Natural Area: 70. Severn Valley	**Geological Significance:** Outstanding **(provisional)**

General geological character: This large Natural Area follows a broad valley underlain primarily by Triassic and Jurassic rocks. The Triassic rocks (formed around 240 Ma), were deposited in an arid environment and consist primarily of Keuper Marls (now known as the Mercia Mudstone Group). The Mercia Mudstones are silty clays variously interpreted as the product of deposition in ephemeral lakes, in an inland sea or saline lake. It is both the thickest and most extensive of the Triassic deposits in the area, giving rise to a generally low lying landscape which has been dissected by the River Severn. The Triassic marls are overlain by marine rocks of Jurassic age (208-187 Ma) of the Lias Group. Outliers of the younger units of the group form hills in the Severn Valley where they cap the soft clays. They are the source of many important fossil faunas, including fish, reptiles and insects. Lower Palaeozoic rocks occur at the Tortworth Inlier, where Tremadoc rocks (early Ordovician, around 500 Ma) and Silurian lavas of the Llandovery Series (around 432 Ma) underlie fossiliferous Wenlock Limestones. In the Severn Valley itself, the succession has a regional dip to the south east which is terminated in the east by the Cotswolds Hill Escarpment. Much of the solid geology is masked by thick deposits of Quaternary sediments deposited during the 'Ice Ages' (the last 2 Ma) by rivers and ice sheets. The area is now drained by the River Severn and Warwickshire Avon, both of which have important staircases of river terraces, formed in response to changes in global climate and base level. Many of these river gravels are fossiliferous and contain vertebrate remains. The river terraces are also important for determining the relative ages of the Quaternary glaciations in England, especially in the numerous sections where their relationship to glacial events can be determined.

Key geological features:

- Tremadoc, Llandovery and Wenlock rocks and fossils
- Exposures of Quaternary sediments including river gravels and glacial deposits

Number of GCR sites:

Quaternary of the Midlands: 9 Rhaetian: 3 Fluvial Geomorphology: 2 Llandovery: 2
Permian-Triassic Reptilia: 2 Permian-Triassic: 2 Hettangian-Pliensbachian: 2 Wenlock: 2
Quaternary of the Thames: 1 Palaeoentomology: 1 Toarcian: 1 Westphalian: 1
Non-marine Devonian: 1 Palaeozoic Palaeobotany: 1 Silurian-Devonian Chordata: 1
Aalenian-Bajocian: 1

Geological/geomorphological SSSI coverage: There are 28 (P)SSSIs in the Natural Area covering 32 GCR SILs representing 16 different GCR networks. Nine of these sites represent the Quaternary history of the area, including the important glacial sequence at Wolston Gravel Pit SSSI (the type site for the Wolstonian glaciation), the glacio-lacustrine sequence at High Close Farm SSSI and the River Severn terrace gravels exposed at Beckford Gravel Pit SSSI. Garden Cliff SSSI is a good example of Rhaetic fauna and sediments, while Cattybrook Brickpit shows the Upper Carboniferous Westphalian plant fauna. Robins Wood Hill Quarry shows the sediments of the Lias Group, and Brinkmarsh Quarry illustrates the Wenlock stratigraphy. Lydney Cliff SSSI is notable for its Devonian fossil armoured fish.

Key geological management issues:

- Need to secure conservation sections in working pits and quarries
- Need to maintain integrity of existing geological sites
- Threat to vulnerable sites from fossil collecting

Key geological objectives:

1. Maintain and enhance existing sites by agreeing conservation sections at working pits and quarries, and through targetted site clearances and the creation of new sections.

2. Encourage the creation and study of temporary and permanent sections in poorly-exposed rocks.

3. Promote responsible fossil collecting at vulnerable sites.

Useful guides/references:

GREEN, G.W. 1992: British Regional Geology, Bristol and Gloucester District. British Geological Survey, London, HMSO

HOLLAND, C.H. 1992: Silurian *in* Duff, P.McL.D. Duff and Smith, A.J. (eds.) Geology of England and Wales. The Geological Society, London

Earth science (P)SSSIs in the Natural Area:

