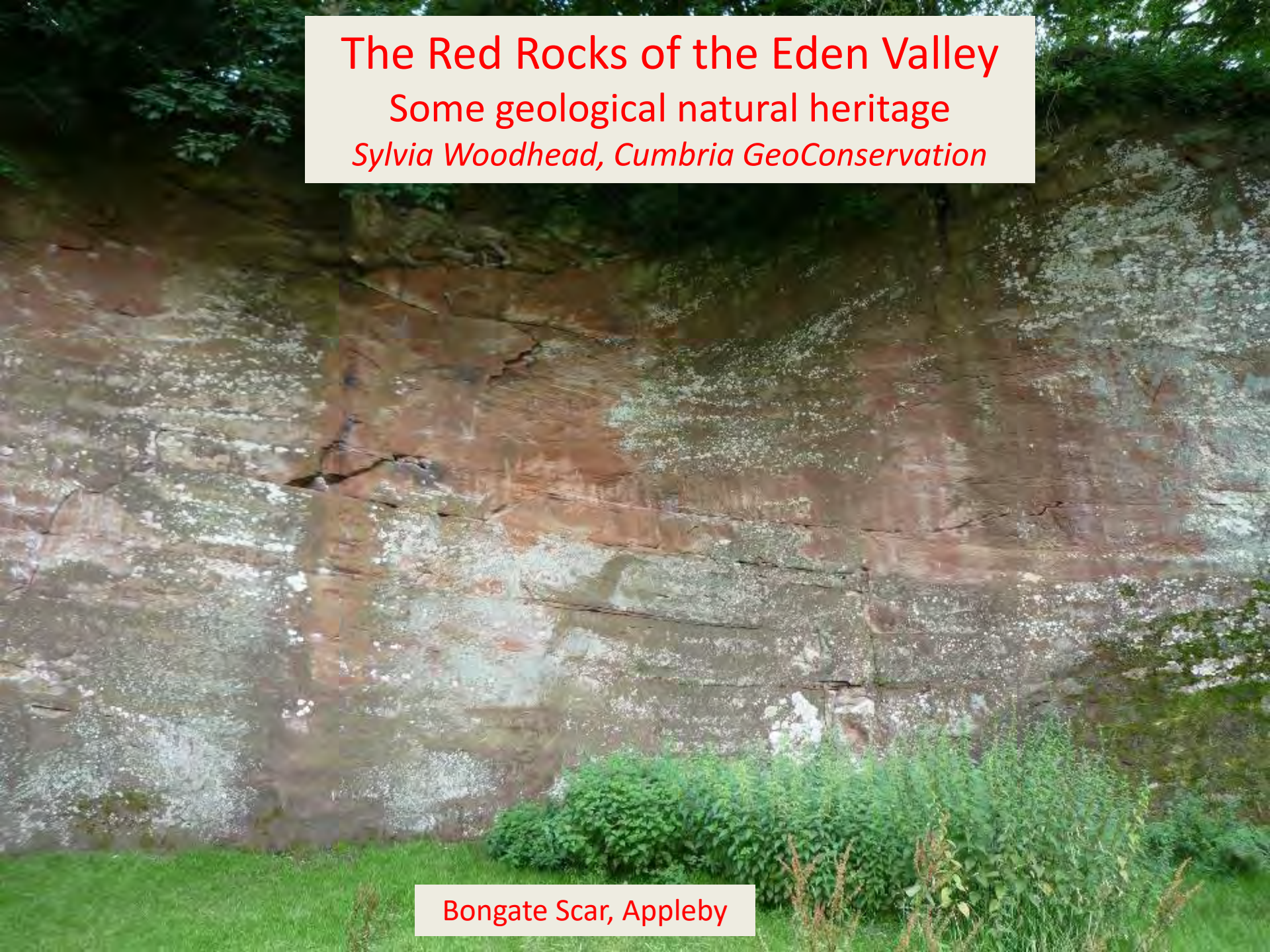
The Red Rocks of the Eden Valley

Some geological natural heritage

Sylvia Woodhead, Cumbria GeoConservation



Bongate Scar, Appleby

Access to Eden

Intellectual access- information about geology

Special Geology Places

Armathwaite - the Cleveland Dyke

Smardale & Waitby- Accessible Trails

Kirkby Stephen- an information hub?

