

APPENDIX 1

HABITATS & SPECIES ESPECIALLY RELEVANT TO MINERAL WORKING

Table A **Habitats which could be associated with Mineral Workings**

Key Habitats (for which costed plans have been prepared).

Coastal and Floodplain Grazing Marsh*
Purple Moorgrass and Rush Pasture
Limestone Pavements
Ancient and/or Species Rich Hedgerows
Reedbeds*
Lowland Heathland*
Upland Oakwood
Saline Lagoons
Cereal Field Margins

* Habitats highlighted by the Royal Society for the Protection of Birds as especially important for biodiversity contributions from the minerals industry.

Key Habitats (for which costed plans will be prepared).

Upland Mixed Ash Woodland
Wet Woodlands
Lowland Wood Pasture and Parklands
Lowland Key Meadow
Lowland Dry Acid Grassland
Upland Calcareous Grassland
Eutrophic Standing Waters
Upland Heathland
Vegetated Shingle

The species identified in Tables B to F could potentially occur on land owned and managed by mineral companies. They are not limited to active or restored sites, but include species that may be found on company land holdings. Many species are protected by the Wildlife & Countryside Act (1981). The lists are not exhaustive: other species not in this or the BAP lists may still be important (eg badgers).

Table B Mammals which could be associated with mineral workings

| Latin Name | Common Name | Long | Middle | Short | Habitat, distribution |
|----------------------------------|-----------------------|------|--------|-------|--|
| <i>Arvicola terrestris</i> | Water Vole | | | ✓ | Banks associated with open water, lakes, ponds, rivers streams and ditches. |
| <i>Lutra lutra</i> | Otter | | | ✓ | Water bodies/watercourses and associated reedbed, osier carr etc. |
| <i>Lepus europaeus</i> | Brown Hare | | | ✓ | Associated with open farmland. Well distributed throughout England and Wales. |
| <i>Muscardinus avellanarius</i> | Dormouse | | | ✓ | Ancient woodland particularly hazel coppice. Restricted to South of England. |
| <i>Sciurus vulgaris</i> | Red Squirrel | | | ✓ | Broadleaved and coniferous woodland. Absent from most of England but still present in Northern areas and parts of Wales. |
| <i>Rhinolophus ferrumequinum</i> | Greater Horseshoe Bat | | | ✓ | Roost in roofs of caves, mines or buildings. Confined to South West England and South Wales. |
| <i>Pipistrellus pipistrellus</i> | Pipistrelle Bat | | | ✓ | Commonest and most widespread British bat - roosting in houses and tree holes. |
| <i>Myotis daubentonii</i> | Daubenton's Bat | ✓ | | | Often associated with water. Inhabits open woodland, hibernates in caves and other underground sites. |
| <i>Plecotus auritus</i> | Brown Long-eared Bat | ✓ | | | Roosts in houses, hibernates in underground sites. |
| <i>Plecotus austriacus</i> | Grey Long-eared Bat | ✓ | | | Similar to Brown Long-eared Bat. Restricted to South West England. |
| <i>Rhinolophus hipposideros</i> | Lesser Horse Shoe Bat | ✓ | | | Associated predominately with large old buildings. Restricted to Wales and South West England. |

Table C Birds which could be associated with Mineral Workings

| Latin Name | Common Name | Long | Middle | Short | Habitat |
|--------------------------------|---------------------------|------|--------|-------|--|
| <i>Acrocephalus paludicola</i> | Aquatic Warbler | | | ✓ | Autumn migrant to wetland sites along the south coast from Kent to Cornwall. |
| <i>Alauda arvensis</i> | Skylark | | | ✓ | Associated with open farmland (Resident). |
| <i>Botaurus stellaris</i> | Bittern | | | ✓ | Reed beds. Breeding birds confined to few known sites in East Anglia and Lancashire. (Resident). |
| <i>Perdix perdix</i> | Grey Partridge | | | ✓ | Lowland farmland, associated with grassy hedge banks and cereal field margins. (Resident). |
| <i>Lullula arborea</i> | Woodlark | | ✓ | | Heathland and Breckland. Restricted southerly distribution to a number of discrete heathland areas. (Resident/summer visitor). |
| <i>Streptopelia turtur</i> | Turtle Dove | | ✓ | | Lowland bird, feeding on open farmland. Associated with South and South East England. (Summer visitor). |
| <i>Accipiter nisus</i> | Sparrowhawk | ✓ | | | Breeds in woodland and scrub-distributed throughout England. (Resident). |
| <i>Alcedo atthis</i> | Kingfisher | ✓ | | | Feeds in shallow and slow moving freshwater. Nests in burrows in sandy/muddy steep banks. (Resident). |
| <i>Dendrocopos major</i> | Great Spotted Woodpecker | ✓ | | | Prefers mature broadleaved woodland but also found in plantation woodland. Distributed throughout country. (Resident). |
| <i>Dendrocopos minor</i> | Lesser Spotted Woodpecker | ✓ | | | Almost exclusively associated with broadleaved woodland. Restricted to Wales, South and West England and Midlands. (Resident). |
| <i>Riparia riparia</i> | Sand Martin | ✓ | | | Nests communally in sandy banks and gravel pits. (Summer visitor). |
| <i>Strix aluco</i> | Tawny Owl | ✓ | | | Woodland bird, also nesting in trees in farmland and gardens. (Resident). |