- Ailstone Old Gravel Pit
- High Close Farm Pit
- Beckford Gravel Pit
- Broom Railway Cutting
- Coten End Quarry
- Cropthorne New Inn Section
- Dumbleton
- Eckington Railway Cutting
- Damery Road Section
- Ashmoor Common
- Brinkmarsh Quarry
- Buckover Road Cutting
- Cullimore's Quarry
- Garden Cliff
- Haresfield Beacon
- Cattybrook Brickpit
- Ryton and Brandon Gravel Pits
- Shrewly Canal Cutting
- Waverley Wood Farm Pit
- Wilmcote Quarry
- Wolston Gravel Pit
- Slickstones Quarry
- Tytherington Quarry
- Lower Woods, Wickwar
- Lydney Cliff
- Robins Wood Hill Quarry
- Wainlode Cliff
- Windmill Tump

Natural Area: 71. Malvern Hills and Teme Valley	**Geological Significance:** Notable **(provisional)**

General geological character: The rocks of the Malvern Hills and Teme Valley Natural Area are of Precambrian and Palaeozoic age (600 to 230 Ma). The oldest (Precambrian) rocks are hard metamorphic gneisses of the Malvern Hills. These rocks were formed as molten 'granitic' rocks, but were then 'metamorphosed' deep within the Earth. Younger layers of sandstones, shales and limestones were periodically laid down on top of these 'Malvernian' rocks throughout Palaeozoic times. They formed as muds, sands and coral reefs at the bottom of an ancient sea, and contain fossil remains of sea bottom creatures, including early jawless fish (Ledbury R/wy Cutting). By Devonian times (approximately 395 Ma), the area was dry desert, where the ('Old Red') sandstones and conglomerates were laid down by seasonal rivers in wadis. The Variscan Orogeny (mountain-building episode) then folded and faulted the rocks of the area to much their present arrangement. Permian / Triassic ('New Red') sediments were laid down on top of the older rocks (eg. Osebury Rock) about 250 Ma. The area escaped glaciation in the last 'Ice Age' (approximately 15,000 years BP) but had a tundra environment, leaving unusual soil profiles in some areas.

Key geological features:

- Upland natural and quarry exposures of ancient Precambrian rocks in the Malvern Hills
- Folded Silurian of the Malvern Hills and Abberley Hills
- Diverted drainage of the Teme
- Fossil fish of the Downton beds

Number of GCR sites:

Precambrian of England and Wales: 1 Cambrian: 1 Llandovery: 1 Ludlow: 2 Permo-Triassic: 1 Silurian-Devonian Chordata: 1

Geological/geomorphological SSSI coverage: There are 5 (P)SSSIs in the Natural Area covering 7 GCR SILs representing 6 different GCR networks. The largest site, The Malvern Hills SSSI, comprises a number of areas over the line of the Malvern Hills range. This covers different aspects of the Precambrian rocks and their relations with younger Palaeozoic rocks. Other sites mainly represent 'snapshots' of the changing environment of the early Palaeozoic (eg. Upper Hall Farm Quarry and Grassland). The site coverage includes natural exposures in crags (eg. Osebury Rock), an active quarry (Woodbury Quarry), disused quarries (The Malvern Hills) and a railway cutting (Ledbury).

Key geological management issues:

- Good relations with land managers to optimise management of existing sites, and where possible, the enhancement and promote geological exposures (where appropriate) in the Natural Area
- Maintaining clean and stable rock faces in quarry and cutting sites, free from vegetation or obscuring developments
- Support continued safe access to natural rock exposures in the area.

Key geological objectives:

1. Maintain and where possible enhance the existing geological exposures and natural processes

2. Encourage initiatives aimed at the joint management of the areas geological and biological resources (eg. with the Malvern Hills Conservators).

3. Promote heritage value of sites using signboards and educational and tourist literature, particularly through links between Malvern Hills geology and geomorphology and the landscape.

Useful guides/references:

EARP, J.R. & HAINS, B.A. 1971: British Regional Geology: The Welsh Borderland (3rd Edn) Institute of Geological Sciences, HMSO.

NCC 1989: Malvern Hills - A student's guide to the geology of the Malverns. Belmont Press, Peterborough.

PENN, J.S.W. & FRENCH, J. 1971: The Malvern Hills. GA Guide No. 4. Colchester.

