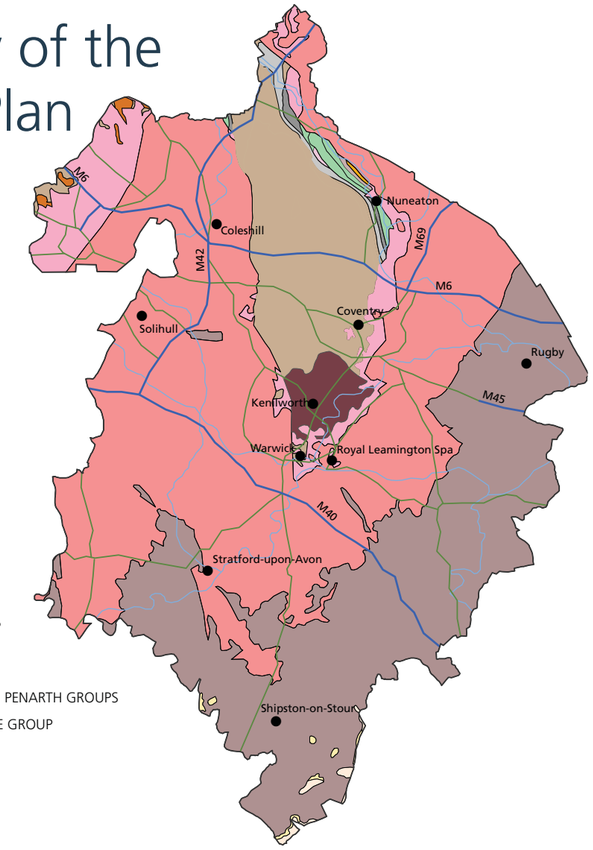
Geology of the Action Plan Area



Legend

- rivers
- major roads

JURASSIC
- GREAT OOLITE GROUP
- INFERIOR OOLITE GROUP
- LIAS GROUP

TRIASSIC
- MERCIA MUDSTONE and PENARTH GROUPS
- SHERWOOD SANDSTONE GROUP

PERMIAN
- HOPWAS BRECCIA
- WARWICKSHIRE GROUP

CARBONIFEROUS
- WARWICKSHIRE GROUP
- PENNINE MIDDLE COAL MEASURES
- PENNINE LOWER COAL MEASURES

DEVONIAN
- OLDBURY SANDSTONE FORMATION

CAMBRIAN-ORDOVICIAN
- STOCKINGFORD SHALE GROUP incorporating ORDOVICIAN INTRUSIVE ROCKS

CAMBRIAN
- HARTSHILL SANDSTONE FORMATION

NEOPROTEROZOIC
- CALDECOTE VOLCANIC FORMATION

Derived from BGS DiGMapGB-625 bedrock data, British Geological Survey

WGCG Hidden wonders in the landscape of Warwickshire

Warwickshire County Council

The Wildlife Trusts Warwickshire

The Geological Society

Cover image © Ian Fenwick - Design from The Drawing Room

Conserving Warwickshire's Geological Heritage

WGCG
Hidden wonders in the landscape of Warwickshire

A Geodiversity Action Plan contributing to the enrichment of the environment of Warwickshire, Coventry and Solihull through conserving and managing its geodiversity – landscapes, rocks, fossils, minerals and soils . . .

for the benefit of all

Warwickshire Geological Conservation Group
c/o Warwickshire Museum
Market Place
Warwick CV34 4SA

www.wggg.co.uk

Geodiversity is the link between landscape, people and their activities. It is the variety of geological phenomena and processes that make the landscapes, rocks, minerals, fossils and soils which provide the framework for life on Earth.

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Warwickshire Geodiversity Action Plan Objectives

The Warwickshire Geodiversity Action Plan is being developed for the County of Warwickshire, the City of Coventry and the Metropolitan Borough of Solihull.