Table C (continued)

| Latin Name | Common Name | Long | Middle | Short | Habitat |
|------------|--|------|--------|-------|--|
| [Wildfowl] | Pintail, Shoveler, Teal, Wigeon, Mallard, Garganey, Gadwall, Tufted Duck and Goldeneye | ✓ | | | Open waters with good marginal habitat. Breeding species |
| [Waders] | Jack Snipe, Greenshank and Redshank | ✓ | | | Wetland, waterbody margins. Breeding species |

Table D Amphibians and Reptiles that could be associated with Mineral Workings

| Latin Name | Common Name | Long | Middle | Short | Habitat |
|----------------------------|--------------------|------|--------|-------|--|
| <i>Triturus cristatus</i> | Great Crested Newt | | | ✓ | Aquatic habitats for breeding preferring still, slow flowing with good weed growth. Terrestrial outside breeding season. |
| <i>Triturus helveticus</i> | Palmate Newt | ✓ | | | Variety of still, shallow waterbodies including ponds, heath and woodland pools. Prefers clear, acid water. |
| <i>Triturus vulgaris</i> | Smooth Newt | ✓ | | | Variety of damp habitats. Breeds in still, shallow water (ponds, ditches etc.). |
| <i>Lacerto agilis</i> | Sand Lizard | | | ✓ | Restricted to coastal sand dunes and sandy heaths. |
| <i>Bufo bufo</i> | Common Toad | ✓ | | | Variety of often fairly dry habitats. |
| <i>Rana temporaria</i> | Common Frog | ✓ | | | Wide range, largely terrestrial occurring in damp areas. Found in waterbodies during breeding. |
| <i>Anguis fragilis</i> | Slow Worm | ✓ | | | Pastures, heather and hedgebanks. |
| <i>Natrix natrix</i> | Grass Snake | ✓ | | | Snake of damp places, swims well and may hunt in waterbodies. |

Table E **Invertebrates that could be associated with Mineral Workings**

| Latin Name | Common Name | Long | Middle | Short | Habitat |
|--|--|------|--------|-------|--|
| <u>Butterflies:</u> | | | | | |
| <i>Boloria euphrosyne</i> | Pearl-bordered Fritillary | | | ✓ | Woodland clearings in England and Wales, more common in south. |
| <i>Aricia artaxerxes</i> * (<i>Subsp. salmacis</i>) | Northern Brown Argus (Durham Brown Argus) | ✓ | | | Rough grassy banks and hillsides. (Southern race occurs from Derbyshire to Scottish Border). |
| <i>Plebejus argus</i> * | Silver Studded Blue | | ✓ | | Heathland, also occurs on chalk/limestone grassland. |
| <i>Lysandra bellargus</i> * | Adonis Blue | | ✓ | | Restricted to South England chalk and limestone hills and lowlands. |
| <i>Cupido minimus</i> * | Small Blue | ✓ | | | Chalk/limestone grassland. |
| <i>Maculinea arion</i> | Large Blue | | | ✓ | Reintroduced species – rough southern grassland with wild thyme and <i>Myrmica</i> ants. |
| <u>Other invertebrates:</u> | | | | | |
| <i>Hirudo medicinalis</i> | Medicinal Leech | | | ✓ | Muddy ponds, poached edges. |
| <i>Nematostella vectensis</i> | | | | ✓ | |
| <i>Edwardsia ivelli</i> | | | | ✓ | |
| <i>Libellula fulva</i> | Scarse Chaser Dragonfly | ✓ | | | River floodplains, water meadows and occasionally gravel pits. Preference for nutrient rich backwaters with prolific emergent vegetation. |

* Identified by Butterfly Conservation as associated with Mineral Workings.