Earth science (P)SSSIs in the Natural Area:

- Ledbury Railway Cutting
- Osebury Rock
- The Malvern Hills
- Upper Hall Farm Quarry and Grassland
- Woodbury Quarry

Natural Area: 72. Dean Plateau and Wye Valley	Geological Significance: Considerable (provisional)

General geological character: The Dean Plateau and Wye Valley Natural Area is centred on the Carboniferous rocks of the Forest of Dean. These consist primarily of Carboniferous Limestone (Dinantian, deposited 350-333 Ma) which forms a ring around a basin of Carboniferous Coal Measures (Westphalian, deposited 318-303 Ma). The Coal Measures have been worked economically in this area for a number of years and smelted using local coal to produce iron, making these an important economic resource. Surrounding and underlying the Carboniferous rocks is the Devonian Old Red Sandstone (approximately 370 Ma). These rocks represent a prolonged period of deposition in lacustrine, fluvial and aeolian environments, derived from the erosion of the Caledonide uplands. Also within the Natural Area are a number of inliers consisting of Lower Palaeozoic rocks. These are Silurian in age (435-405 Ma) and consist of a succession of limestones, siltstones and shales which form prominent scarp features wherever they outcrop.The River Wye now meanders through the area, cutting a series of impressive incised meanders and gorges into the underlying limestone and sandstone.

Key geological features:

- Exposures of Silurian, Devonian and Carboniferous rocks and fossils
- Links between geology, scenery and industrial heritage in the area
- Spectacular gorges and incised meanders of the Wye

Number of GCR sites:

Ludlow: 4 Wenlock: 4 Westphalian: 3 Dinantian: 3 Non-marine Devonian: 2 Palaeozoic Palaeobotany: 2 Pleistocene Vertebrata: 2 Arthropoda: 1

Geological/geomorphological SSSI coverage: There are 16 (P)SSSIs in the Natural Area covering 21 GCR SILs representing 8 different GCR networks. Many of these cover Silurian, Devonian and Carboniferous geological interests. Wood Green Quarry and Railway Cutting SSSI is important for Ludlow rocks and stratigraphy and is noted for a rich limestone fossil fauna. The Wenlock rocks are typified by the section at Scutterdine Quarry, and Puddlebrook Quarry is noted for its fossil mosses of Dinantian age. Upper Wye Gorge SSSI is an important site for palaeontology where caves in the limestone gorge contain the remains of numerous Quaternary mammals. These illustrate the changes in environment and habitat over this time.

Key geological management issues:

- Need to maintain exposures at key geological sites (guard against tipping and in-filling)
- Ensure responsible fossil collecting at sensitive or vulnerable sites
- Encourage links between geological and heritage history of the area
- Encourage links with RIGS group to build-up knowledge of local geological resource
- Maintain the operation of natural fluvial processes in the Natural Area

Key geological objectives:

1. Management of existing sites to enhance and promote the geological exposures within the Natural Area.

2. Encourage responsible fossil collecting at vulnerable sites.

Useful guides/references:

HOLLAND, C.H. 1992: Silurian. *in* Duff, P.McL.D. Duff and Smith, A.J. (eds). Geology of England and Wales. The Geological Society, London

Earth science (P)SSSIs in the Natural Area:

- Edgehills Quarry
- Hobb's Quarry, Longhope
- Meezy Hurst
- Oakenhill Railway Cutting
- Land Grove Quarry, Mitcheldean
- Linton Quarry
- Little Hill
- Longhope Hill
- Perton Roadside Section and Quarry
- Puddlebrook Quarry
- Scully Grove Quarry
- Scutterdine Quarry
- Stenders Quarry
- Upper Wye Gorge
- Wilton Bluff, Ross-on-Wye
- Wood Green Quarry and Railway Cutting

Natural Area: 73. Black Mountains and Golden Valley	Geological Significance: Some (provisional)

General geological character: The Black Mountains form a striking plateau bounded to the northwest by the River Wye, to the south by the River Usk and to the east by the Herefordshire Plain. The Black Mountains are composed of nearly horizontal Devonian Lower Old Red Sandstone (Ditton and Brecon Series; 408-386 Ma) rocks. Resistant sandstones of the Brownstones Group (Brecon Series) form the highest scarps at over 800m while to the southwest, the main area of the plateau is formed from resistant 'cornstone' (nodular limestone) capping less resistant marls (Ditton Series). An isolated outcrop of Carboniferous Limestone and Millstone Grit form the youngest rocks in the Black Mountains capping Pen-cerig-calch. Notable Hills such as the Sugar Loaf and Table Mountain are capped by resistant conglomerates the Devonian Upper Old Red Sandstone. The Devonian Old Red Sandstone is fluvial in origin, sediments being transported from the highlands of Central and North Wales. Flash flood deposits contain rare concentrations of early Devonian fish as well as evidence for primitive plants which were beginning to colonise the area in what is believed to have been a tropical climate. During the Carboniferous the area was covered by a tropical sea which again gave way to fluvially dominated environments towards the end of the period.