The Eden catchment is huge.

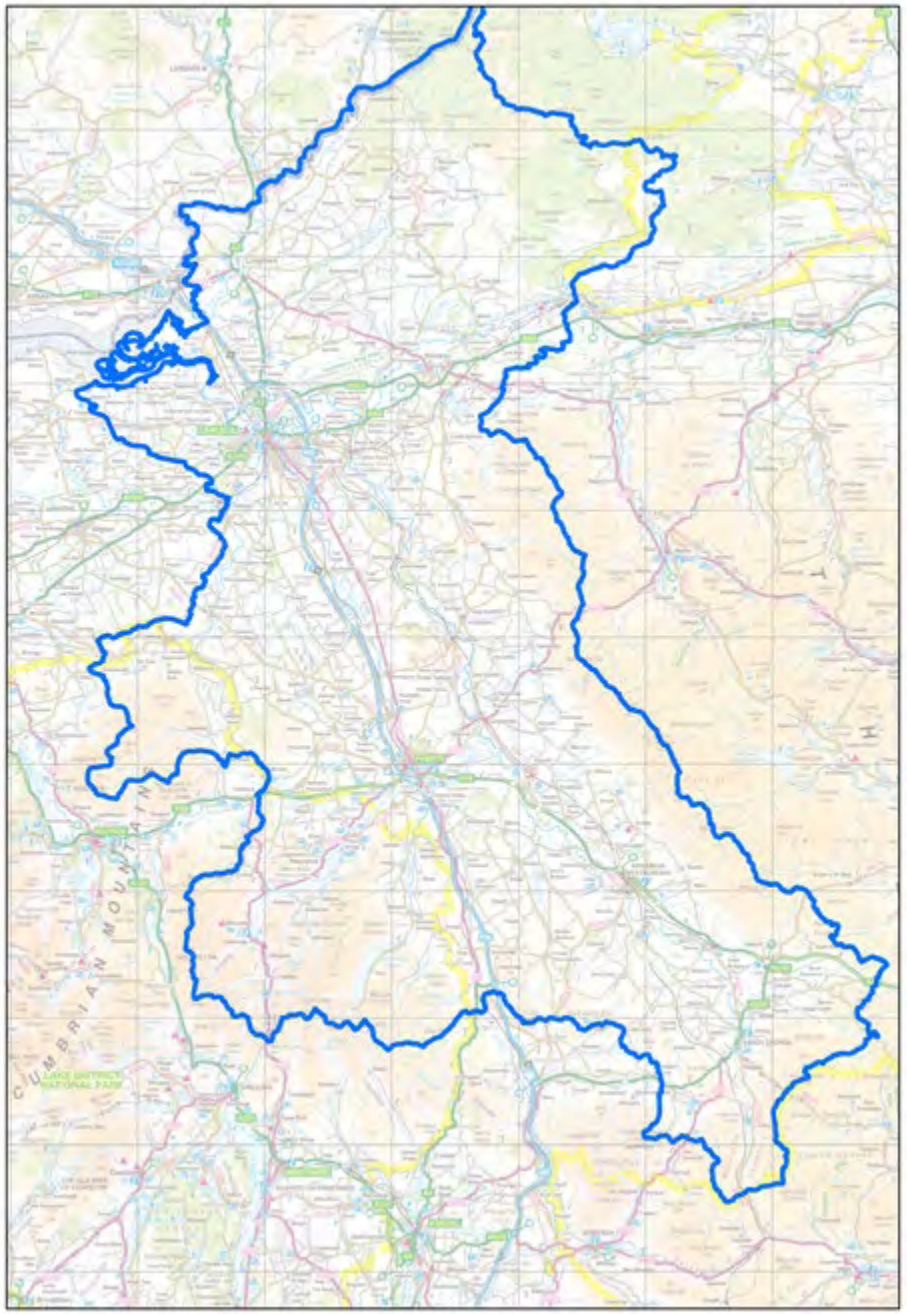
The River Eden is 80 miles long, from Hell Gill Force to the Solway.