The objectives of the Warwickshire Geodiversity Action Plan are to:

1. identify and audit the geodiversity resource
2. conserve, manage and monitor Warwickshire's geodiversity
3. embed the geodiversity concept, its significance and the need to conserve local geodiversity, throughout the planning system.
4. conduct research on Warwickshire's geodiversity
5. increase awareness of and support for Warwickshire's geodiversity with reference to professional bodies, conservation practitioners, landowners, the education sector, and the general public
6. initiate, support and conduct educational initiatives concerning local geodiversity
7. integrate geoconservation with bioconservation and landscape quality initiatives
8. measure our progress

© Warwickshire Museum

Quarries enable investigation of the area's geodiversity which would otherwise be hidden underground. One such location is Cross Hands Quarry (a Site of Special Scientific Interest) which allows amateur and museum-led groups to collect fossils and learn about sedimentary rocks in a safe, accessible environment. The quarry exposes limestones of Middle Jurassic age. The rock beds have yielded significant research findings including a new species of dinosaur and the fossilised remains of a diverse Jurassic sea-life.

© Alan Cook

The value of quarries to the study of geodiversity can be extended if owners manage the features of interest, especially where working has ceased. Grants from the Aggregate Levy Sustainability Fund (ALSF) have enabled recommendations to be made for geoconservation at sites such as Griff Hollows (Local Geological Site 74) through the development of Site Management Plans. These identify the main features of the sites, record them accurately, suggest possible management strategies and set the sites in their environmental, biodiversity and historical contexts.

© Warwickshire Museum

Detailed work on rock exposures enables continued auditing of and research into the area's geodiversity. The photograph shows a new variety of trace fossil - Solusichnium southamense *- attributed to a shrimp-like crustacean that became buried beneath a layer of silt in the Early Jurassic sea. It was first decribed by Lorna O'Brien of the University of Bristol in 2009. It comes from a thin layer of siltstone near the base of the Lias Group exposed near Southam in eastern Warwickshire. The brown, nodular structure adjacent to the trace fossil is an aggregate of pyrite ('fool's gold'). The pyrite formed in the stagnant sea-floor mud on which the silt was deposited.*

© John Ball

Geodiversity does not exist in isolation. The meanders of the River Arrow at Studley (Local Geological Site 49) lie within a historic landscape. The meanders and evidence of the former the river channels tell much about the geomorphological processes at work now and in the past. But the river is surrounded by evidence of early medieval farming practices now seen as ridge and furrow strips in the fields. The Church of St. Mary, in its circular enclosure, dates from the 12th century and there are the degraded remains of a Norman motte and bailey castle to the north (right in the photograph) of the church.

© Ian Penwick

In many areas the bedrock of Warwickshire is masked by sands and gravels, which have been extensively worked as a building resource. Intensive study of these sands and gravels by Professor F. W. Shotton and his successors has revealed much about the geological history Britain during the Ice Age. He named a cold period the Wolstonian after the village of Wolston. This work is commemorated by an interpretation board installed on the village green of Wolston and 'unveiled' in the presence of Professor Shotton's daughters.

The lead organisation in implementing the plan is the Warwickshire Geological Conservation Group (WGCG) whose objectives are compatible with and complementary to those of the Action Plan.

Membership of WGCG is open to all and through its activities with members, the public at large and other organisations it aims to:

- Increase the understanding of the science of geology
- Conserve the geological heritage of Warwickshire
- Show the importance of geology for understanding landscapes and biodiversity
- Demonstrate how geology influences many aspects of human activity

WGCG Hidden wonders in the landscape of Warwickshire

Warwickshire County Council

The Wildlife Trusts Warwickshire

The Geology Trusts

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Local Geological Sites in Warwickshire

Local Geological Sites are important places for geology and geomorphology that underpin and complement Sites of Special Scientific Interest (SSSI). They were established in 1990 by the Nature Conservancy Council and continue to be actively supported by the UK statutory conservation agencies.

Their designation helps to recognise and protect important Earth Science and landscape features for future generations to enjoy.

Unlike Sites of Special Scientific Interest, Local Geological Sites have no legal protection. The landowner has no obligation to conserve them and the general public have no right of access, unless they are on a public right-of-way. Many landowners do, however, grant permission for visits by interested parties.

