that are proposed at the planning stage and during reviews of old mineral permissions carried out under the Environment Act.

The nature conservation objectives of restoration plans need to be demanding to maximise biodiversity gain, especially where extraction sites are initially of low nature conservation value. Those plans with the greatest biodiversity potential should have the best chance of being accepted by the MPA.

Restoration schemes should include provision for the retention and study of geological and archaeological features on working and restored mineral sites. They should also take account of the potential conflict between biological and geological interests when setting restoration goals.

Opportunities to enhance the management of former mineral workings for biodiversity should be investigated as part of the strategic element of the BAP, even when mineral operators no longer own the sites.

The working group should give consideration to ways to secure the longer term future of restored mineral sites that have nature conservation or geological interest, beyond the usual, statutory 5 or 10 year period.

### **11.5 Fact sheets for site managers**

Working Group members should co-ordinate and where necessary prepare simple guidelines to promote biodiversity and geodiversity conservation. These should describe best practice principles and techniques, key species and habitats and include information on the legal status of protected species to avoid breaches of legislation. The fact sheets should be distributed to all mineral site managers.

### **11.6 Promoting best practice**

The Working Group should bring together examples of best practice, successes and failures in mineral site restoration and management techniques and disseminate the information as widely as possible, locally via the Working Group and to others working in the field nationally via the MIRO website.

A standard reporting form could be devised for distribution to all site managers that should be filled in when nature conservation restoration or management work is carried out. An effective mechanism will need to be developed to ensure reports are filed with the Working Group.

A programme of biological survey and monitoring is essential on sites under restoration to provide reliable data on habitats and species population development. This will complement the in-house, site managers' reports.

### **11.7 Demonstration site**

The Working Group should select at least one mineral site in West Sussex that has the potential for development as an educational centre and example of best practice, ideally a site that also has recreation and amenity potential. The Group should collectively make the commitment to fund and run a "minerals and nature conservation project" from that site.

Funding for the project could come from a variety of sources including partners in the Working Group, the Aggregates Levy Sustainability Fund (ASLF), landfill tax, QPA, SAMSA, EN, HLF etc. A conservation body such as SWT, RSPB or a local authority with site management staff and experience could be appropriate site owners for such a joint venture.

### **11.8 Strengthening links**

A seminar or series of meetings with mineral operators, site managers and nature conservation bodies should be organised in West Sussex. Their aim should be to promote closer working practices and demonstrate ways that the BAP objectives and targets can be achieved.

Nature conservationists could illustrate the habitats that develop during extraction, their value to wildlife, what to do if protected species are found on site and how to report wildlife sightings. Mineral operators could educate conservationists about the constraints they work under and ways that they promote biodiversity on their sites.

All parties should inform and work with local communities where possible on restoration proposals that enhance biodiversity and conserve geodiversity. There is also scope to expand the network of mineral site liaison groups and improve communication between the various interested bodies and individuals for each site.

There is an opportunity to strengthen direct links between mineral operators and local conservation bodies and wildlife related businesses, for example by operators making consistent use of local provenance trees, wildflower seed etc. in restoration schemes or by nature conservation bodies using locally distinctive bricks in construction projects.

### **11.9 Local Nature Reserves**

Some restored sites will have the potential to become Local Nature Reserves of community benefit and may be eligible for funding from EN. The Working Group, together with EN, should identify suitable sites as they become available.

### **11.10 Environmental award scheme**

The Working Group should organise a County environmental award scheme for mineral sites that will recognise, reward and promote good practice and successful restoration schemes.

### **11.11 The Working Group**

The West Sussex Mineral Sites BAP Working Group should meet at least annually, and preferably more often, to review and report on the progress of the BAP. Members should take an active role in promoting the BAP within their organisations and industries.

The activities of the Working Group should be reported to all the mineral operators with sites in West Sussex, especially those who are not represented on the Group.

The actions set out in this plan make it clear that for the West Sussex Mineral Sites BAP to be a success the Working Group will need to be a strong and effective body with fully committed members. The emphasis throughout the plan is on nature conservationists, mineral operators and planners working in partnership to benefit wildlife on mineral sites in the County.

Unlike most other Habitat Action Plans and Species Action Plans where actions will mostly be delivered by statutory bodies and NGOs, the West Sussex Mineral Sites BAP will rely on the members of the Working Group and their organisations to take forward the objectives, targets and actions set out in the BAP and for monitoring progress towards meeting the goals of the BAP.

The direct involvement of the Working Group and its constituent member organisations in the implementation of the West Sussex Mineral Sites BAP will present a unique challenge to the Group members, but will also provide an opportunity for member organisations to demonstrate their commitment to the national and local BAP process and make a real difference to biodiversity on mineral sites in the County.