Table F **Vascular plants which could be associated with Mineral Workings**

| Latin Name | Common Name | Long | Middle | Short | Habitat |
|-------------------------------------|------------------------------|------|--------|-------|---|
| <i>Ajuga chamaepitys</i> * | Ground Pine | ✓ | | | Known from small scale abandoned chalk quarry workings in North Kent. |
| <i>Alisma graminea</i> | Ribbon-leaved Water-plantain | | | ✓ | Shallow water/eutrophic. Main site is artificial lake. Very rare. |
| <i>Arabis glabra</i> | Tower Mustard | | ✓ | | Dry grassy, rocky and waste places. Decreasing England only. |
| <i>Arabis scabra</i> | Bristol Rock-cress | ✓ | | | Limestone rocks near Bristol. Very rare. |
| <i>Arenaria norvegica anglica</i> | English Sandwort | ✓ | | | Bare limestone, Yorkshire. Very rare. |
| <i>Carex humilis</i> | Dwarf Sedge | ✓ | | | Short turf inspp rich limestone/chalk grassland. Very common. |
| <i>Carex muricata ssp. muricata</i> | Prickly Sedge | | ✓ | | Very rare on steel dry limestone slopes. |
| <i>Chamaemelum nobile</i> | Wild Chamomile | ✓ | | | Short grassy places on sandy soils. Central/southern England. |
| <i>Dianthus armeria</i> | Deptford Pink | | ✓ | | Rare on gravel pits and banks and other open and disturbed places. Southern. |
| <i>Filago gallica</i> | Narrow-leaved Cudweed | ✓ | | | Sandy and gravelly ground. Introduced. <u>Now extinct except Sark</u> (formerly South England). |
| <i>Filago lutescens</i> | Red-tipped Cudweed | | ✓ | | Bare sandy places. Very local and decreasing in South and East England. |
| <i>Filago pyramidata</i> * | Broad-leaved Cudweed | | ✓ | | Rare on sandy soils in South England. Present in bottoms of worked out chalk pits. |
| <i>Fumaria purpurea</i> | Purple Ramping Furnitory | | ✓ | | Rare in waste places and other artificial habitats. Scattered but western endemic. |
| <i>Gentianella anglica</i> * | Early Gentian | | | ✓ | Successfully colonised some small scale chalk and limestone quarries in Lincs and Glos. |
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Table F (continued)

| Latin Name | Common Name | Long | Middle | Short | Habitat |
|--|--|------|--------|-------|--|
| <i>Gentiana verna</i> | Spring Gentian | ✓ | | | Stony grassy places on limestone. North England - very local. |
| <i>Herniaria glabra</i> | Glabrous Rupture-wort | ✓ | | | Dry sandy places, very localised and decreasing, East Anglia. |
| <i>Hypochaeris glabra</i> | Smooth Cats-ear | ✓ | | | Grassy/open ground on sandy soils. Decreasing. |
| <i>Luronium natans</i> | Floating Water-plantain | | | ✓ | Acidic oligotrophic lakes, (2m of mud), sometimes mesotrophic. North West distribution. |
| <i>Ophrys sphegodes</i> | Early Spider Orchid | ✓ | | | Grassland or spoil/heaps on chalk or limestone - including quarry debris. Local, southern. |
| <i>Orchis militaris</i> | Military Orchid | ✓ | | | Chalk grassland/old chalk pit with invading trees and shrubs. Very rare (4 sites in Bucks and Suffolk). |
| <i>Orchis ustulata</i> | Burnt-tip Orchid | ✓ | | | Short grassland on chalk and limestone. Rare and local. |
| <i>Pilularia globulifera</i> | Pillwort | ✓ | | | Silty or gravelly mud by lakes, ponds, reservoirs. Submerged for at least part of year. On acid soil, including clay/gravel pits (especially new). |
| <i>Polemonium caeruleum</i> | Jacob's ladder | ✓ | | | Very localised (Peak District, Yorkshire Dales) on limestone grassland, scree and rock ledges. |
| <i>Potamogeton compressus</i> | Grass-wrack Pondweed | | ✓ | | Calcareous/mesotrophic water, often with rich associates. Recorded from a few flooded clay and gravel pits. Rare. |
| <i>Silene gallica</i> | Small-flowered Catchfly | | ✓ | | Waste, open, cultivated places on sandy and gravelly soil. Local and often casual. |
| <i>Teucrium botrys</i> | Cut-leaved Gernander | | | ✓ | Chalky fields/open habitats in chalk grassland. Very rare. Southern. |
| <i>Thlaspi perfoliatum</i> * | Perfoliate Pennycress (Cotswold Pennycress) | | ✓ | | Limestone spoil/bare stony l'stone in Wilts, Oxon, Glos, casual elsewhere. Known from quarry sites. |
| <i>Veronica spicata</i> (ssp <i>hybrida</i>) | Spiked Speedwell | ✓ | | | Limestone rocks in few scattered localities. |

* Identified by Plantlife as associated with mineral workings.