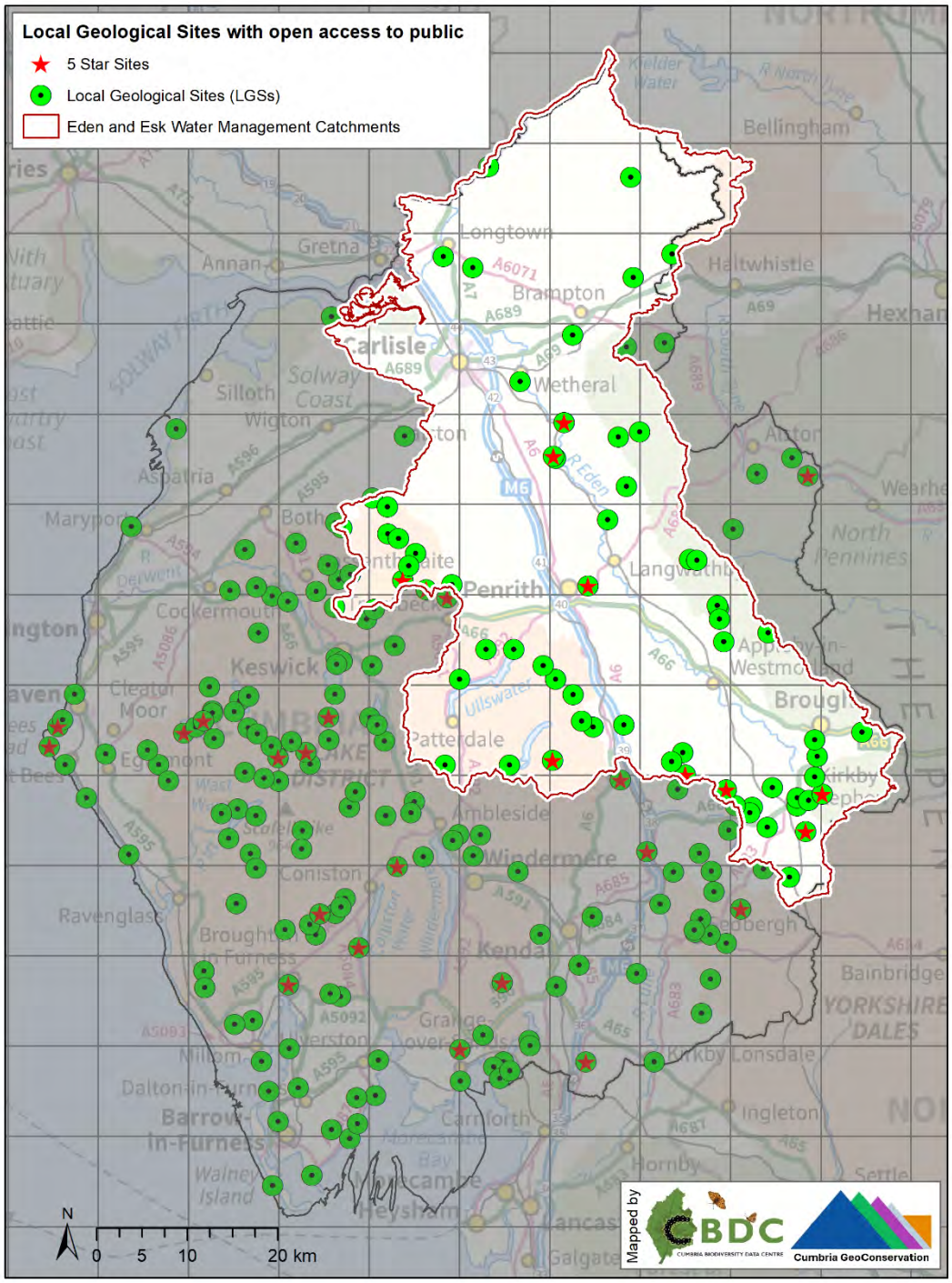
It is underlain by different rocks from most of the rest of Cumbria.