## 12. ACTION PLAN

ACTION		POTENTIAL DELIVERERS		YEAR (to be completed or in place by)			MEETS OBJ. No.	PRIORITY
		LEAD	PARTNERS	ON-GOING	2009	2014		
<b>ACTION PLAN PROCESS / LINKS TO OTHER PLANS</b>								
1	This Action Plan should be considered in conjunction with the following Habitat and Species Action Plans: woodland, chalk grassland, hedgerows, lowland heathland, floodplain grassland, reedbeds, saline lagoons, standing freshwater, unimproved neutral and dry acid grassland, arable, otter, water vole, great crested newt, pipistrelle bat, bittern, little ringed plover, kingfisher, sand martin, glow worm, stag beetle and field cricket	SBP	ALL	✓			1	MEDIUM
2	Monitor progress on this Action Plan annually	WG	ALL	✓				MEDIUM
3	Conduct a five-yearly review of progress on this Action Plan and revise where necessary	SBP	ALL		✓			HIGH
<b>COMMUNICATION – ADVISORY</b>								
4	Provide consistent and quality advice and training to land owners and managers, workers, contractors and advisors on management, restoration and creation of habitats and features 4a. Prepare habitat and species guidance sheets for site managers or co-ordinate existing material 4b. Prepare best practice guidelines for site managers or co-ordinate existing material 4c. Prepare guidance sheets for conservation and management of geological exposures	WG	RSPB/ SWT/EN/ LA/BM	✓			3, 4	HIGH
5	For advisory purposes, collate a list of sites in West Sussex that demonstrate good practice	WG	All	✓			3, 4	MEDIUM
6	Establish communication network to facilitate information exchange and understanding between influential organisations, land owners and managers 6a. Run seminars/meetings with operators, managers and nature conservation bodies 6b. Report on activities of the Working Group to all mineral operators in the County	WG	All	✓			3, 4	HIGH
7	Contribute to consultation on all planning applications affecting this habitat	LA	ALL	✓			1	HIGH

ACTION		POTENTIAL DELIVERERS		YEAR (to be completed or in place by)			MEETS OBJ. No.	PRIORITY
		LEAD	PARTNERS	ON-GOING	2009	2014		
<b>COMMUNICATION – PUBLICITY</b>								
8	Raise awareness and understanding of the habitat across all sectors 8a. Consider development of at least one site to demonstrate best practice restoration techniques and provide recreation and amenity for local community 8b. Develop County environmental awards scheme for mineral sites	WG	All	✓	✓		3, 4, 5	MEDIUM
9	Publish material promoting management, restoration and creation of habitat for decision makers, land owners and managers 9a. Make use of the MIRO website to publicise activities on West Sussex sites	WG	All	✓			4, 5	MEDIUM
10	Report and publicise trends and results of research and monitoring	WG	All	✓	✓		4, 5	MEDIUM
<b>FUNDING / RESOURCES</b>								
11	Ensure that land owners and managers are aware of all available grants and funding	WG	EN/Defra/ FC/LA	✓	✓		4	MEDIUM
<b>HABITAT AND SITE MANAGEMENT</b>								
12	Ensure appropriate management of existing sites/habitat 12a. Carry out nature conservation and geological audit to assess the extent and potential of habitats on mineral sites across the County	WG	SWT/ RSPB/LA/ EN/BM	✓	✓	✓	2	HIGH
13	Develop and implement management plans where feasible 13a. Produce “site-BAPs” for all sites	WG	ALL	✓	✓	✓	1, 2, 3, 4, 6	HIGH
<b>HABITAT CREATION / RESTORATION</b>								
14	Ensure no net loss of valuable habitat 14a. Carry out strategic assessment of restoration plans to deliver maximum biodiversity and geodiversity benefit	MPA	ALL	✓			1	HIGH
15	Identify key areas for habitat restoration or creation	WG	All	✓	✓		1, 2, 3	HIGH
16	Conduct habitat creation / restoration	MO/ SWT/LA	WG	✓			3	HIGH