Subsequent uplift during the late Carboniferous has meant the area has been subject to erosion rather than deposition since the Carboniferous. As a result, the Black Mountain plateau is deeply dissected by southward flowing streams. During the Pleistocene glacial and interglacial erosion was extreme. A glacier filled much of the Wye valley emerging from a narrow valley to the northwest of the Black Mountains and spreading out onto the Herefordshire Lowlands. An ice 'tongue' from this glacier is believed to have cut the Golden Valley (Silurian erratics from the north being present) producing a valley which is outsized in comparison to the small River Dore which now flows down it to the south.

Key geological features:

- Devonian sedimentology
- Vertebrate palaeontology (early Devonian fish)
- Devonian palaeobotany
- Pleistocene glacial erosion

Number of GCR sites: Silurian-Devonian Chordata: 1

Geological/geomorphological SSSI coverage: There is 1 (P)SSSI in the Natural Area (Wayne Herbert Quarry, a disused sandstone quarry to the east of the Golden Valley) which has yielded a superb Lower Devonian (Ditton Series) fish fauna. The fauna is believed to represent a near complete fish fauna deposited and rapidly buried by a flash flood. Many complete specimens have been preserved which is relatively rare for Devonian faunas making this a particularly important site for understanding the taxonomy and evolution of early Devonian fish.

Key geological management issues:

- Improvement of the limited exposure
- Improvement of awareness of the geological resource and its relationship to landscape

Key geological objectives:

1. **Maintenance and enhancement of the geological resource** through a) enhancement of existing exposures (especially RIGS), b) development of local conservation strategies that include geology (liaison with CCW), c) assessment of educational/research value of new sites (eg. quarries and cuttings, temporary or permanent).

2. **Promotion of geological resource** through a) assessment and promotion of site educational value, b) on-site interpretation (e.g. sign boarding, trail guides, leaflets), c) promotion of the link between geology and local habitats and landscape development of the Natural Area.

Useful guides/references:

EARP, J.R. & HAINS, B.A. 1971: British Regional Geology, the Welsh Borderland. Institute of Geological Sciences, HMSO. London.

Earth science (P)SSSIs in the Natural Area:

- Wayne Herbert Quarry

Natural Area: 74. Hereford Plain	**Geological Significance:** Some **(provisional)**

General geological character: The Hereford Plain Natural Area is bordered to the east by the Malvern Hills, to the west by Radnor Forest and to the south by the Black Mountains and rising slopes of the Forest of Dean. The area is transected by the Rivers Lugg and Wye which meet near Hereford. Topographically the area mainly lies between 65-125m AOD, a few 'upland' areas SW of Leominster attain heights of 125-240m AOD. The solid geology of the Natural Area consists entirely of Lower Old Red Sandstone which here ranges from late Silurian (Ludlow) to early Devonian in age (approximately 415 to 390 Ma). The Old Red Sandstone is divided into two:- a lower Downton Series (the 'Downtonian Stage') and an upper Ditton ('Dittonian Stage').

Rocks assigned to the Downton Series occupy most of the gentle terrain of the lowlands and plains of Hereford. The base of the Series is marked by the famous Ludlow Bone Bed which is a fine sandstone (of variable thickness and extent) which contains disarticulated fossil remains of early fish (ostracoderms), crustaceans, arthropods (euryterids) and brachiopods. There follows a thin passage sequence (the Rushall Beds) in most areas which represents the change into red-bed terrestrial deposits. These sediments pass upwards into the thick (225m +) Ledbury Group which comprises red siltstones, mudstones and fine-grained micaceous sandstones with local thin palaeosol limestone nodules. Fossil fish and eurypterid fragments occur sporadically in the Ledbury Group and when found they usually occur in lenses or pockets in pellety sandstones. Sedimentary structures and fossil burrows in the sediments indicate that they formed in fluviatile/deltaic mud flat environments. A number of volcanic ash bands or tuffs occur in the higher Downtonian rocks throughout the entire region from SW Wales to the West Midlands. These are valuable marker beds and allow correlation between different successions which are generally variable in lithologies and poor in fossils. They also afford the only indication of Silurian-Devonian aged volcanic activity between Devon and the Cheviot area in the Scottish Borders.