These are **red sandstones**, formerly called **New Red Sandstone**.

There are 60 **Local Geological Sites** along its length. The southernmost are in Mallerstang, Wild Boar Fell & Janny Wood

The Eden Catchment





Local Geological Sites

www.cumbriageoconservation.org.uk

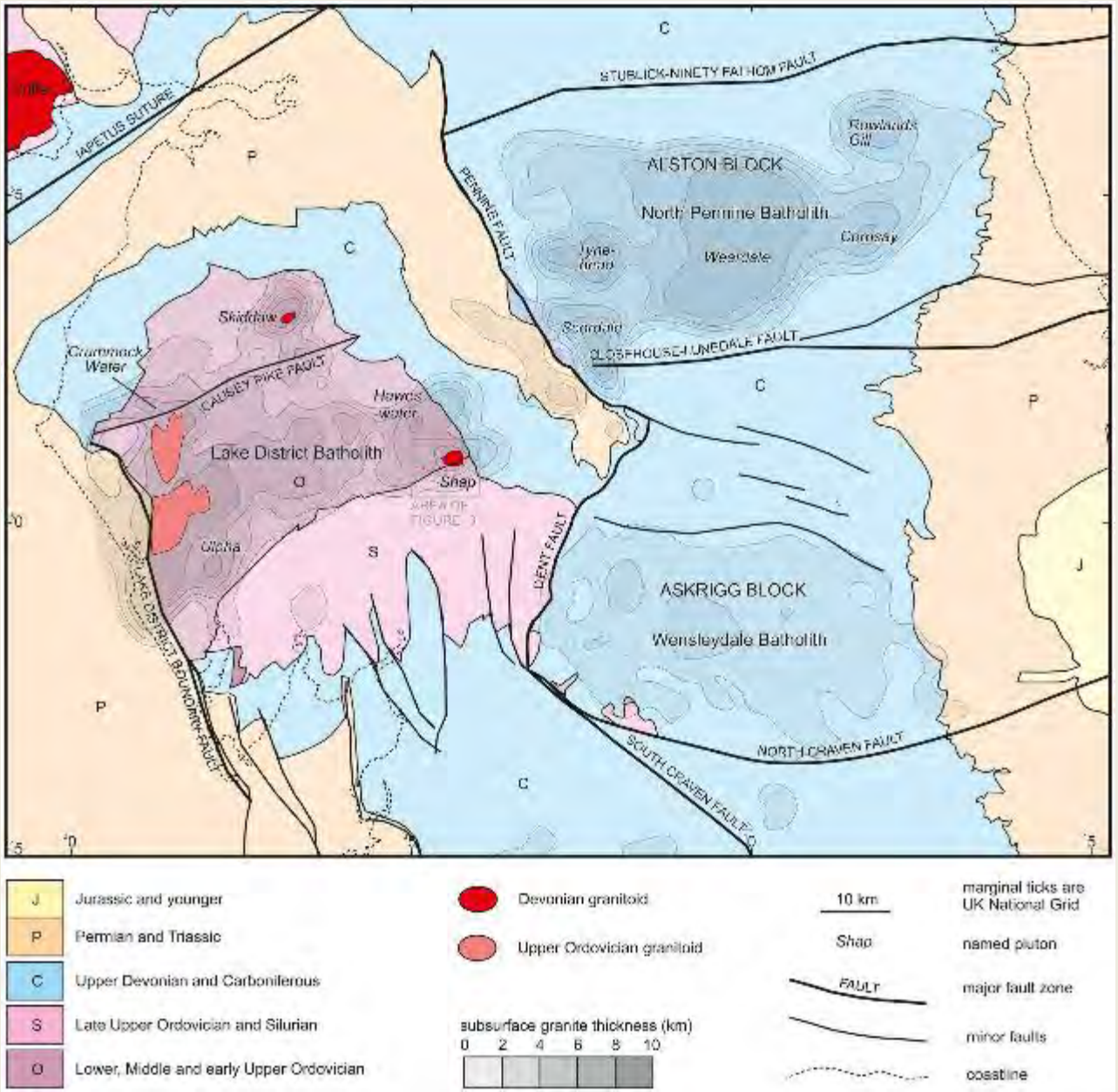
Red = 5* sites

Glasson Point- drumlin
Wetheral Woods- St Bees Sst
Lowhouse Woods, Armathwaite PS
Armathwaite dyke
Coombe Clints- PS
Lacy's Caves- PS
Thistley Hill Quarry, Appleby B
Dufton Ghyll SBS
Rowley Wood, Appleby Carb
Smardale Limestone Quarry Carb