Local Geological Sites are selected in Warwickshire by a panel comprising representatives of the Warwickshire Geological Conservation Group, Natural England and Warwickshire Museum.

They are selected using four nationally agreed criteria:

- The value of a site for educational purposes in life-long learning;
- The value of a site for study by both professional and amateur Earth Scientists;
- The historical value of a site in terms of important advances in Earth Science knowledge, events or human exploitation;
- The aesthetic value of a site in the landscape, particularly in relation to promoting public awareness and appreciation of Earth Sciences.

Currently there are at least 3500 Local Geological Sites designated in Great Britain, nearly 90 of which are in Warwickshire. Although the geology of Warwickshire is extremely varied, obvious exposures of the underlying geology are rare due to the general 'flatness' of the county. The designated sites are very important, therefore, in providing a record of where rocks from most of the geological periods can be examined.

Information on each designated site is made available to the public from the Geological Localities Record Centre at Warwickshire Museum and on the internet at **www.wgcg.co.uk**.

© Brian Ellis

River Avon, Stratford Racecourse *LGS 51 GR SP 184533*

The Avon is the iconic Warwickshire river. The Local Geological Site (LGS), adjacent to Stratford Racecourse, has aesthetic value typical of the Avon valley. The banks preserve river sediments deposited within the last 6500 years. These are dated using the shells of freshwater molluscs which are found broken up in the river banks and on the river's edge. The LGS is accessible on a public footpath.

© Brian Ellis

Baginton Garden Centre *LGS 43 GR 339 750*

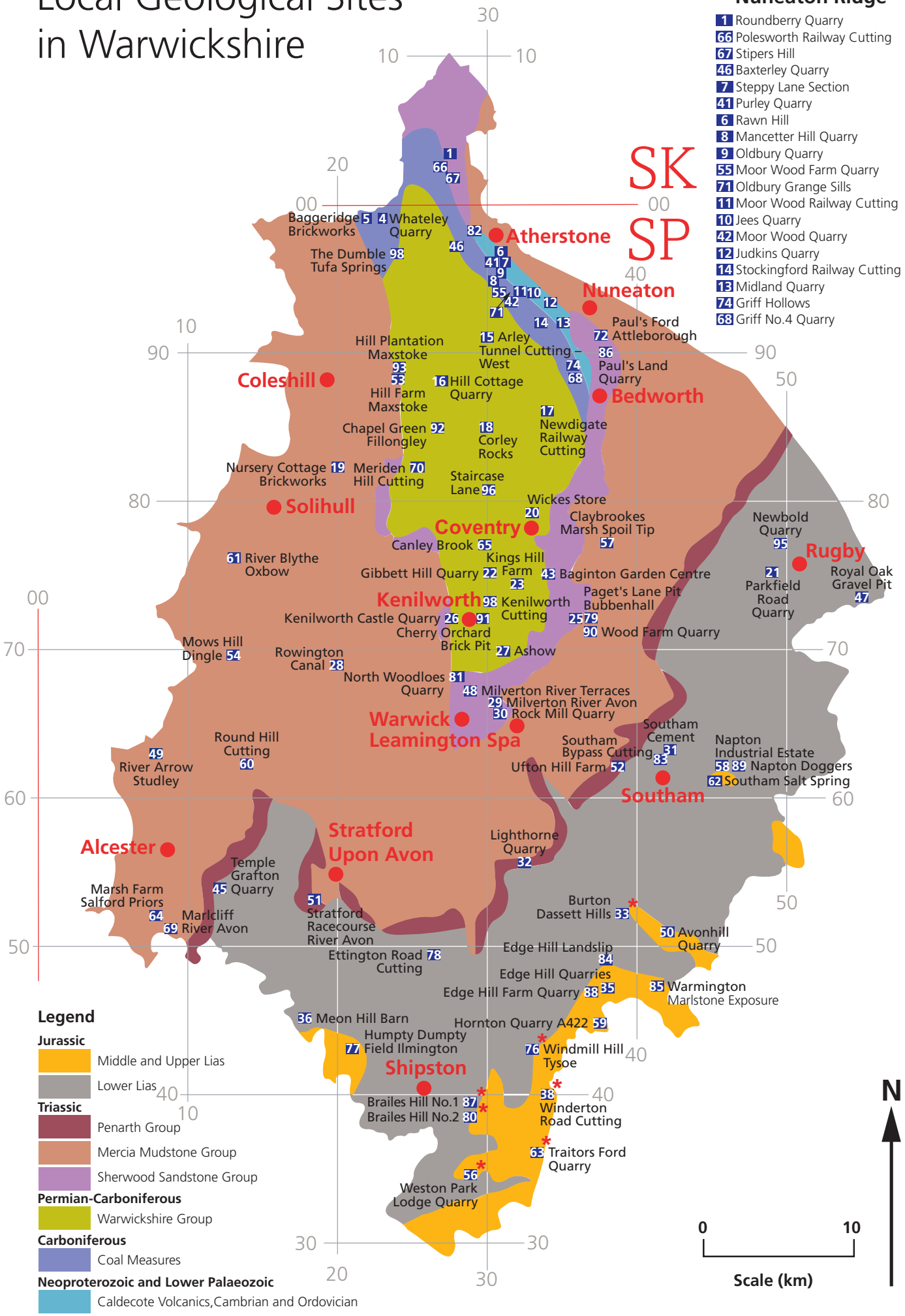
The LGS is an old quarry conserved and then planted by the owner as a rock garden with water features. It is accessible for a small charge.
The rocks are Bromsgrove Sandstone from the Sherwood Sandstone Formation. They are typical of sandstones deposited by intermittent river flows when Britain was semi-arid during the Triassic Period about 250 million years ago. The rocks demonstrate many sedimentary structures.