The overlying Ditton Series was deposited in similar environments and is up to 450m thick. It consists mainly of red siltstones and sandstones; the latter are typically more conspicuous than in the underlying Downton Series and exhibit cross-bedding and erosion surfaces. The lowest 150m of the Ditton Series contains several thin concretionary palaeosol/calcrete limestones (termed 'cornstones'). These are the 'Psammosteus Limestone' and they yield most of the fossil fish recorded from the Ditton Series. Two of the most 'common' fish encountered are *Pteraspis* and *Cephalaspis*.

The youngest sediments exposed in the area are of Quaternary age. These comprise alluvial deposits (confined mainly to modern river systems) and glacial sands and gravels. The latter are concentrated in the Hereford-Leominster area and are usually associated with the younger alluvial deposits. The sands and gravels were typically laid down by meltwaters close to an ice front and hence are strictly of fluvioglacial origin.

Key geological features:

- Lower Old Red Sandstone stratigraphy and sedimentology
- Downton-Ditton fossil fish and eurypterids, including the Ludlow Bone Bed
- Quaternary alluvial/fluvioglacial sediments

Number of GCR sites:

Arthropoda: 1 Fluvial Geomorphology of England: 1 Non-marine Devonian: 1
Palaeozoic Palaeobotany: 1 Ludlow: 1 Fluvial Geomorphology of England: 1

Geological/geomorphological SSSI coverage: There are 3 (P)SSSIs in the Natural Area containing 5 GCR SILs representing 5 different GCR networks. Monnington Scar has been selected for Lower Old Red Sandstone Stratigraphy (Non-marine Devonian) and the River Lugg Meanders for features of river management and applied fluvial geomorphology. Perton Roadside Section and Quarry exposes an extensive section through Ludlow and Downton strata. The sediments are highly fossiliferous and include fossil plant spores.

Key geological management issues:

- Maintain and enhance existing exposures
- Encourage recording/data collecting of temporary sections
- Misuse of sensitive fossil locations (including Ludlow Bone Bed exposures, fossil fish and eurypterid sites)
- Maintain the operation of natural fluvial processes

Key geological objectives:

1. **Maintain current geological/geomorphological exposures** and enhance where practical

2. **Maintain the operation of current natural fluvial processes**

3. **Increase the number of permanent geological exposures and/or recording of temporary sections** by encouraging joint initiatives with RIGs, local geological groups

4. **Encourage responsible fossil collecting** and contact with local Museum

Useful guides/references:

EARP, J.R. & HAINS, B.A. 1971: British Regional Geology: The Welsh Borderland. Institute of Geological Sciences. NERC

DINELEY, D.L. *in* DUFF, P.McL. & SMITH, A.J. 1992: Geology of England and Wales, Chapter 6, Devonian. The Geological Society. London

Earth science (P)SSSIs in the Natural Area:

- River Lugg Meanders
- Perton Roadside Section and Quarry
- Monnington Scar

Natural Area: 75. Midlands Plateau	Geological Significance: Outstanding (provisional)

General geological character: The geology of the Midlands Plateau Natural Area is extremely varied with Precambrian, Cambrian, Ordovician, Silurian, Carboniferous, Devonian, Permian and Triassic rocks all represented. This spans 500 million years of geological history from 700 Ma through to 200 Ma.

Metamorphic and volcanic rocks belonging to the Precambrian (700-570 Ma) are found in the west of the Natural Area around the Wrekin; Precambrian lavas and ashes forming hills on the eastern side of the Church Stretton Valley. The Church Stretton Valley itself follows the line of the Church Stretton Fault, a major fault active from the Precambrian to about 50 million years ago. Towards the end of the Precambrian a shallow sea covered much of the area depositing the shales and sandstones.