Smardale Bridge – Carb. Asfell sst
Ewbank Scar- Carb
Stenkrith Gorge- Brockram
Janny Wood - Carb
Nateby- Brockram
Wild Boar Fell- landslips

A structural geology P = Permian and Triassic rocks

Eden valley rocks are Permian and Triassic (P) on the map.

It is a ‘half graben’, a rift valley bounded by the Pennine Fault, which forms a dominant scarp to its east side.



Stratigraphic column, from the Geological Memoir for Appleby

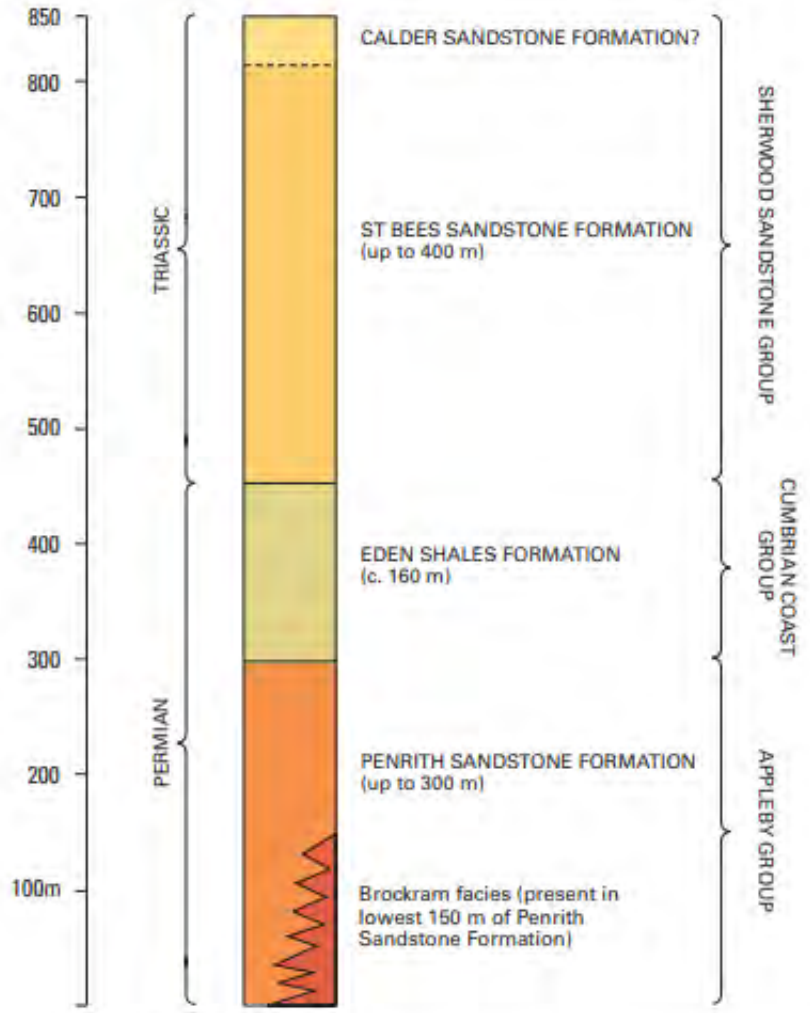


Figure 3 Generalised vertical section through the Permian and Triassic sequences.