APPENDIX 2 OPPORTUNITIES FOR THE MINERALS INDUSTRIES TO ENHANCE HABITATS

| KEY HABITAT (for which costed Action Plans have been prepared) | TYPE OF MINERAL EXTRACTION | SPECIES (s) = short list (m) = middle list (l) = long list | EXAMPLES OF ACTION NEEDED WHEN KEY HABITAT IS CLOSE TO PROPOSED MINERAL WORKING SITE | OPPORTUNITIES DURING EXTRACTION | OPPORTUNITIES FOR ACTION BEFORE AND AFTER EXTRACTION |
|---|---|---|---|---|--|
| <p>COASTAL AND FLOODPLAIN GRAZING MARSH</p> <p>Southern England river valleys</p> <p><i>(RSPB priority area)</i></p> | <p>Floodplain gravel extraction, coastal gravel extraction, river estuary extraction.</p> | <p>Particularly important for the number of breeding waders: snipe (l) lapwing (l) curlew (l) redshank (l) teal (l) shoveler (l) and over-wintering birds: Bewick swan (l) Whooper swan (l) On flooded grasslands: wigeon (l) teal (l) mallard (l) golden plover (l)</p> <p>High diversity of native plant species, and invertebrates</p> | <p>Mineral extraction in vicinity of coastal and floodplain grazing marsh could threaten the habitat if dewatering regime affects seasonal water levels and inundation. Action to isolate the effects of lowering the ground water is needed. No levels should be raised which would block flood waters or seasonal inundation.</p> | <p>e.g. Creation of ponds, wader scrapes and ditches could attract wildfowl during extraction and before final restoration completed.</p> | <p>Extraction should only occur on areas downgraded by drainage, flood defence works, neglect, eutrophication, etc. Ensure: restoration to levels that can be seasonally inundated; no blocks in flood plain; traditional water meadow management. Could be difficult restoring soil structure in such conditions. Would possibly need dewatering regime until structure stabilised. Would be difficult also on land backfilled with imported materials – pollution hazard, etc. Most of these sites tend to end up restored to water areas: as a result, aggregates extraction is seen as one of the major threats and a reason why such meadows have declined.</p> <p>There is potential for <u>extending</u> floodplains from areas previously above flood plain levels. For details of restoration requirements refer FS 24 of <i>Reclamation of damaged land for nature conservation</i>, HMSO. The type of grassland that can be created depends on the soil type, climate and drainage.</p> |

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| <p>PURPLE MOORGRASS AND RUSH PASTURE</p> <p>South West England</p> | <p>Hoggin, Old Red Sandstone, granite, slate.</p> | <p>Key species: Molinia caerulea Juncus acutiflorus</p> <p>associated with: Hypericum undulatum Carum verticillatum (l) Cirsium dissectum Crepis paludosa Plantanthera chlorantha Plantanthera biflora</p> <p>Marsh fritillary (s) Brown hairstreak Narrow-bordered bee hawk (l)</p> <p>curlew (l) snipe (l) barn owl (l)</p> | <p>When working land adjacent to this habitat care should be taken to ensure ground water conditions of the adjacent habitat are not altered. The effects of dust and noise pollution and general disturbance should be addressed, e.g. suitable buffers introduced. The role of the proposed working site as a hinterland to the key habitat should be assessed.</p> | <p>Existing old buildings on the proposed working site near this key habitat could be adapted to attract barn owls as they forage on these pasture lands.</p> | <p>Creation of habitat is possible with different soil drainage regimes to create a mosaic with areas suitable for wet heath, dry grassland, swamp and scrub, and some areas poorly drained specifically for molinia and juncus. Works best when introduction of species from adjacent habitats involving natural colonisation. Ensure pH and nutrients remain low. Habitat creation can only be achieved where soil, aspect and climatic considerations are favourable. Consideration should be given to creating edge habitats of scrub, woodland and grassland, as appropriate, possibly designed-in as part of buffer zones prior to extraction taking place. Detailed care with drainage, soil structure, nutrient levels necessary (as with all restorations), but there is far less margin for error in achieving this intended habitat. Much of this habitat which remains is fragmented and isolated. Extension by creating new areas and/or linking fragmented strands could be valuable.</p> |
| <p>LIMESTONE PAVEMENTS</p> | <p>Carboniferous limestone</p> | <p>Rich in vascular plants, bryophytes and lichens. Unusual combinations of plants.</p> | <p>If limestone pavements are within an area or adjacent to an area of excavation care should be taken to ensure that the habitat is maintained, and that where left in isolated areas there is a sufficient margin to ensure both landscape integration and habitat conservation.</p> | <p>Limestone pavements are a scarce and non-renewable resource which cannot be recreated.</p> | <p>Limestone pavements are a geological feature incapable of reconstruction on fresh exposed limestone, and therefore should not be worked. Any reinstatement of surrounding land should reflect and complement the geological and habitat value of the resource.</p> |