ACTION		POTENTIAL DELIVERERS		YEAR (to be completed or in place by)			MEETS OBJ. No.	PRIORITY
		LEAD	PARTNERS	ON-GOING	2009	2014		
<b>INFORMATION AND DATABASES</b>								
17	Liase with SxBRC to ensure that data is held in an accessible database	SBP	ALL	✓		✓	2	HIGH
<b>POLICY AND LEGISLATION</b>								
18	Ensure that adequate policies exist in local plans to protect this habitat 18a. Incorporate strong links with this BAP into the MLP review 18b. Instigate management agreements beyond the first 5 year period on the most valuable sites	LA/EN/EA	WG	✓			1, 4	HIGH
19	Ensure that an appropriate ecological assessment is carried out as part of any development 19a. Mineral Planning Authority should give biodiversity a high priority in proposed restoration schemes 19b. Proposals for landfill in restored sites should be weighed against the biodiversity and geodiversity value of sites	LA	EN/EA	✓			1	HIGH
<b>RESEARCH</b>								
20	Undertake research into the effects of management practice and other impacts	SWT/ LA RSPB/ EN/EA/	WG	✓			2, 3	MEDIUM
<b>SITE PROTECTION AND DESIGNATION</b>								
21	Ensure all sites are appropriately designated and protected 21a. Consider LNR or SNCI status for sites after restoration where appropriate	LA/EN	WG	✓	✓		1, 4	MEDIUM
<b>SURVEY AND MONITORING</b>								
22	Establish survey methods and design a methodology for data gathering and analysis	WG	SWT/LA/ RSPB/MO		✓		2, 3	HIGH
23	Develop and implement programmes to monitor the habitats and important species populations on mineral sites	WG	ALL	✓	✓	✓	3	HIGH

**BM** = Booth Museum, **Defra** = Department for Environment, Food and Rural Affairs, **EA** = Environment Agency, **EN** = English Nature, **FC** = Forestry Commission, **LA** = Local Authorities, **LNR** = Local Nature Reserve, **MO** = Mineral Operators, **MPA** = Mineral Planning Authority, **NGOs** = Non-governmental Organisations, **RSPB** = The Royal Society for the Protection of Birds, **SBP** = Sussex Biodiversity Partnership, **SNCI** = Site of Nature Conservation Importance, **SxBRC** = Sussex Biodiversity Record Centre, **SWT** = Sussex Wildlife Trust, **WSCC** = West Sussex County Council, **WG** = West Sussex Mineral Sites BAP Working Group

## 13. MONITORING AND REVIEW

The Working Group will have a crucial role in monitoring the progress made with this BAP. Meetings of the Group should be frequent enough to ensure that the actions enshrined in the plan are carried out and that real progress is made towards achieving the objectives. As a minimum the Group should meet twice a year in the initial five years of the BAP and it will be necessary at each meeting to delegate actions from the plan to members of the Group and partner organisations.

There is a standard review procedure for all BAPs, HAPs and SAPs via the Sussex Biodiversity Partnership on a five yearly basis. This BAP will be reviewed in 2009.

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- WSCC 2003. Minerals Local Plan. WSCC.

## Useful Websites

- Minerals and nature conservation forum website: [www.qpa.org/natureconservation](http://www.qpa.org/natureconservation)
- OPA website: [www.qpa.org](http://www.qpa.org)
- MIRO: [www.goodquarry.com](http://www.goodquarry.com) and [www.mi-st.org.uk](http://www.mi-st.org.uk)
- West Sussex County Council: [www.westsussex.gov.uk](http://www.westsussex.gov.uk)
- Hanson: [www.hanson-europe.com](http://www.hanson-europe.com)
- RMC: [www.rmc.co.uk](http://www.rmc.co.uk)
- Tarmac: [www.tarmac.co.uk](http://www.tarmac.co.uk)
- Aggregates Industries: [www.aggregate.com](http://www.aggregate.com)
- The UK Biodiversity Action Plan: [www.ukbap.org.uk](http://www.ukbap.org.uk)
- The Sussex Biodiversity Action plan *From Rio to Sussex*: [www.biodiversitysussex.org](http://www.biodiversitysussex.org)
- The National Biodiversity Network: [www.nbn.org.uk](http://www.nbn.org.uk)
- Country Land and Business Association: [www.cla.org.uk](http://www.cla.org.uk)
- Department for Environment, Food and Rural Affairs: [www.defra.gov.uk](http://www.defra.gov.uk)
- English Nature: [www.english-nature.org.uk](http://www.english-nature.org.uk)
- Environment Agency: [www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)
- Farming and Wildlife Advisory Group: [www.fwag.org.uk](http://www.fwag.org.uk)
- Royal Society for the Protection of Birds: [www.rspb.org.uk](http://www.rspb.org.uk)
- Sussex Wildlife Trust: [www.sussexwt.org.uk](http://www.sussexwt.org.uk)
- The Association of United Kingdom RIGS Groups: [www.ukrigs.org.uk](http://www.ukrigs.org.uk)

## 15. CONSULTATION

This BAP has been prepared in close consultation with the West Sussex Mineral Sites BAP Working Group, which comprises representatives from:

Hanson plc  
Land Management Services  
RMC plc  
Royal Society for the Protection of Birds  
Sussex Biodiversity Partnership  
Sussex Regionally Important Geological and Geomorphological Sites group (RIGS)  
Sussex Wildlife Trust  
Tarmac plc  
WSCC Environment and Economic Policy Service  
WSCC Planning Service