The Rocks of the Eden Valley (Permian & Triassic)

(Youngest at the top)

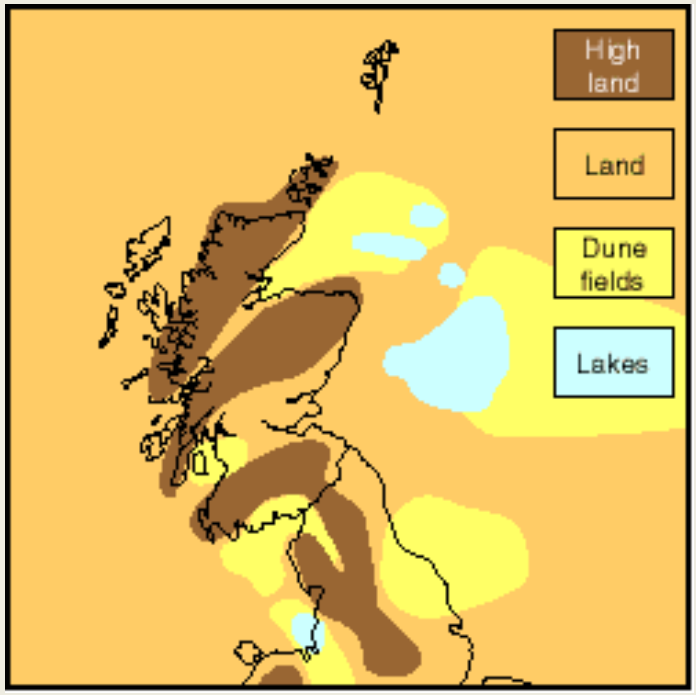
Triassic

St Bees Sandstone

Permian

Penrith Sandstone

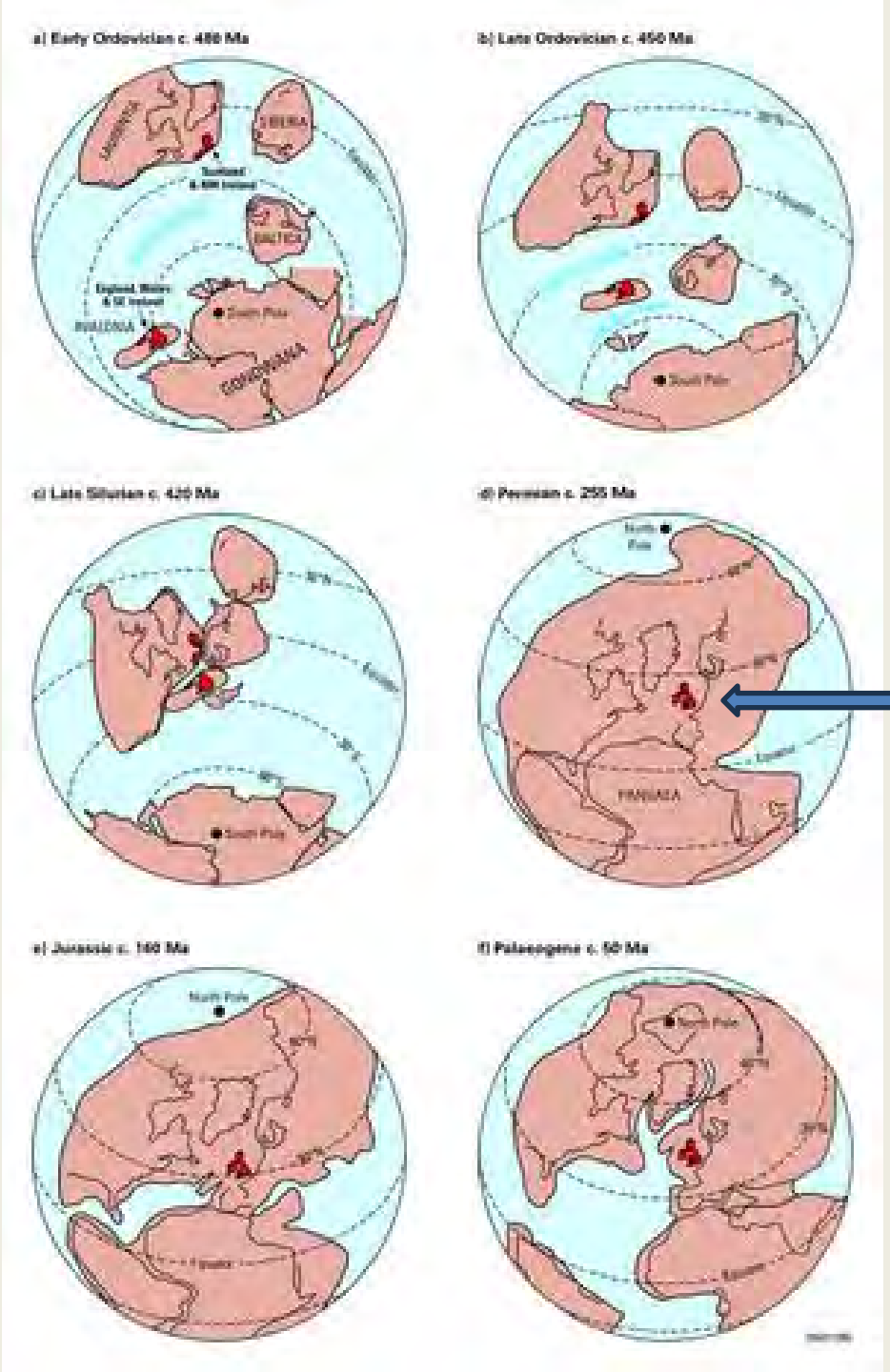
Brockram



Eden valley in Permian times.
A rift valley, surrounded by high land.
Map from Scottish Geology Trust

Erosion of Carboniferous mountains produced fan deposits of Brockram, a locally distinctive rock, best seen round Kirkby Stephen.

BROCKRAM



Eden Valley in Permian times, 300-200 million years ago. Middle of a vast continent, Pangaea. North of the equator, similar latitude to the Sahara desert. Mountains cut off rainfall. It was a desert environment.

Plate Tectonic movement, over 400 million years. Internet source

Revealing the Foundations

Elizabeth Pickett
published by Cumbria GeoConservation

Revealing the Foundations, a new publication by Cumbria GeoConservation, tells the story of the geology and landscape of this fantastic area. The Westmorland Dales forms the north-west corner of the Yorkshire Dales National Park and is a beautiful part of east Cumbria. The area has a rich and varied geological heritage, recording over 400 million years of Earth history.

