REVISED PLAN MARCH 2018

QUARRIES & GRAVEL PITS

1. INTRODUCTION

Bishop's Bowl © Steven Falk

This plan covers both active and former quarries and land-fill sites. There has been a history of quarrying in the sub-region stretching back several centuries; it has exploited a variety of deposits such as limestone, clay and ironstone in the south and east, coals, shales, quartzites and volcanic rocks in the centre and north, and sands and gravels in river valleys or areas of glacial drift deposits. Whilst some mineral sites have been land-filled and even built over, many large quarries, gravel pits, sand pits and associated spoil heaps or sidings still remain.

However, many quarries are now abandoned or managed for nature conservation and when regular disturbance ceases, semi-natural habitats start to develop. This can evolve into highly complicated habitat mosaics, often containing a variety of grasslands, wetlands, ruderal habitats, scrub and secondary woodlands. No other land-use in the sub-region has produced so many large, species-rich wildlife sites, or is so uniquely placed to help us create new ones for the future. The bare soil and disturbed ground associated with this habitat is ideal for turtle doves (*Streptopelia turtur*) that feed on arable weed seeds and any rough grassland that develops would be valuable for barn owls (*Tyto alba*). Both little ringed plover (*Charadrius dubius)* and the increasingly scarce sand martin (*Riparia riparia*) are almost reliant on active gravel and sand pits and only if the habitat is specifically managed for these species will they be remain a breeding species in the county. Quarries are suitable sites for creating sand martin cliffs.

Current data suggests that several hundred insect and plant species are mainly or entirely reliant on quarry sites, including a high proportion of Red Data Book (RDB) and Nationally Scarce species of fly, bee, wasp, beetle, butterfly and damselfly. Quarries and gravel pits provide some of our best sites for wild bees. The number of scarce plant and insect species found at some sites can be remarkable, the best only matched in the area by the best ancient woods. The limestone quarries contain much of the better limestone grassland in the south of the county with many 'calcicolous' plants and 9 species of bumblebees.

At least 200 insect species are wholly or largely dependent upon quarries and gravel pits for their presence in Warwickshire, including butterflies such as dingy skipper (*Erynnis tages)* and bees like the red-tailed mason bee (*Osmia bicolor).* The biggest threat to the wildlife of quarries and gravel pits in Warwickshire is succession and development pressure rather than conversion to agriculture.

The shaded pug moth at Bishops Hill is a nationally scarce species. Four quarries are the only sites in the county for chalk carpet moth (*Scotopteryx bipunctaria),* with large colonies at Bishops Hill and Bishops Bowl and smaller at Southam and Nelson's Quarries; at the

latter site numbers have gone up following scrub clearance. A list of quarry specialist macro-moths may be seen in the **Appendix.**

Gravel pits support some of Warwickshire's best wetlands, including most of the larger reed beds and important wildlife assemblages and species, including the bittern (*Botaurus stellaris*). The strongest population in the county of the internationally threatened white-clawed crayfish *(Austropotomobius pallipes*) once occurred at Ensor's Pool, an old brick pit; however, a survey in 2014 revealed no crayfish present, thought to be due to infection by non-native crayfish. A bioassay carried out June – September 2015 found no evidence of crayfish plague and further trapping in 2015 again found no crayfish; it seems unlikely that crayfish remain present in Ensor's Pool.

Some quarry sites will fall into the category of 'Previously Developed' or 'brown-field' land, which is viewed as a more acceptable location for new development or landfill, than 'green-field' land. It is recognised that many of the habitats contained within this action plan are subject of other Habitat Biodiversity Action Plans (HAPs) but this HAP is geared towards promoting the diverse character of such sites and assisting the organisations that specifically own or manage them. Many of these sites have features of local geological importance. Any action for biodiversity should be harmonised with the geological management requirements of the site where possible; in some instances the requirements may be the same.

Future expansion of the habitat will continue to be provided by new gravel and mineral workings, e.g. extension at Southam Quarry may create opportunities for substantial habitat creation in future years.