© Colin Frodsham

Purley Quarry *LGS 41 GR 303 962*

The LGS is in a disused road aggregate quarry. The quarry is being backfilled and reinstated but, with a grant from the Aggregate Levy Sustainability Fund, a section has been cleaned, preserved and fenced off because of its geological significance. Shales of Cambrian age (about 515 million years old) are fossil bearing and were used in pioneering geological research in the 19th century. In the Ordovician period, molten magma was intruded into the shales and it is this rock (a type of diorite called lamprophyre) that was quarried, There is no public access without permission of the quarry owners.

Local Geological Sites in Warwickshire



Nuneaton Ridge

1 Roundberry Quarry
66 Polesworth Railway Cutting
67 Stipers Hill
46 Baxterley Quarry
7 Steppy Lane Section
41 Purley Quarry
6 Rawn Hill
8 Mancetter Hill Quarry
9 Oldbury Quarry
55 Moor Wood Farm Quarry
71 Oldbury Grange Sills
11 Moor Wood Railway Cutting
10 Jees Quarry
42 Moor Wood Quarry
12 Judkins Quarry
14 Stockingford Railway Cutting
13 Midland Quarry
74 Griff Hollows
68 Griff No.4 Quarry

*These sites have exposures of Jurassic Inferior Oolite or Great Oolite rocks

March 2011

Geodiversity – places and people

The Warwickshire Geodiversity Action Plan is being developed for the County of Warwickshire, the City of Coventry and the Metropolitan Borough of Solihull. The region's varied rock formations and landscapes bear witness to an epic journey across the face of the Earth spanning six hundred million years during which the British Isles slowly moved from a position near the South Pole to arrive at today's location in the northern hemisphere. The constant motion and shifting of continental plates over our planet's fluid interior is attributed to plate tectonics; a drifting of the Earth's continents that continues today.

The geological evidence for this grand voyage through time and space is preserved in the rocks exposed in quarries and cuttings that can be seen in many places in the region's diverse landscapes. It is this variety which makes up the region's geodiversity.

The rocks of the **Nuneaton Ridge** are associated with ancient volcanic events, former great oceans and fossilised primitive lifeforms. They can be found in the large stone quarries north-west of Nuneaton.