At its heart is dramatic limestone countryside including Great Asby Scar National Nature Reserve, but there's more to see, from the slaty rocks of the Howgills to the red sandstone of the Eden Valley, and many glacial and recent landforms. This book, beautifully written and illustrated by Elizabeth Pickett, is a wonderful introduction to the area.It spans 450 million years of geological history and describes how the landscape that we see today has been shaped by ice and water. The book also recommends places to visit.

It has been produced as part of the Westmorland Dales Landscape Partnership Scheme, grant funded by the National Lottery Heritage Fund, with additional grant support from the Yorkshire Dales National Park Authority's Sustainable Development Fund.

Key Features include

A geological map of the region and geological cross section

Illustrations of the Earth in the past

Hand drawn 3D block diagrams

Superb photographs

Easy to understand explanations

Present day examples

Contents

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Proceeds from the sale of this book will support the work of Cumbria GeoConservation
Available from
https://www.cumbriageoconservation.org.uk

Geology of the Eden valley, in *Revealing the Foundations*, by Elizabeth Pickett

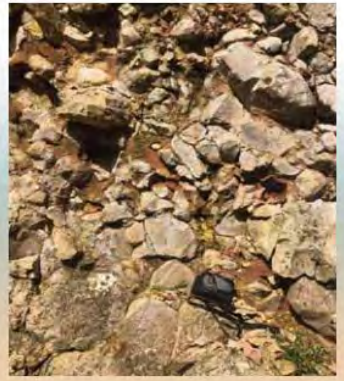
Desert basin

A belt of red rocks, dating from the Permian and Triassic periods, occupies the Eden Valley and stretches as far as Kirkby Stephen. By this time, roughly 300 to 200 million years ago, Britain had moved north of the Equator and was once again part of a huge desert continent.