2.	OBJECTIVES	TARGETS
Associated Action Plans are: '*Lowland Grasslands (all types*)', '*Reedbeds', 'Lakes & Reservoirs', 'Bats',* '*Barn Owl'*, '*Snipe', 'Lapwing',* '*Bittern', 'Great Crested Newt*', '*White-clawed Crayfish'*, '*Rare Bumblebees', 'Dotted Bee-fly', 'A Cuckoo Bee', 'Dingy Skipper', 'Small Blue'* and '*Chalk Carpet'*		
PLEASE CONSULT THE ***'GENERIC HABITATS'*** ACTION PLAN IN CONJUNCTION WITH THIS DOCUMENT FOR OBJECTIVES COMMON TO ALL HABITAT PLANS		
A.	**To improve the condition of semi-natural habitats in and around mineral sites, with priority given to those holding UK Priority Species*, Red Data Book, Nationally Scarce and Regionally Scarce species.** **The UK BAP was succeeded by the 'UK Post-2010 Biodiversity Framework' in July 2012. The UK list of priority species, however, remains an important reference source.*	**ongoing**
B.	**To improve the condition of semi-natural habitats in and around landfill sites.**	**ongoing**

3. NATIONAL BAP OBJECTIVES & TARGETS

Whilst there are no specific national Biodiversity Action Plan (BAP) objectives for minerals sites, national BAP targets do exist for a number of the habitats contained within quarries and gravel pits e.g. reedbeds, calcareous grassland etc. Mineral sites also provide a unique opportunity to promote habitat creation within design proposals for the restoration

of those sites, in a manner that helps address national targets. As such close liaison with developers/operators and the planning authority should be sought early in the planning process.

4. CURRENT STATUS

The Habitat Biodiversity Audit (HBA, 2017) estimates the area of quarries and spoil heaps in Warwickshire, Coventry & Solihull to be 6700ha, of which spoil is 20ha.

Limestone/ironstone quarries and spoil heaps

These are scattered throughout the south and east of the county with three important concentrations associated with the cement industry. The first is based upon the Bishops Hill-Bishops Bowl complex, a Local Wildlife Site (LWS) between Harbury and Bishops Itchington, which supports the largest continuous area of calcareous habitat in our area and is extremely diverse. It represents an abandoned quarry complex and associated large spoil heap. Harbury Spoilbank (a re-vegetated mound of limestone and clay produced by construction of the Leamington to Oxford Railway) lies only 0.75km away and Ufton Fields Local Nature Reserve (a long-abandoned shallow White Lias quarry) is only 1km beyond this. The second important concentration consists of Southam (Long Itchington) Quarry (LWS), an active and expanding CEMEX quarry with much habitat, Stockton Cutting (an inactive Blue Lias quarry and railway line) and Nelson's (Stockton) Quarry (an inactive Blue Lias quarry), part of a larger SSSI). These form a chain between Long Itchington and Stockton, linked by a disused railway line. The third concentration exists within suburban west Rugby and includes Newbold Quarry (a Nature Reserve and LWS) and a quarry/spoil-heap complex around the Rugby Cement works straddling Parkfield Road. There is far less semi-natural habitat associated with this third concentration than the previous two. Further important quarries include Cross Hands Site of Special Scientific Interest (SSSI) and LWS at the southern tip of the county (an old Oolite quarry that is being partially in-filled), Edgehill (Ratley Grange) Quarry (an active ironstone quarry and LWS), and abandoned ones at Napton Hill and Lighthorne (both LWS), Wilmcote (Gypsy Hall), and Avon Hill (near Avon Dassett). Harbury Spoilbank, Ufton Fields, and the Stockton Cutting - Nelsons Quarry complex are biological SSSIs. Harbury Spoilbank, Stockton Cutting, Ufton Fields and Newbold Quarry are Wildlife Trust Reserves. Some sites also contain small geological SSSIs, usually small sections of quarry face, or Local Geological Sites (LGSs, previously Regionally Important Geological Sites RIGS), often much of or the entire site. Most of our better limestone grassland is contained within limestone quarries and several contain open water and high quality wetlands.

Some sites also contain small geological SSSIs (usually small sections of quarry face) or LGSs (often much of the entire site).