Other organisations consulted on drafts of the West Sussex Mineral Sites BAP:

Council for the Protection of Rural England  
Country Landowners Association  
Department for Environment, Food and Rural Affairs  
English Nature  
Environment Agency  
Sussex Biodiversity Records Centre

# APPENDICES

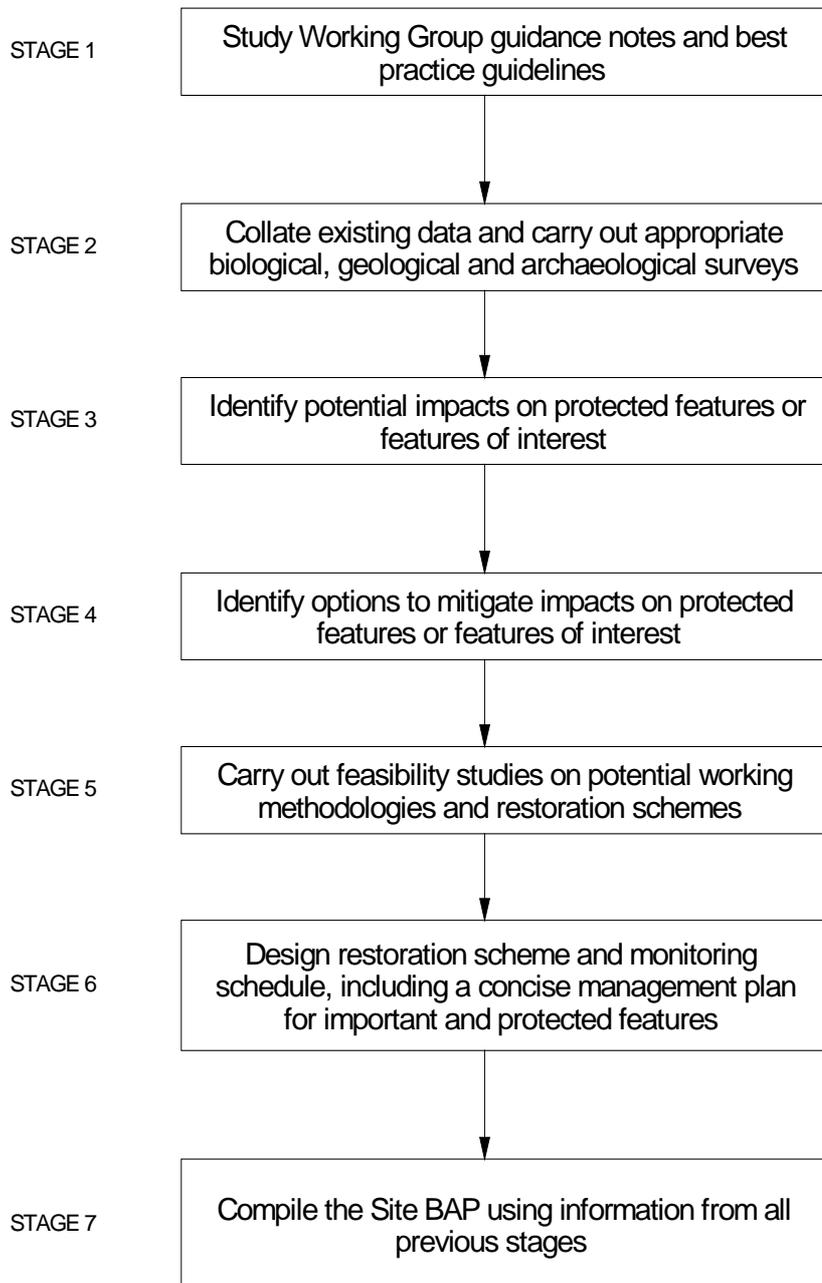
## Appendix 1

### Glossary of acronyms used in the text

ALSF	Aggregates Levy Sustainability Fund
AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BM	Booth Museum of Natural History, Brighton
CS	Countryside Stewardship Scheme
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EN	English Nature
ESA	Environmentally Sensitive Area
FC	Forestry Commission
HAP	Habitat Action Plan
HLF	Heritage Lottery Fund
LA	Local Authorities
LNR	Local Nature Reserve
MIRO	Minerals Industry Research Organisation
MIST	Minerals Industry Sustainable Technology
MLP	Minerals Local Plan
MO	Mineral Operators
MPA	Mineral Planning Authority
MPG	Mineral Planning Guidance
NGO	Non-Governmental Organisation
PPG	Planning Policy Guidance
QPA	Quarry Products Association
RDB	Red Data Book
RIGS	Regionally Important Geological or Geomorphological Site
ROMP	Review of Old Mineral Permissions
RSNC	Royal Society for Nature Conservation
RSPB	Royal Society for the Protection of Birds
RTPI	Royal Town Planning Institute
SAC	Special Area for Conservation
SAMSA	Silica and Moulding Sands Association
SAP	Species Action Plan
SBP	Sussex Biodiversity Partnership
SNCI	Site of Nature Conservation Importance
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWT	Sussex Wildlife Trust
SxBRC	Sussex Biodiversity Record Centre
WGS	Woodland Grant Scheme
WSCC	West Sussex County Council