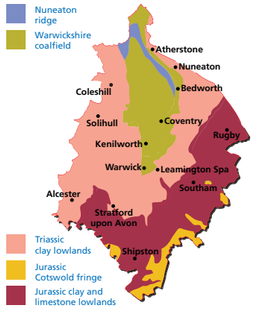
© Alan Cook

Judkins Quarry, Nuneaton. Precambrian, Lower Paleozoic and Triassic rocks , overlooking the Triassic Hinckley plain.

The sandstones and coal seams of the **Warwickshire Coalfield** preserve the remains of a tropical rain forest which grew when the British Isles crossed the equator. Daw Mill, the only mine still working, is Britain's largest deep coal mine.

© John Ball

The UK's largest producing coal mine; Daw Mill colliery, Arley, near Coventry.



Warwickshire Geology and landscapes

Thick deposits of compacted desert dust, muds from temporary lakes and river sand, more than 200 million years old, make up the **Triassic clay lowlands** that surround the Warwickshire coalfield. Two sandstones – Bromsgrove and Arden – have been quarried as building stone and also yield rare, remarkable fossils of primitive reptiles and their footprints.

© Warwickshire Museum

Skull of a Triassic reptile known as a rhynchosaur from Coten End, Warwick.

The **Jurassic clay and limestone lowlands** of southern and eastern Warwickshire are underlain by Jurassic clay and limestone deposits that were laid down in a widespread warm, muddy sea. These rocks have provided the raw materials for the Rugby Cement industry.

© Warwickshire Museum

Lower Jurassic Blue Lias beds at Southam cement quarry.

Fringing the lowlands in the south and east, the hilly **Jurassic Cotswold fringe** is underlain by beds of clay, sandstone, ironstone and limestone that contain many fossils. Some of the harder beds have been quarried locally as building stones, or used for ornamental purposes.

© John Ball

The Bishop's Bowl, near Harbury. An abandoned, flooded cement quarry in the Blue Lias.

No evidence remains of rocks being deposited since the middle of the Jurassic Period. For the last 30 million years or so the land has been above sea level and has been eroding to give the skeleton of the landscape we see now. More recently during glacial episodes over the past 500,000 years ice has sometimes covered the whole area. This moulded the present landscape, leaving behind pockets of economically valuable sand and gravel deposits and evidence of early human habitation in the Midlands.

© Warwickshire Museum

Palaeolithic hand-axe made of andesite, from Bubbenhall

© John Ball

The effects of the extraction of sands and gravels at Bubbenhall

© Warwickshire Museum

The Country Park at Burton Dassett Hills with old quarry workings within the Lower Jurassic Marlstone.

The need for conservation

Geological features can provide special opportunities for scientific research and public education, but are often threatened or even lost by construction work. Their value needs to be recognised, recorded and protected, to demonstrate the profound impact that geological processes have on our environment, its biodiversity and way of life.

The need for an action plan

The Geodiversity Action Plan (GAP) is being developed with a number of partners, co-ordinated by the Warwickshire Geological Conservation Group. It is an action plan that promotes and protects the geodiversity of the 'greater Warwickshire' vice-county area, which includes Warwickshire, Coventry and Solihull. The GAP will increase awareness, understanding and involvement in geoconservation and provide guidance to planners, landowners and local communities on the benefits and advantages of good conservation practice. The GAP will also increase educational opportunities to promote an appreciation of local geology and landscapes by improving access to places where rocks and fossils can be seen, and where interpretation boards, leaflets and guides can be made available to the general public. The ultimate aim of the GAP partnership is to conserve the region's geological heritage for the benefit of all concerned.

© Ian Helmrick

WGCG volunteers clearing a quarry in Lower Jurassic Wilmcote Limestone at Temple Grafton.

How you can help

The Warwickshire Geological Conservation Group promotes geology by providing walks, talks and trails that will introduce people to the geological and landscape features that can be seen in the countryside and in the towns. New members are always welcome to join the group and support the Warwickshire Geodiversity Action Plan (GAP), irrespective of their level of understanding and knowledge of geology. With the help of partners, local authorities, local interest groups and communities, the GAP will ensure a healthy future for the area's outstanding geological heritage.

© Colin Footsham

Contractors working on a conservation project in a former-diorite quarry at Purley, near Nuneaton.