Gravel and sand pits

Most of our largest and richest wetlands have developed in abandoned flood-plain gravel workings and are regionally important for birds, e.g. Middle Tame and Blythe Valley and Draycote Water. The greatest chain of pits exists within the Tame Valley between Coleshill and Tamworth. It includes the huge Kingsbury Water Park complex (LWS and County Council Country park), the adjacent Middleton Lakes (a Royal Society for the Protection of Birds (RSPB) reserve), Whitacre Heath (SSSI and Warwickshire Wildlife

Trust (WWT) reserve) and the adjacent Ladywalk Reserve (LWS), Dosthill Pool and the areas around Coton Hall (both private and designated LWS). A similar but smaller complex extends along the Blythe Valley between Bradnock's Marsh and Stonebridge and is augmented by the Cornetts End quarry complex (part of which is a landfill site) and the smaller, abandoned Cuttle Pool Lane sand pit, a LWS and WWT reserve near Temple Balsall.

To the east of Coventry, in the Avon Valley, is the very diverse Brandon Marsh SSSI and 2km south of this, the large Ryton Pools - Bubbenhall complex (a Country Park partially on landfill plus an active landfill site and expanding quarry); smaller satellite sand pits such as The Dell, Ryton and the Brandon Hall Sand Pit occur nearby. A less ecologically valuable site exists a few miles east at Lawford Heath (a landfill site upon the Dunsmore Plateaux) and several further small sand pits of low value exist elsewhere within the plateaux. Sand and gravel pits in the Tame Valley, at Brandon and Lawford Heath, and High Cross Quarry on the north-east border of Warwickshire are all important habitats for sand martins. Lea Marston gravel pit near Kingsbury was designated as a LWS in 2017.

The only other substantial site, Marsh Farm / Salford Priors quarry, with the largest colony of sand martins in the county (up to 185 pairs, at least half the usual county population) is no longer being actively worked and a designated LWS. It has developed limited vegetation and young wetlands and is being restored to farmland; this has included the removal of all suitable cliffs for sand martins which did not breed here this year for the first time (2015). Bubbenhall Quarries (LWS), Brinklow and Meriden quarries are other sites where artificial cliffs could be constructed to meet the nesting requirements of sand martins, to address the continuing loss of breeding sites. There have been colonies of 50-100 pairs at these sites in recent years now gone due to the loss of suitable cliffs.

Several conservation bodies, including the RSPB, are working together to produce an alternative proposal to agricultural use for quarry restoration with the creation of reedbed; Middleton Lakes in the north of the county is one such example. Some old quarries sites such as Lawford Heath, and Cornets End near Coventry, are suitable for heathland creation (J.Bowley, pers.comm.2015).

Hard rock quarries

A great chain of mostly very deep quarries exploiting Precambrian and Palaeozoic shales, quartzites and volcanic rocks exists within the Atherstone Ridge between Baddesley Ensor and Nuneaton. It includes quarries such as Purley and Oldbury (now Mancetter), both designated LWS, and Boons (also known as Man Abel's), Jees, Woodlands, Judkins (all LWS), and Midland. Griff Quarry and Dosthill Brickpit resemble the above examples but are located a few miles away from the Ridge. Ensors Pool in Nuneaton is a particularly large and wildlife rich site which is designated as an SSSI and a Local Nature Reserve. Most are either still being worked or are subject to landfill operations or development proposals. They mostly lack calcareous soils and tend to produce neutral to acid grassland, progressing to gorse, broom and other types of scrub, then to birch-oak secondary woodland with bracken where allowed. Some support valuable habitat mosaics of county value, and occasionally patches of heathland (a scarce habitat in our area), though they fail to attain the quality of the best limestone ones, and generally lack high quality wetlands. Other small sandstone quarries historically exploited for building stone can be found in the northern half of the county, but have mostly become wooded over. Malpass Quarry near Rugby was designated a LWS in 2017.

4.1 Legal and Policy Status

A wide range of species and habitats are protected under international and domestic laws, including the Wild Birds Directive (1979), the Wildlife and Countryside Act (1981), the Conservation Regulations(1994) and EC Habitats Directive (1992). Protection of sites is afforded nationally through SSSI, Special Areas of Conservation (SAC) and Local Nature Reserve (LNR) statutory status. Other sites are offered recognition of their value through Local Wildlife Site status (LWS), Local Character Areas and identified Landscape Scale Areas. The National Planning Policy Framework (2012) chapter/section 11 states conditions with regard to any development negatively affecting biodiversity, including protected sites, ancient woodland and other irreplaceable habitats (paragraph 118). The Wildlife & Countryside Act and schedule 2 of the Conservation of Habitats & Species Regulations (2010) make it an offence to intentionally kill, injure, take, possess, sell, buy or transport a range of species.