## Appendix 2.

### Seven main stages to preparing a site BAP



#### Notes

Stage 1: The Working Group will prepare and collate guidance notes and best practice guidelines as a priority action under the Mineral Sites BAP

Stage 2: Potential sources of data are SxBRC, WSCC and the Booth Museum

Stage 5: Select possible restoration options with reference to UK and Local BAP targets. Consider the long-term potential for LNRs, recreation, transfer of ownership, future management of the site etc.

Stage 6: Monitoring should include simple methods such as photographic monitoring and population census for key species. The management plan should cover all stages of the restoration process and include a risk assessment for loss or damage to features of importance

## APPENDIX 3 CASE STUDIES

### Drayton Quarries, West Sussex

#### Background

The Drayton sand and gravel quarries lie to the southeast of Chichester in West Sussex. The northern quarry is already worked for its aggregates by Tarmac plc, whilst the southern section is a new extension to the site.

The original land-use at Drayton South, prior to mineral extraction, was intensive arable farming and ecological surveys of the site found it to be of minimal wildlife value. Instead of returning the land to agricultural use the Mineral Planning Authority and Tarmac plc have agreed a restoration scheme to habitats of high nature conservation value.

The total area of the two quarries is in the region of 30ha, divided into approximately 13ha at Drayton North and around 17ha at Drayton South. Of the southern extension nearly 12ha will be worked and a buffer of between 5m and 10m will remain un-worked around the periphery of the site, amounting to about 5ha in total.

#### The restoration scheme

Sand and gravel extraction from Drayton South will take place over a 3-4 year period in three phases of between 12 and 15 months each with a progressive restoration scheme that



will be implemented as soon as each phase of quarrying is finished. The quarry will be worked wet so no de-watering will be necessary over the active phase of the site.

Before extraction commenced an advanced tree and shrub planting programme was undertaken to enhance an existing, gappy hedgerow, plant a new hedgerow and create an avenue of oak trees along the track that separates the two halves of the site.

The restoration scheme for Drayton South is based around

an extensive freshwater lake with areas of reedbed, surrounded by a mosaic of species rich grassland and woodland. This scheme will complement the proposed restoration of Drayton North, which will be to a similar suite of habitats.

The main elements of the restored Drayton South quarry will be:

- A freshwater lake of approximately 11.5ha with scalloped, graded margins, reedbeds, shallows, deep pools, gravel beaches and islands
- 2.3ha of grassland margins including a series of seasonal wetlands, scrapes and shallow ponds
- 1ha of woodland and scrub, comprising 0.5ha of broadleaved woodland, 0.1ha scrub and 0.4ha of willow carr/wet woodland
- Additional features such as tern rafts, bird nesting boxes and bat boxes will also be incorporated into the restored site

## **The Lake**

The lake will be the main feature of the restored site. It will be primarily groundwater fed with some surface water input and the natural hydrological movement through the site will be maintained by retaining uncovered gravel beaches above and below the waterline on the north and south lake margins. This will allow an unimpeded flow of groundwater across the site.

The lake will have a variety of features to benefit different kinds of wildlife, including some muddy margins, often favoured by invertebrates, as well as gravel beaches that are attractive to birds such as little ringed plover. There will be shallows where water is warmer



and aquatic plants can colonise, deeper areas for diving birds, islands safe from predators and tern rafts for nesting birds. Diverse, scalloped margins with spits and inlets of varied height, depth and gradient will further increase the value of the lake to fauna and flora.

The reedbeds will be partially planted to about 20% cover with the rest of the area left to natural colonisation. The scrapes and shallow ponds will be planted with appropriate native wetland plant species such as water mint and water forget-me-not. Native stock will be used for all the planting on the site, where possible using locally sourced material.

The larger of the islands in the lake will not only have value to wildlife but will also protect an area of archaeological interest. The island outcrop will be excluded from extraction, as will a second area of archaeological value on the shore of the lake.

## **Grassland**

The grassland fringe around the lake will be seeded using an appropriate mixture of native, local provenance wildflower and grass seed. It will be managed to promote a mosaic of micro-habitats including bare ground, short sward, dense tussocks, rank grassland and scrub leading from the waterline to the wooded areas.

Grassland management will be by a varied mowing regime, with removal of cut material to maintain low soil fertility. Some control of pernicious weed species such as creeping thistle, ragwort and dock that might occur as a legacy of the former land use may be necessary.