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| <p>ANCIENT AND/ OR SPECIES RICH HEDGEROWS</p> | <p>All types of mineral extraction.</p> | <p>Ancient Hedgerows defined as those in existence before between 1720 and 1840. Species rich hedgerows are defined as: In a 30 m length - In Southern England, where there are 5 or more woody species. In Northern England, where there are 4 or more woody species., Or - less, in both the North and South, where there is a rich basal flora of herbaceous plants.</p> | <p>Where hedgerows come adjacent to workings sufficient buffer should be allowed to ensure their survival. The width of the margin necessary will vary according to soil type and with type and condition of species in the hedgerow. Landscape criteria should also be considered and care in design should ensure that hedgerows are not cut off, left isolated or without function. Their link in an overall pattern of wildlife corridors should be understood. Management of <u>all</u> hedgerows in ownership should be undertaken in accordance with Habitat Action Plan.</p> | <p>Preserved hedgerows and neighbouring hedgerows should be seen as a valuable resource during extraction for sources of wildlife which may colonise both the working phase, as well as the final restorations. They are wildlife corridors for the dissemination of species.</p> | <p>Ancient hedgerows should be preserved. Where within or adjacent to the workings they are a valuable resource for linking in with reinstated, and/or newly created hedgerows. When recreating hedgerows or creating new ones design should reflect the local type of hedge in both structure and species .(eg, banks, stonewalls, ditches, trees, wide margins and verges.) Existing hedgerow species should be emulated. Stock should be native and if possible local —raised from on-site source materials. Protection from vermin will be necessary until the hedge is established. This will also help with natural recolonisation by local species, which should not be removed or weeded out. Design in the final after use should ensure there is a proper function for the hedge and continuity in landscape terms.</p> |
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| <p>REEDBEDS <i>(RSPB priority area)</i></p> | <p>Flood/river valley gravel extraction. Others where excavation is taken below the watertable e.g. clay, sand, sand and gravel</p> | <p>Phragmites australis A wide distinctive breeding bird assemblage including 6 nationally rare Red Data Birds:- Bittern (s) Marsh Harrier (l) Crane(l) Cetti's warbler(l) Savi's warbler (l) Bearded tit (l) 5 Red Data invertebrates</p> | <p>Adjoining reedbed communities are dependent on maintenance of water levels. Dewatering of extraction areas must not jeopardise groundwater levels.</p> | <p>Colonisation by waders and waterfowl may start as soon as waterbodies are created within extraction areas.</p> | <p>Many opportunities for large stands and smaller littoral areas on edge of lakes. Must ensure correct final levels so that water table is at or above ground level for most of the year. Phragmites will withstand wide range of conditions from oligotrophic to eutrophic, but is reliant on an organic content between 30-60%. It is therefore important that all organic content of topsoil stripping is maintained. Many river valleys have rich deposits of organically rich alluvium and peaty deposits above the overburdens and this should be conserved with care. Continued management of the Reedbeds is necessary as it is a sub-climax community and will gradually be invaded by willow and alder carr.</p> |
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| <p>LOWLAND HEATHS <i>(RSPB priority area)</i></p> | <p>Hoggin gravels Sand Clay China clay</p> | <p>Examples of plants specific to lowland heathland: Calluna vulgaris Ulex minor Ulex gallii (l) Erica tetralix Erica cinerea Vaccinium myrtillus Scirpus Sphagnum compactum</p> <p>Associated bryophytes and lichens.</p> <p>Examples of associated birds, amphibians, reptiles and invertebrates:- Skylark (s) Nightjar (m) Woodlark (l) Sparrowhawk (l) Sandmartin (in open faces) (l) Dartford Warbler (Dorset)(l)</p> <p>Palmate newt(l) Great Crested Newt(s)</p> <p>Slow-worm (l) Adder (l) Grass snake (l) Sand Lizard (s)</p> <p>Silver Studded Blue (m) Heath Fritillary (s)</p> | <p>One of the biggest threats to this habitat is fragmentation and isolation. When working adjacent or nearby operations should be seen as an opportunity to link isolated habitats by restoring to heathland, and allowing areas in ownership which have been agriculturally improved to revert to heath.</p> | <p>Examples of colonising species: Sandmartins may colonise open faces. Flexibility in area of working enables face to be abandoned until sand martins have left their burrows. Shallow pools, left behind working face in unrestored levels may be colonised by invertebrates and amphibians from conserved bordering heathlands. Sandbees and other invertebrates requiring open dry silt/sand conditions may colonise dry silt bed areas. Care should be taken of all recolonising species to ensure this resource is not wasted either during extraction or during the restoration phase.</p> | <p>It has been demonstrated that heathland can be created. The link with an existing heathland area is an important element in the success of the restoration as a source of plant material and recolonisation of all species. Areas of varying height suitable for woodland, scrub, bare ground, gorse, wet heath, bog and open water should be created to ensure the full range of conditions is available within the habitat. Careful soils handling and control of final levels, water levels and retention of low nutrient, neutral to acidic conditions is important.</p> |
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| <p>UPLAND OAKWOODS</p> | <p>Granite Slate Old Red Sandstone Sandstone</p> | <p>Oak (commonly sessile, but local variations of pedunculate) and birch in the canopy. Understorey of holly rowan, and hazel. Ash and elm on lower richer part of slope. Examples of other species: Dogs Mercury False brome Ramsons Enchanters Nightshade Tufted hair grass Sphagnum mosses Many ferns, lichens and liverworts, especially in the oceanic S.W. Distinctive breeding bird assemblage: Redstarts (I) Woodwarblers (I) Pied flycatcher (I)</p> | <p>Areas of oak woodland adjacent to extraction should be protected by buffer zones to ensure ground water and stability are not endangered. The community exists on slopes with a wide range of water and nutrient conditions which create the opportunity for a rich biodiversity of plants and animals.</p> | <p>These woodlands should not be disturbed,</p> | <p><u>For creation</u>, best if allowed to recolonise naturally from <u>native stock</u> but will take long time and need seral community established first to ensure the richness of vascular plants associated with this habitat. Needs local source nearby. Climate, aspect, slope, drainage are critical. Experiments should be carried out first to ensure creation is feasible on natural protected unworked areas adjacent to existing oak woodland. Best likelihood of success would be in areas where the woodland has either been removed or degraded in the distant past so that the right soil and climatic conditions exist.</p> |
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| CHALK RIVERS | Chalk | <p>Characteristic plant community: River water crowfoot(l) Starworts Watercress Lesser water parsnip</p> <p>Rich diversity of invertebrate life supporting:</p> <p>Brown Trout Salmon (l) Brook Lamprey (l) Crayfish (s) Otters (s)</p> | <p>Must ensure that working of chalk quarries near chalk rivers does not jeopardise flow due to lowering of water table. No artificial techniques should be undertaken on the river itself to reduce such problems. All action taken to protect the rivers should be restricted to mineral extraction site or between the extraction site and the river. Artificial measures to counter loss of ground water such as sealing the bed of the stream can themselves have negative ecological effects.</p> | <p>If near to chalk rivers, otters could be using area delineated for extraction . Care should be taken not to disturb them.</p> <p>Both ground water levels and ground water quality should be maintained. Pollution with fines/silts would damage this habitat very quickly.</p> | <p>Unlikely that chalk rivers can be introduced into worked areas unless by lowering levels water table/aquifers are exposed and rivers/streams created through bottom of quarries. Possibilities should be looked for, but effect on aquifers and other streams taken into account. Opportunities in restoration plan should be sought to offer habitat for the otter.</p> |
| SALINE LAGOONS | Coastal sand/sand and gravel extraction | <p>Zostera communities supporting a variety of specialised invertebrates (eg <i>Nematostella vectensis</i> and <i>Edwardsia ivelli</i>) and waterfowl, marshland birds and sea birds.</p> <p>The juxtaposition of freshwater, brackish/ marine and lagoonal conditions means that the biodiversity is high.</p> | <p>Care should be taken to ensure aquifers are not polluted with salt due to unnatural lowering of water tables during dewatering periods. Conversely freshwater aquifers/groundwaters may “ pollute” existing saline lagoons and change their ecology if dewatering activities change ground water flows.</p> | | <p>Existing saline lagoons should not be disturbed. Possible creation where workings go below watertable on coastal sites or in areas where there are saline deposits near water table. There are opportunities here for extraction industry to make a good contribution since the habitat is, by nature, a transient one, and therefore needs replacement. Opportunities for creation of new lagoons following extraction could be explored further as many current lagoons are the result of past extraction.</p> |