Brandon Marsh, Harbury Spoilbank, Stockton Cutting and Quarries, Ufton Fields, several sites within the Blythe valley and Whitacre Heath contain biological SSSIs and small geological SSSIs and Local Geological Sites are present at several sites. As at 2017 21 sites have been formally designated as LWSs but the majority are informally-designated County Ecosites, including two of the best limestone sites (which are now confirmed as having nationally important insect assemblages). Newbold Quarry and Stockton Cutting are Local Nature Reserves. Kingsbury Water Park, Ryton Pools and Ufton Fields are Country Parks. Several sites support great crested newt, which is specially protected under the Wildlife & Countryside Act.

4.2 Current Factors Affecting the Habitat

- **Lack of conservation management** – leads to encroachment of scrub, rank grassland, even secondary woodland at some sites, which can be serious if species rich grassland or ruderal habitats become too restricted (though the same process can help create valuable habitat mosaics where kept in check). Several rare orchids and insects have declined in the county due to loss of early successional stages at certain key sites. All sites require some ongoing management to maintain their value in the long-term, and some would benefit from the creation of wetlands and features such as humps, hollows and clifflets.
- **Excessive disturbance** – most of these sites benefit from light or piecemeal disturbance – it helps combat the previous factor. But catastrophic disturbance that destroys much habitat within a short time period can be very harmful.
- **Development and land-filling** – all these sites fall into the category of brown-field land, which is seen as a more desirable location for development than green-field land, and some are being actively land-filled in line with planning conditions for long-term restoration to other uses (which can include nature conservation).
- **Unsympathetic restoration and management** – Allowing natural regeneration of vegetation directly upon rock, sand or subsoil, which is far better for species diversity than using fertile top-soil or artificial seed mixtures. Tree planting is rarely appropriate within the body of the site

(where wetlands or floristically-rich habitats are more desirable or perhaps already present). On capped landfill, a final capping with infertile, locally sourced sub-soil, and the promotion of topographic and structural diversity, e.g. humps, hollows, clifflets, can produce SINC-quality habitat in the long-term. Landscaping and restoration should be undertaken as part of an approved scheme. This issue needs to be considered in the context of minerals planning.

- **Recreational pressure** – can cause disturbance to nesting or wintering bird populations (e.g. on disused quarry sites with water sports or noisy vehicle activity) and excessive dog-fouling can promote species-poor rank grassland by enriching the soil. However, light disturbance can be beneficial as it favours early successional habitats.
- **Small total area of habitat** – a problem at some small sites resulting in small and vulnerable population sizes of key species there and a break down of metapopulations.
- **Isolation of sites** – leaving populations / metapopulations vulnerable with limited colonisation potential. This can sometimes be countered by improving the quality of the surrounding countryside. There is clear evidence from recent surveys that species breeding in quarries and pits will forage in surrounding hedgerows, flowery field margins, fallow fields, disused railways or nearby woodland rides and margins.

5. LOCAL ACTION

- **Survey work and designation** - many sites have been subject to a long history of wildlife recording, although the data is of varying scope, detail and age. Recent entomological survey effort has been good at many – resulting in detailed, loosely comparable lists for many key insect groups. This is revealing the relative values of the different sites and should facilitate ongoing LWS designation and possibly raise the need for some new SSSIs. A few active quarries have had minimal recording, especially in the north.
- **Education -** the country parks and many of the Wildlife Trust reserves host educational events for all age groups, and Earth Science educational visits are also permitted at several sites.
- **Planning Procedures** - current planning procedure regarding Minerals licensing after-use and redevelopment of sites ensure that the county ecologists can request amendments to plans so that that wildlife and habitat interests are protected wherever possible. The earlier in the planning stages that biodiversity concerns are considered the better.
- **The identification of all existing ecologically important quarries, gravel** pits and sand-pits, and their ownership (including freehold or leasehold status, has been completed (pers.comm. Mike Slater, 2012)
- **Established management** - most active within the SSSIs, LNRs, WWT reserves and country parks – most of which have management plans and a work programme of management activities, often involving volunteer work parties. Some of the active quarries have land informally set aside for nature conservation e.g. Southam and Edgehill. The damaging effects of excessive

scrub encroachment has now been recognised, and substantial scrub removal has recently taken place at Harbury Spoilbank, Stockton Cutting and Ufton Fields – improving conditions for various scarce flowers and insects.