## Woodland

A mixture of appropriate species of native trees and shrubs such as oak, ash, hawthorn, hazel and field maple, if possible of local provenance, will be planted around the site margins to create areas of woodland with scalloped edges that grade into the scrub and grassland mosaic.

Native black poplar will be used as a component of the wet woodland along with willows and alder.

## Soils

Some of the topsoil from the site will be used in the restoration works, for example on the lake margins in places where reedbed is planned. Because of the progressive restoration of the site, topsoil and subsoil stripped from an area to be worked can be replaced immediately on parts of the previously extracted phase, which will minimise possible degradation of soils through unnecessary storage and handling. The lower fertility topsoil and subsoil will be used in the proposed grassland areas because limited soil fertility is more conducive to the development of species rich grassland and there is likely to be a heavy weed seed bank in the most fertile topsoil.

## Aftercare period

A particularly important feature of the restoration scheme is the agreed 10-year aftercare period (rather than the usual 5 year period).

Tarmac plc plan to hold annual aftercare meetings throughout the 10-year aftercare period with the Mineral Planning Authority and all parties with a legal interest in the site to inspect and review the restoration and aftercare progress.

## BAPs

The Drayton South Quarry restoration scheme has taken account of both national and local Biodiversity Action Plans and is intended to make a contribution to the following:

### Habitat Action Plans

Reedbed  
Wet woodland  
Open standing water  
Unimproved neutral grassland  
Ancient and/or species rich hedgerows  
Broadleaved woodland

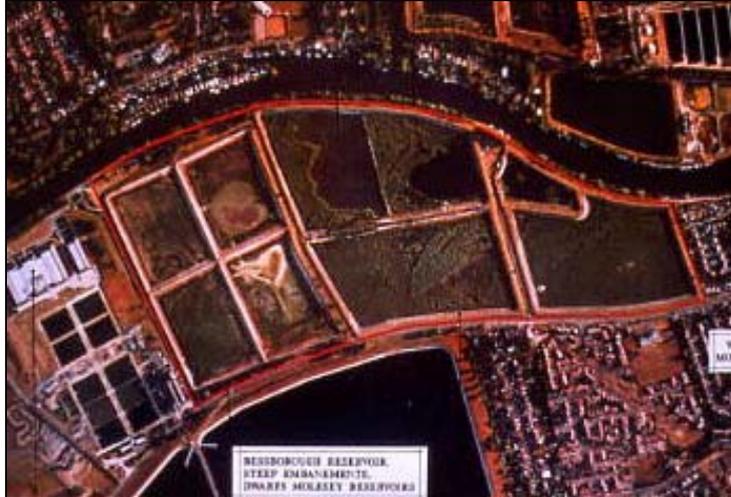
### Species Action Plans

Black poplar  
Scarce chaser dragonfly  
Great crested newt  
Song thrush  
Reed bunting  
Water vole  
Pipistrelle bat  
Otter



## Molesey Reservoirs, Surrey

Molesey Reservoirs are located on the south bank of the Thames, and comprise some eight Thames Water owned concrete basins, known as the Chelsea & Lambeth Group.



The Surrey Minerals Local Plan identified the site for future mineral working. Working in partnership with Thames Water and the extraction company, Island Barn Aggregates (a joint venture company between RMC and Lafarge), a restoration led extraction scheme was put together. This will deliver a 60 ha wetland reserve, with public access, on completion of working.

The site was identified in the then proposed SW London Reservoirs and Gravel Pits Special Protection Area (SPA), being of international importance for wintering waterfowl. However, because the reservoirs had been decommissioned and drained down, the wintering waterfowl interest had declined. It was therefore agreed that the best way forward was to work the site for sand and gravel, and recreate the wetland interest. Because of the phased working of the site, the opportunity also existed to re-flood some of the basins to maintain the wetland interest, in advance of restoration.

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Works commenced in 1999, and the first phase is currently under restoration. On completion in 2009, it will create open water, seasonally flooded grassland, mudflats, and a 5 ha reedbed. Whilst the site is isolated and secure from public disturbance to the wildlife, new access will be created with viewing areas which do not detract from this. This will utilise the existing features of the reservoirs, and link to interpretation of the site's industrial water industry past.

Aside from being a genuine restoration led scheme, which seeks to compliment and reinforce the designated SPA, this site is notable for its enhancements that have been undertaken both before and during mineral working.

Because the site's water levels had been drained down following decommissioning by Thames Water, the base of the reservoir basins had undergone a rapid colonisation by water plants. A considerable plant resource existed on site which could be utilised in the final restoration, and so a wetland plant retrieval excise was undertaken. This involved the creation of a wetland plant holding area or nursery, where water levels are carefully regulated, to store the plants. The nursery has proved to be excellent habitat in its own right with breeding reed & sedge warblers. Common reed dominated the plant retrieval, but rush, sedge and various other wetland plant species were also retrieved. The Company's staff also designed and built their own digger bucket to lift the plants like floor tiles.