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| <p>FENS</p> | <p>Lowland valley gravels</p> | <p>All types of fenland support a rich diversity of plants and animals, and most areas are already designated as SSSI/ASSIs</p> | <p>The industry can only contribute here by respecting fenland habitats and if working in their vicinity, ensure water levels are not changed during any phase of working, or restoration and by restoring land to a compatible use which will augment the habitat. Any fenland in the ownership of the industry should be managed in accordance with the BAP.</p> | | <p>The peatlands on which fens survive are irreplaceable because they have developed over geological time. Fenlands are a sub-climax community which need management. There are no opportunities for the industry to create peat, only to produce the correct conditions for marsh, e.g. phragmites communities; the climatic conditions and time span needed for peat formation are beyond control.</p> |
| <p>CEREAL FIELD MARGINS</p> | <p>All mineral extraction where agriculture is existing use, or where restoration is to agriculture.</p> | <p>Rare arable flowers:- Adonis annua (l) Centaurea cyanus (l) Euphorbia platyphyllos (l) Petroselinium segetum ((l) Scandix pecten-veneris (l) Valerianella dentata (l)</p> <p>Nesting and feeding sites for game birds, and some woodland nest builders. Some 2000 species of invertebrates including grasshoppers, butterflies, moths, and plant bugs.</p> | <p>All existing land in ownership should be managed in accordance with the BAP advice.</p> | <p>Buffers to headlands and hedgerows should be wide enough to allow colonisation. These areas will then be able to act as a source of plant and animal material for colonising restored areas.</p> | <p>Where restorations are to agriculture hedgerows should be incorporated into restoration plans, with wide margins and headlands allowed for colonisation by seral communities. Seeding and transplanting can help introduce species. Native stock should be used. Management of finally restored agricultural land should comply with the BAP advice on cereal field margins.</p> |