- **Habitat creation:**
  - At Brandon Marsh, a substantial new reed bed was created in 2011/12.
  - At Berkswell, gravel workings previously operated by RMC Aggregates Western (originally part of the RMC Group and now CEMEX), have been 'restored' since the completion of extraction in 1999, creating a series of wetland habitats. Now named Marsh Lane Nature Reserve, the site won a Quarry Products Association award for nature conservation lakes.
  - In 2007 the RSPB took over the former sand and gravel quarries from Hanson Aggregates at Middleton Hall which straddles the Warwickshire/Staffordshire county border and created Middleton Lakes, a 23ha range of wetland habitats including reedbeds.
  - At Purley Quarry the Biodiversity Action Plans have been used to plan quarry 'restoration' and create more heathland, using heather from the Merevale estates. Unfortunately this does not seem to be setting seed (pers.comm. Camille Newton, 2017) and a repeat experiment is planned.
  - Part of the Bubbenhall sand pit has been 'restored' to grassland and open water and wetland created; in 2016 it became a WWT reserve, along with Bubbenhall Wood.
- **Habitat restoration:** Butterfly Conservation Warwickshire (BCW) has restored habitat at 4 sites**:** Malpass Quarry (a BCW reserve) 18ha; Southam Quarry (30ha); Nelson's Quarry (5ha); Parkfield Road Quarry (4ha) by management, e.g. scrub control.

6. PROPOSED LOCAL ACTIONS

ACTION	Lead	Partners	By
PLEASE CONSULT THE ***'GENERIC HABITATS'*** ACTION PLAN IN CONJUNCTION WITH THIS DOCUMENT FOR ACTIONS COMMON TO ALL HABITAT PLANS			
Policy, Legislation & Protection			
PL1. Ensure that any site meeting the relevant criteria is considered for designation as an SSSI.	NE	WWT WCC	ongoing
PL2. Continue to select all qualifying quarries or gravel pits as LWSs and enter onto database.	LWSP	WWT NE WCC LAs HBA	ongoing
PL3. Ensure that the protection of all designated quarries and gravel pits is included in Local Development Plans, Neighbourhood Plans and any other relevant strategies, including targets for maintenance, restoration and expansion.	WCC	LAs WWT NE	ongoing
PL4. Ensure that new minor or major	WCC	NE WWT	ongoing

ACTION	Lead	Partners	By
PLEASE CONSULT THE '***GENERIC HABITATS***' ACTION PLAN IN CONJUNCTION WITH THIS DOCUMENT FOR ACTIONS COMMON TO ALL HABITAT PLANS			
developments aim for net biodiversity gain through adherence to the mitigation hierarchy.		LPAs NWBC NBBC	
PL5. Provide policy-based support for the restoration of quarries and landfill sites to high-quality wildlife habitat.	WCC	NE WWT EA LECs NAM BCW	2015
Site / Species Safeguard & Management			
SM1. Actively work with the Mineral Products Association to ensure development proposals do not reduce the nature conservation value of sites. Formulate compensatory measures where such damage is unavoidable including flexible restoration plans and phased extraction, and ensure that interim landscaping requirements do not impede later conservation value.	WCC	WWT BCW LAs LECs	ongoing
SM2. Inform landowners/ managers of the ecological significance of their existing quarry sites, ensuring that management action plans and maps account for all the key areas of interest for all LWS-quality sites.	LWSP	WCC WWT LAs LECs	ongoing
SM3. Ensure the creation of quality wildlife habitat at 12 worked out quarries, (including the creation of artificial cliffs) across the whole site, or over part of the site during the active quarrying, in line with planning consents. • Birds dependent on quarrying are: little ringed plover, sand martin, snipe, lapwing (*Vanellus vanellus*). • Invertebrates dependent on quarrying are: grizzled skipper (*Pyrgus malvae*), dingy skipper (*Erynnis tages*), small blue (*Cupido minimus*), chalk carpet, shaded pug (*Eupithecia subumbrata*), scarce blue tailed damselfly (*Ischnura pumilio*). **This target has been reset in the light of progress 2011-2017.**	BCW	WWT WCC LOs HBA	2020
SM4. During landfill site restoration promote the importance of capping with locally-sourced subsoil and creating topographic features, e.g. scrapes and banks, wetlands etc., with regard to existing restoration plans	BCW	WWT WCC LOs	ongoing
SM5. Actively work at Brandon Marsh SSSI to ensure that water levels are controlled to provide optimal water for the reedbeds.	NE	EA WWT LAs	ongoing
SM6. Inform the specification for screen planting	BCW	QOs WCC	ongoing