During the Cambrian, Ordovician and Silurian Periods (570-405 Ma) shallow marine conditions persisted. Cambrian rocks occur in the Church Stretton area and to the north of Bromsgrove and contain some of the earliest abundant fossils in Britain. The Silurian Wenlock Edge forms perhaps the best example of an escarpment in Britain with a steep westerly face and a gentle dip-slope to the east. The Wenlock Limestone was laid down under a shallow tropical sea in which coral reefs grew. These reefs are now fossilised together with their associated fauna on Wenlock Edge and a number of inliers around Dudley and Walsall. During the late Silurian and Devonian Period (405-355 Ma) the area rose above sea level for the first time, all the rocks formed during this period were laid down in lakes and shallow lagoons as red and green sandstones, marls and limestones which today form the Old Red Sandstones of the Clee Hills on the southwestern edge of the Natural Area.

During the Carboniferous (355-290 Ma) most of the area was once more covered by sea, Carboniferous Limestone and Millstone Grit forming the highest part of the Clee Hills. The Carboniferous in this area is, however, most famous for its coal deposits (South Staffordshire and Warwickshire Coalfield) laid down by widespread deltas and associated swamps. Towards the end of the Carboniferous the Hercynian Orogeny folded and faulted the Carboniferous and older rocks producing the dome-like structures or periclines of the Dudley and Walsall Silurian inliers. Red sandstones and mudstones dominate the scenery around Bridgenorth and form the Midland Plain around Wolverhampton and between Wolverhampton and Coventry. These sandstones were deposited during the Permian and Triassic Periods (290-205 Ma) in a Saharan-like environment. Upper Mesozoic (Jurassic and Cretaceous) and Tertiary sediments are not found, little is known about these periods in the Natural Area though it is likely the area was emergent for much of this time.

Pleistocene ice sheets covered the area on as many as five occasions over the last two million years and there was certainly a glacier in the Church Stretton valley as recently as 20,000 years BP. When the ice sheets melted they left behind a cover of glacial clay, sands and gravels ('boulder clay') and fluvio-glacial sands. Blocking of the Dee Estuary by ice forced the River Severn to flow southward, cutting the Ironbridge gorge and joining the Avon drainage system, after ice melt this southward course was maintained. Present-day fluvial geomorphology is also important, the elevated are of the Midlands Plateau forming a watershed between the Humber and Bristol Channel drainage systems.

Key geological features:

- Precambrian stratigraphy, volcanic activity and faulting
- Cambrian stratigraphy, palaeoenvironments and palaeontology (trilobites, brachiopods & graptolites)
- Ordovician stratigraphy, palaeoenvironments and palaeontology (trilobites, brachiopods & graptolites)
- Silurian stratigraphy, palaeoenvironments and palaeontology (corals, trilobites, brachiopods & graptolites)
- Devonian stratigraphy, palaeoenvironments and palaeontology (early fish)
- Carboniferous stratigraphy, palaeoenvironments and palaeontology (plants)
- Triassic stratigraphy, palaeoenvironments and palaeontology (early reptiles)
- Pleistocene stratigraphy and palaeoenvironments
- Present fluviogeomorphology

Number of GCR sites:

Westphalian: 10 Wenlock: 8 Permian-Triassic: 6 Ludlow: 3 Tremadoc: 2 Cambrian: 2 Silurain-Devonian Chordata: 1 Fluvial Geomorphology of England: 2 Caledonian Igneous: 1 Permian-Triassic Reptilia: 1 Precambrian England/Wales: 1 Pleistocene/Quaternary of the Pennines: 1 Pleistocene/Quaternary of the Midlands: 1

Geological/geomorphological SSSI coverage: There are 26 (P)SSSI in the Natural Area covering 39 GCR SILs representing 13 different GCR networks. The geological diversity of the Midlands Plateau has attracted geologists for over 200 years and many standard reference (type) sections are now found within the area. Murchison based his foundational work, 'The Silurian System', on rocks in this area and the Silurian Wenlock Series is named after Wenlock Edge, its type area. Today, many sites are considered of international importance including The Wrekin and the Ercall, Wenlock Edge and the Wren's Nest.