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| <p>DAMAGED LAND</p> | <p>All mineral workings</p> | <p>Specific groups of animals that are particularly associated with damaged land.</p> <p>-----</p> <p>BATS Greater Horseshoe Bat (s), Pipistrelle Bat (s), Daubenton's Bat (l) Brown Long-eared Bat (l) Grey Long-eared Bat (l) Lesser Horseshoe Bat (l)</p> | | <p>Derelict buildings and land left behind extraction, or in advance of working may provide new habitats for bats. Working practices should ensure that they are not disturbed.</p> | <p>Care is required to ensure that bats taking advantage of derelict buildings and land are not disturbed by the reclamation process. Opportunities for colonisation can be increased by design of restoration and after use. Their natural habitat requires a range of roosting sites for use throughout the year for resting, breeding and hibernation. They need access to a source of food which provides a range of insect life. Typical roosting sites:- tree hollows, tunnels, bridges, caves, mines, cellars, roof spaces, barns.</p> |
| | | <p>INVERTEBRATES</p> | | <p>Extraction and the creation of damaged land can provide opportunities for colonisation by a wide variety of invertebrate life due to the mosaic of habitats provided such as small pools and bare ground through all stages of recolonisation succession if left undisturbed. These invertebrates can support many other animals of nature conservation interest e.g. bats, as indicated above.</p> | <p>Restoration schemes should be designed to maintain as wide a variety of small habitats within the major reclamation as possible, even if final use is not for nature conservation. For example wide field margins, hedges, ponds, bogs, ditches, copses, field headlands can provide good habitats for surviving and colonising invertebrates. Management of land without the use of pesticides, and a varied use of land – grazing, trampling, and rotational use of crops with alternate areas being left open on an annual basis can allow colonisation from one area to another.</p> |

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| | | Dragonflies & Damselflies: Scarce Chaser Dragonfly (l) | | Areas of water left undisturbed during extraction can attract dragonflies and damselflies particularly if meadow, scrub, marsh and woodland are close by for feeding and roosting of the adult phase. | Dragonflies require a stable and undisturbed habitat of freshwater for the egg and nymph stages, and adjacent areas of meadow, marsh and scrub for the adult phase. Many mineral extraction restorations can provide the habitat required by these species if thought is given at the design stage. Water bodies should be designed with extensive areas of shallows to encourage an abundant growth of emergent vegetation. Bare areas of mud should also be retained. (Phragmites (reed beds) do not encourage dragonflies, however.) |
| | | Butterflies: Pearl-bordered Fritillary (s) Northern Brown Argus (l) Silver Studded Blue (m) Adonis Blue (m) Small Blue (l) | | Many plants colonising damaged land in the process of being extracted , or stockpiled materials ,are important food plants for butterflies, e.g. buddleia, nettles thistles. These areas should be left undisturbed until restoration. | Design of restored land, to have sheltered sunny south facing areas , diversity in the vegetation structure, to provide sources of nectar for the adult butterfly, and suitable plants for the egg and caterpillar stage. Whatever the after-use there is always an opportunity to provide some areas which can attract butterflies, e.g. wide field margins in an agricultural restoration. The types of butterflies attracted will depend on the range of food plants available, which will vary in accordance with soil type and other conditions. |
| | | AMPHIBIANS Great crested newt (s) Palmate newt (l) Smooth newt (l) Common toad (l) Common frog (l) | | New wet areas created during extraction are often quickly colonised by amphibians. Minor modifications, or protective action can help to ensure their survival during and after extraction. | Amphibians require areas of water for reproduction and the aquatic stage of the life cycle, and surrounding damp areas of dense vegetation, hedgerows, rock piles and logs to provide food and shelter. All types of extraction where some areas are below the water table or where ponds and ditches can be created have opportunities to offer amphibians. |