Elsewhere, willow colonisation caused a particular problem. The longer it was left in advance of extraction, the greater the clearance expense would be. Surveys revealed that this was limiting the ecological value of the site, with declining bird nesting as it developed from scrub into semi mature stands. The opportunity was taken to remove the willow by flailing it, and then re-flooding the areas concerned. Very shallow water levels have led to counts of 27+ snipe being flushed off the willow cleared areas, as well as innumerable other wader species including sandpiper, redshank, lapwing, and last autumn the arrival of avocet on site.



Other cleared areas have been flooded to deeper levels for waterfowl. The removal of the willow has allowed the development of marginal aquatic plants including reed, reedmace and sedge. This is generating excellent numbers of wintering waterfowl, with water levels being targeted to meet the needs of the two SPA species, gadwall and shoveler.



The site is subject to the national wetland bird survey counts (WeBS). As part of the ongoing monitoring of the site these counts have been increased from a monthly to weekly basis, working closely with local birdwatchers.

Water levels and water level control are critical in any wetland scheme, and the Company has been undertaking extensive works and trials to ensure that it can control the water levels as desired, once the site is restored. This has utilised much of the original Victorian reservoir pipework, but also the installation of new works, a significant engineering task itself. Using areas yet to be worked as a test bed to ensure the system effectively works, has also enabled habitat to be manipulated in association with the willow clearance in advance of extraction.



The correlation between mineral sites and sand martins is critical. A recent survey undertaken by the County Council in association with the Surrey Bird Club revealed just how important this is. Sand martin colonies can be a problem to mineral operators, interrupting activity by utilising the quarry's operational sand faces. At Molesey, to avoid this, specific sand matins faces were cut, with the result that in 2001 the site held Surrey's largest sand martin colony, and no disruption to extraction activities resulted.



A local liaison committee exists for the site, and visits for local residents and interest groups such as RSPB and Wildlife Trust have been undertaken.

In 2002 The County Council gave Island Barn Aggregates a restoration and enhancement Award, in recognition of the work that has been achieved to date. Molesey remains a 'flagship' example of the contribution the Minerals industry is making to improve Surrey's biodiversity.

## APPENDIX 3 CASE STUDIES

### Lydd Quarry at Dungeness

#### Introduction

The former Lydd quarry at Dungeness has been the site of gravel extraction since the 1930's



The site is located approximately 25 km south east of the town of Ashford in Kent and accessed via the B2075 near Lydd. It is situated within the Dungeness headland, which is the largest shingle landscape in Britain, and of its type in the world.

Extraction operations at Lydd quarry ceased in the 1990's although links with the neighbouring RSPB reserve (the oldest in the UK, having been established in 1931) had been forged since the early 1960's. Since that time, both the RSPB and Hanson (and their predecessors) have worked in partnership to progressively create new and better habitats which have greatly increased the wildlife and bird interest on the site. Features established as a result of gravel extraction include freshwater lakes, islands and wetlands. In addition, the RSPB have put in place extensive facilities for the 25,000 + visitors who come to the reserve each year to enjoy the unique landscape and first class birdwatching opportunities.

The QPA award submission area is in fact made up of four separate areas, each having been worked and restored during a separate period over the overall site's history. This long tradition of gravel extraction on the headland has been characterised by the increasingly difficult task of obtaining planning permissions, reflecting the changing nature of how the whole Dungeness landscape has been viewed since the Second World War.

A key feature of restoration work since the 1960's has been the part played by the RSPB, who have contributed knowledge, skill, time and effort in helping Hanson and its predecessors create many of the high quality habitats that visitors can now enjoy at the Dungeness RSPB reserve.

## **Working and Restoration Process**

**The unique shingle landscape at Dungeness with very little overburden and few initial planning conditions meant that working the area in the 1950's and 1960's was very profitable**

The first excavations at Dungeness were shallow operations worked by hand until the introduction of mechanical shovels in the 1930's. After uncertainty during the war years, two large IDO permissions were granted in the late 1940's which effectively launched the beginning of large scale gravel extraction operations in the area.

Most of the initial deposits were worked using excavators filling boats and barges which would unload at the plant site. As works progressed south of Dungeness Road, extraction techniques changed to the use of dragline excavators, loading shovels and conveyors to feed the plant. This method was effectively in use for 30 years or more, creating the large open waterbodies characteristic of post war restoration at Lydd.

It was during these early years that the relationship between ARC and the RSPB was initiated and subsequently became an increasingly important part of the overall long term restoration concept at Lydd.