Precambrian and Cambrian - important sections are found in The Wrekin and the Ercall where Cambrian rocks unconformably overly the Cambrian, elsewhere the Cambrian Abbey Shales at Illing's Trenches contain an abundant fauna (especially trilobites). **Ordovician** - Sheinton Brook and Chermes Dingle expose the fossiliferous Shineton Shales (early Ordovician, Tremadoc Stage) in their type area. **Silurian** - Wren's Nest and Wenlock Edge expose internationally important sequences of the Wenlock and Ludlow Series, over six hundred species have been described from the reefs and associated deposits of Wren's Nest alone. Whitewell Coppice is the international standard for the base of the Middle Silurian Homerian Stage. **Devonian** - Prescott Corner is the type locality for the Upper Devonian Farlovian Sandstones which have yielded important fish remains, Devil's Hole has also yielded Old Red Sandstone fish. **Carboniferous** - a number of localities including Bromsgrove Road Cutting, Doulton's Clay Pit and Ketley Clay Pit expose Upper Carboniferous rocks belonging to the Westphalian. Alveley Grindstone Quarry exposes late Carboniferous sandstones transitional with the overlying Triassic. **Permian** - the most spectacular Permian sandstones are found at Kinver Edge. **Triassic** - Claverley Road Cutting provides a striking section through the Wildmoor Sandstone, other sections include Burcot Roadside Cutting, Cannock Chase, Wollaston Ridge and Guy's Cliff , the last has yielded important vertebrate remains. **Pleistocene** - Four Ashes Pit is the type locality for the Devensian, the last Pleistocene Stage. **Fluvial geomorphology** - both the River Stour Flood Plain and Buildwas Sand Quarry are important for understanding the development of the River Severn, both containing alluvial sediments which date this river back to the Devensian.

Key geological management issues:

- Management of established type localities and international reference sections
- Management of palaeontological sites
- Conservation in working quarries
- Site assessment of new sites (eg. new quarries and cuttings)
- Promotion of the value of the geological resource and its link with industrial heritage

Key geological objectives:

1. **Maintenance and enhancement of the geological resource** through a) enhancement of existing exposures through site clearance, (type localities and internationally important sections given priority), b) development of local conservation strategies that include geology (eg. Black Country Conservation Strategy, c) continued assessment of educational/research value of new sites (eg. quarries and cuttings, temporary or permanent).

2. **Promotion of geological resource** through a) assessment and promotion of site educational value (particularly relevant with the urban setting of the Natural Area), b) on-site interpretation (eg. sign boarding, trail guides, leaflets; see Wren's Nest and The Wrekin and the Ercall), c) promotion of the link between geology and local habitats, scenery and the industrial development of the Natural Area (the link between geology and the former industry is particularly important).

Useful guides/references:

CUTLER, A., OLIVER, P.G. & REID, C.G. R. 1990: Wren's Nest National Nature Reserve. Geological Handbook and Field Guide. NCC.

HAINS, B.A. & HORTON, A. 1969: British Regional Geology. Central England. HMSO, London.

STEVENSON, I.P. & MITCHELL, G.H. 1955: Geology of the country between Burton upon Trent, Rugely and Uttoxeter. Memoir of the British Geological Survey, HMSO, London.

TOGHILL, P. 1990: Geology in Shropshire. Swan Hill Press.

TOGHILL, P. & BEALE, S. 1994: Ercall Quarries, Wrekin Area, Shropshire. Geologist's Association Guide No. 48

WHITEHEAD, T.H. & POCOCK, R.W. 1947: Geology of the country between Dudley and Bridgenorth. Memoir of the British Geological Survey, HMSO, London.

Earth science (P)SSSIs in the Natural Area:

- Griff Hill Quarry
- Whitwell Coppice
- Guy's Cliff
- Brewins Canal Section
- Madeley Heath Pit
- Bromsgrove Road Cutting, Tenterfields
- Kinver Edge
- Burcot Roadside Cutting
- Ketley Clay Pit
- Daw End Railway Cutting
- Lincoln Hill
- Doulton's Clay Pit
- Kingsbury Brickworks
- Four Ashes Pit
- Illings Trenches
- Gospel End Road Cutting
- Cannock Chase
- Hay Head Quarry
- Farley Dingle
- Alveley Grindstone Quarry
- Buildwas River Section
- Buildwas Sand Quarry
- Chermes Dingle
- Claverley Road Cutting
- Devil's Hole, Moreville
- Eyemore Railway Cutting