ACTION	Lead	Partners	By
PLEASE CONSULT THE '***GENERIC HABITATS'*** ACTION PLAN IN CONJUNCTION WITH THIS DOCUMENT FOR ACTIONS COMMON TO ALL HABITAT PLANS			
and bank creation prior to commencement of quarrying to maximise wildlife value.			
Advisory			
A1. Advise owners/managers of adjacent land, where it is likely that this will benefit vulnerable species or assemblages, or will produce 'stepping stones' between sites.	WCC	NE WWT EA BCW	ongoing
Communication & Publicity			
CP1. Develop closer working relationships between ecologists, planners, minerals operators and developers to ensure protection and enhancement of biodiversity.	WCC	NE EA WWT NAM BCW LOs RSPB	ongoing

Abbreviations: BCW - Butterfly Conservation Warwickshire**, EA -** Environment Agency, , **HBA** – Habitat Biodiversity Audit, **LECs** – Local Extraction Companies, **LAs** – Local Authorities, **LOs** – Landowners, **LPAs** – Local Planning Authorities, **LWSP** – Local Wildlife Sites Project **NAM** – Nature After Minerals, **NE** – Natural England, **RSPB** - Royal Society for the Protection of Birds, **WCC** – Warwickshire County Council, **WWT** – Warwickshire Wildlife Trust.

7. PROGRESS WITH ACTIONS

From 2015–2020 there will be a rolling programme of reporting on progress, of 10 action plans per year with an annual summary of results. Progress with this plan up to 2017 can be seen at www.warwickshirewildlifetrust.org.uk/LBAP.

8. BIBLIOGRAPHY

Kirby, P. (1992). Habitat management for Invertebrates: a Practical Handbook. RSPB.

Falk, S. J. (1995). Insects in Urban and Post-industrial Settings. Land Contamination & Reclamation. 3 (2): 75-76.

Falk, S. J. (1996). Invertebrates and Local Authorities. In: Eyre, M. D. (ed.) Environmental Monitoring, Surveillance and Conservation using Invertebrates. EMS Publications, Newcastle upon Tyne.

Barker, G. (ed) (2000). Ecological recombination in urban areas: Implications for nature conservation. English Nature (now Natural England).

Watson, D. & Slack (2000). Wildlife Management & Habitat Creation on Landfill Sites. A Manual of Best Practice. Ecoscope Applied Ecologists. Management for Commercial and Wildlife Interest.

Falk, S. J. (2006). The modern bee and wasp assemblages (Hymenoptera: Aculeata) of Warwickshire's calcareous quarries and spoilheaps, and the

conservation issues facing them. British Journal of Entomology and Natural History, 19: 7-33.

Falk, S.J. (2009) Warwickshire's Wildflowers - provides habitat-specific species lists, and explanations of habitats from a botanical viewpoint.

Lawton, J.H. (2010) Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra, advocating a landscape-scale approach guided by four key principles, summarised as '*more, bigger, better and joined*'.

DEFRA (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services.

Dobson, M. et al. (2012) Guide to Freshwater Invertebrates. Freshwater Biological Association. ISBN-13: 9780900386800

HBA (2013) The State of the Habitats of Warwickshire, Coventry and Solihull.

RSPB (2016) State of Nature – a stocktake of all our native wildlife by over 50 wildlife organisations.

Natural England (2016) The Conservation Strategy for the 21st Century sets out how NE will help deliver DEFRA's ambitions for the environment to reverse biodiversity loss, sustain distinctive landscapes and enhance engagement with nature.