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| | | <p>REPTILES Adder (l) Grass snake (l) Smooth snake (l) Common lizard Sand Lizard (s) Slow worm (l) All British reptiles are protected under the Wildlife and Countryside Act 1981</p> | | <p>Some reptiles will colonise damaged areas if basking areas and sheltered and underground areas for hibernation are available. If colonisation by any of the protected reptiles has taken place it is an offence to disturb them. Any sites found to be important for reptiles should be retained.</p> | <p>These reptiles have a variety of habitat needs with the rarest, the sand lizard, being restricted by its habitat requirements of sand dunes and open heathland. There are opportunities in all restorations to provide for reptiles, by studying their habitat requirements.</p> |
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APPENDIX 3

PROGRESSING BIODIVERSITY IN THE UK

In June 1992 the British Prime Minister signed the Biodiversity Convention at the Earth Summit in Rio de Janeiro. The UK voluntary nature conservation organisations responded to the Convention by issuing a discussion document entitled *Biodiversity Challenge* in December 1993. The organisations were the Wildlife Trusts, RSPB, WWF, FoE, Butterfly Conservation and Plantlife. Their document provided a visionary but practical contribution to the implementation of biodiversity, by setting out for Government consideration the actions which they considered necessary to fulfil the obligations of Rio, together with costs.

The Government's keynote policy statement in response to the Biodiversity Convention followed soon after *Biodiversity Challenge*. *Biodiversity: The UK Action Plan* was launched in January 1994. The Government announced that a **Biodiversity Steering Group** would be set up which would include representation from key individuals and would be chaired by the Department of the Environment (as was). The Biodiversity Steering Group would be responsible for overseeing the following tasks:

- developing costed targets for key species and habitats;
- suggesting ways of improving the accessibility and co-ordination of information on biodiversity;
- recommending ways of increasing public awareness and involvement in conserving biodiversity;
- recommending ways of ensuring that commitments in the Plan were properly monitored and carried out; and
- publishing findings before the end of 1995.

A year after the Action Plan the Biodiversity Challenge organisations published their own *Agenda for Action in the UK* (January 1995). The Wildlife Trusts and RSPB in particular have continued their involvement at a national and local level, and are partners in many of the core groups which have led the production of local BAPs. Many Wildlife Trusts have authored their local BAP (as they are key dataholders for species and habitats), with funding from their local authority and others in the partnership.

Biodiversity: The UK Steering Group Report, published later in 1995, contained individual action plans for 116 of the UK's most threatened and endangered species (Short List Species) with plans proposed for a further 286 species by the end of 1998. Action Plans were also prepared and published for 14 key habitats with a further 24 nearing completion. The Action Plans contain targets for maintaining or increasing populations and habitats and identify key players in achieving these targets.

Local Biodiversity Action Plans (LBAPs) were identified in the Steering Group Report as a means of translating national targets into action at a local level. In order to further the preparation of LBAPs a set of Guidelines were drawn up and discussed with the Local Authority Associations and Local Government Management Board. It was agreed that this approach would be taken forward through the Local Agenda 21 process and that a series of pilot projects to develop LBAPs would be undertaken.

Guidance was prepared by the **UK Local Issues Advisory Group** and has been endorsed by the Local Government Management Board and the UK Biodiversity Group. As the Guidance sets out, one of the key functions of LBAPs is to ensure that national targets for species and habitats are attained in a consistent manner throughout the UK. However, they should go further than this, and the Guidance identifies six functions of local BAPs (see 'Local Biodiversity Action Plans' within 'Context and rationale' in the main text).

In order to oversee the implementation of the Steering Groups proposals, a number of separate groups were proposed, which have been established.

The UK Biodiversity Group – A National Focus Group established in July 1996 which is made up of representatives from the Department of the Environment, Transport and the Regions (DETR), the conservation agencies for England, Northern Ireland, Scotland and Wales, NGOs, MAFF, Local Government and the CBI. The Group oversees the implementation of the original Steering Group proposals and provides a strategic steer to the whole process.

Biodiversity Country Groups – These are Country Focus Groups for England, Northern Ireland, Scotland and Wales set up to implement national habitats and species plans and the various relevant LBAPs. The groups have major roles on the monitoring and reporting process and special responsibilities for raising public awareness.

UK Local Issues Advisory Group – This group is made up of representatives from local government and also reports through the Local Agenda 21 process. The group has been responsible for preparing a series of Guidance Notes on preparing LBAPs.

National Targets Group – A group that continues to develop a range of specific costed targets for key species and habitats for the years 2000 and 2010.

National Information Group – A group that acts to improve the accessibility and co-ordination of existing biological datasets, to provide common standards for future recording and to facilitate the creation of a UK Biodiversity Database (UKBD).

UK Biodiversity Secretariat – This services the UK and England Country Groups and issues information and guidance on processes and groups.