**A process of continual improvement in restoration methods has ensured that each long term phase of the overall restoration has been of better quality than the last.**



In the late 1960 'S the RSPB agreed with ARC (now Hanson) to release a 46 hectare block of land that had previously been disturbed and ecologically degraded by military activity, which helped in gaining planning permission for gravel extraction. The agreement worked well for both parties, with the RSPB contributing significantly to the restoration, both in terms of planning and in how design objectives were carried out.

Burrows Pit as it is known, was worked from 1970 until 1977 and by the time it was finished there were already over 180 pairs of common terns and 160 pairs of black headed gulls nesting on its islands. These had been specially created at sufficient distance from the shoreline and with gently sloping, scalloped banks in order to provide ideal habitat for many bird species. Varieties of ducks and grebes were also increasing and the scheme had proved that restoration quality can be enhanced when specialist advice and guidance is provided from the outset.

Since 1980, further areas have been worked as part of the operation, the eventual restoration of each benefiting from early involvement by the RSPB



In 1987 permission was finally granted for the extraction of mineral in the Walkers Outland area, following lengthy and extensive consultation regarding the potential effects of the works re. derogation of the main aquifer. During this time, and throughout the operation itself, both the Company and the RSPB developed their relationship and particular attention was paid to the effect of silting operations from the dredger. The deposited silt proved to enhance the quality of the restored wetlands and was thereafter a feature of subsequent further restoration work both on Burrows Pit and Walkers Outland.

Following the success of Walkers Outland, the Company realised that further permissions on the beach shingle area would be difficult to obtain, and instead focussed attention on the more marginal gravels to the west. This would involve working the deposits in long, narrow strips, stripping agricultural soils where necessary and safeguarding the aquifer. Dengewest South, as the area was known, received planning permission in 1993 and extraction lasted approx. 6 years.

### **The Dengewest South area provided new challenges both in the extraction and eventual restoration of the site**

Apart from having to strip the agricultural soils present on site, which hadn't been the case elsewhere, the working method for Dengewest South required the use of dump trucks and excavators rather than draglines and conveyors. The linear, narrow water bodies that resulted were then planted with marginal species and the land between the lakes restored where necessary to low density grazing land.

The RSPB encouraged the Company to create restoration habitats that would compliment the more open lake and island type landscape present on previous working areas. Whilst not as inviting to migrant and wading birds, Dengewest South will provide added ecological interest and diversity to the overall site, as it provides good habitat for a wide range of invertebrates.

The plant site within the original IDO area north of Dungeness Road was the last area to be restored and now forms part of the RSPB reserve at Dungeness. As with previous areas the continued input and guidance of the RSPB enabled Hanson to restore the area for the benefit of a variety of bird and other animal species. Various methods were used including island and beach creation, bund establishment for future hide locations and blocks of tree and shrub planting to provide cover and food.

## Site Use & Management

The RSPB reserve at Dungeness is internationally important for both its shingle landscape features and several non-avian species



As well as being the oldest RSPB reserve in the UK, the Dungeness reserve can claim to be one of the most diverse and interesting, with many nationally and internationally important species of flora and fauna within its 922.3 hectares, of which 210.2 hectares comprise the overall OPA award submission area.

The site is visited by over 25,000 people annually and their needs are catered for by a wide variety of first class facilities including a visitor centre with giftshop, picnic area (with disabled access), a number of spacious hides complete with interpretation boards and an extensive system of paths and trails. large car park with toilets,

The local community play a vital part in the success of the reserve, with a number of volunteer wardens always on hand to advise and good links with local schools and interest groups providing an important educational resource.

**Since 1997, the RSPB reserve has been incorporated in the Dungeness NNR, and contains over 60% of the undamaged shingle ridges**

The reserve acts as a major point of public access to the unique Dungeness landscape and the RSPB actively encourage visitors to experience at first hand what makes this area so special, both in pure landscape and geological terms as well as its diverse range of plant and animal life.

The visitor centre overlooking Burrows Pit provides a number of useful information sightings and the shop provides a good source of income. leaflets and volunteers are always on hand to answer questions about the reserve and the birdlife on it. Notice boards inform visitors of the latest bird

A number of hides are located around the man-made water bodies offering excellent year round birdwatching. Most are accessible by car and/or wheelchair and a network of trails offer visitors an ideal chance to explore.

The RSPB intends to develop the newly certified IDO Plant Site area to compliment and extend the main reserve, with a New car park, trails and hides built to overlook the large Wetland.

Additional proposals include a classroom extension to the visitors centre (2004) and further expansion of the successful education programme.

**If you would like a copy of this publication in another format (audio, Braille, large print, another language) please contact the Communications Officer, Environment and Development, The Grange, Tower Street, Chichester, West Sussex PO19 1RH  
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