9. FURTHER INFORMATION

Habitat Biodiversity Audit (HBA) for Warwickshire, Coventry & Solihull – mapping data set and associated information. Phase 1 (JNCC) 1996-2002 and Phase 2 (Local Wildlife Sites) ongoing.

Biodiversity Planning Toolkit - a new online resource to help incorporate biodiversity
and geodiversity into the planning system and new development.

RSPB (2007). Habitat Creation Handbook for the Minerals Industry - a practical guide to the creation of priority Biodiversity Action Plan habitats on redundant mineral workings.

Buglife - the Invertebrate Conservation Trust (2004) – provides Information on the habitat-management requirements of key invertebrates. Also 'Managing Aggregate Sites for Invertebrates – A Best Practice Guide available online or from 01733 201210

Butterfly Conservation - Butterfly Banks, Scallops, Scrapes, Seeding and Plug Planting - management factsheets for advice on habitat creation and maintenance that can benefit several species of butterfly and moth in one location.

MineralsUK - the British Geological Survey's Centre for Sustainable Mineral Development. This website has a wealth of information on mineral resources, mineral planning, policy and legislation, sustainable development, statistics and exploration.

Nature After Minerals is a resource for everyone with an interest in quarry restoration & minerals planning for biodiversity.

Warwickshire CC Mineral Strategy - the minerals development framework consists of a number of documents.

Plantlife – carries out plant species and habitat conservation, owns and manages nature reserves, campaigns, and raises awareness through education.

Flora Locale - promotes the restoration of wild plants and habitats for the benefit of biodiversity, landscapes and people in town and countryside.

Wildfowl & Wetlands Trust (2015) – the Wetland Manifesto is a 10 point plan to look after the UK's remaining wetlands.

10. CONTACT

David Lowe, Team Leader, Ecology,
Historic Environment & Landscape, Community Services,
Warwickshire County Council. Tel. 01926 418060.
Tel. 01926 418060. Email: davidlowe@warwickshire.gov.uk

Mike Slater, Butterfly Conservation Warwickshire Branch Conservation Officer.
Tel: 01788 335881 Email: michael.slater50@ntlworld.com

Tony Lyons, Planning Policy, Warwickshire County Council.
Email: tonylyons@warwickshire.gov.uk

11. APPENDIX.

Quarry-specialist macro-moths (David Brown 2018).	
Annulet	*Charissa obscurata*
Barred Rivulet	*Perizoma bifaciata*
Blackneck	*Lygephila pastinum*
Bordered Pug	*Eupithecia succenturiata*
Bordered Sallow	*Pyrrhia umbra*
Broad-barred White	*Hecatera bicolorata*
Burnet Companion	*Euclidia glyphica*
Campion	*Hadena bicruris*
Chalk Carpet	*Scotopteryx bipunctaria*
Dark Brocade	*Mniotype adusta*
Heart and Club	*Agrotis clavis*
Large Nutmeg	*Hadula trifolii*
Latticed Heath	*Chiasmia clathrata*
Lesser Treble-bar	*Aplocera efformata*
Light Brocade	*Lacanobia w-latinum*
Light Feathered Rustic	*Agrotis cinerea*
Lychnis	*Hadena bicruris*
Marbled Coronet	*Hadena confusa*
Mother Shipton	*Callistege mi*

Mullein Wave	*Scopula marginepunctata*
Narrow-bordered Five-spot Burnet	*Zygaena lonicerae*
Netted Pug	*Eupithecia venosata*
Pimpinel Pug	*Eupithecia pimpinellata*
Reddish Light Arches	*Apamea sublustris*
Rustic Shoulder-knot	*Apamea sordens*
Shaded Pug	*Eupithecia subumbrata*
Shears	*Hada plebeja*
Six-belted Clearwing	*Bembecia ichneumoniformis*
Six-spot Burnet	*Zygaena filipendulae*
Small Elephant Hawk-moth	*Deilephila porcellus*
Tawny Shears	*Hadena perplexa*
Toadflax Pug	*Eupithecia linariata*
Treble-bar	*Aplocera plagiata*
Vines Rustic	*Hoplodrina ambigua*