Waterworn brockram beside the River Eden at Stenkrith Park near Kirkby Stephen.

Floods and fans

In the Permian, a desert basin flanked by hills of Carboniferous limestone developed in an area that corresponds roughly to the present-day Eden Valley. Rubbly rock, washed off the hills by flash floods, accumulated in fan-shaped deposits known as alluvial fans. These coarse sediments became a distinctive local rock known as brockram. Brockram is a breccia (a rock made of angular pieces of older rocks) and is mainly made of Carboniferous limestone fragments set in red sandy material. Good examples of brockram can be seen west of Nateby, in the River Eden at Stenkrith Park and in Waitby Cutting near Smardale.



Permian desert landscapes in which brockram formed along the foot of rocky hills.

Brockram exposed in Waitby Cutting, once part of the Stainmore railway line.

St Bees Sandstone in the River Eden near Kirkby Stephen.

Dunes, salt flats and rivers

Away from the hills, sand dunes and salt flats developed, and are now preserved as red Penrith Sandstone and layers of the minerals anhydrite and gypsum. These rocks are mainly seen in the Eden Valley, where they make up parts of the Appleby and Cumbrian Coast rock groups. In Crosby Ravensworth the 'Millennium Stone' outside the church is a circular slab of Penrith Sandstone brought here from a quarry near Lazonby.

Later, during Triassic times, large rivers flowed across the desert landscape, depositing sand which was to become another red rock, the red-brown St Bees Sandstone of the Sherwood Sandstone Group.

Red stone for building

In the Eden Valley both Permian and Triassic red sandstones have been widely used as building stone. In the Westmorland Dales, some red sandstone used in buildings, especially as quoins and around doors and windows, may be Permian or Triassic sandstone brought into the area. However, some is the local Carboniferous Ashfell Sandstone, which is also reddish in colour. Brockram has been quarried for use as a local building stone and can be widely seen in and around Kirkby Stephen.

The Cloisters in Kirkby Stephen, built with local Permian and Triassic red sandstone.

Brockram used as a building stone in a barn near Kirkby Stephen.

The Eden valley in the Ice Age

Frozen land

By 2.6 million years ago, at the start of the present Quaternary Period, Britain had drifted north to its present position. World climate had cooled, heralding the start of a series of major glaciations which have profoundly shaped the character of the Westmorland Dales landscape.

Iced over

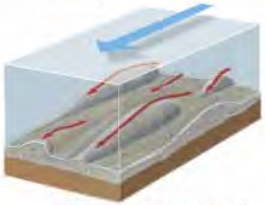
Over the past 2.6 million years northern England has been covered in ice many times. Glacial periods (often called ice ages) have alternated with warmer intervals, when the climate has been similar or even warmer than today's.

During glacial periods, ice advanced out from mountainous areas in Scotland and northern England. There have been several major glaciations during the Quaternary, each one largely obliterating the effects of the previous one. For this reason, most glacial landforms and deposits in the Westmorland Dales date from the last major glaciation, which was at its height around 25,000 years ago.

The possible maximum extent of ice, around 25,000 years ago (overlain over modern coastlines).
Based on information and maps compiled by A. Emery and others in www.AntarcticGlaciers.org

This view of Antarctica shows how parts of upland northern England might have looked around 20,000 years ago.
© M. Embree/US National Science Foundation

Looking west over the River Eden and drumlins, from south of Nateby.



Drumlins forming in till at the base of flowing ice.

Glacial till exposed where the River Lune is cutting into a drumlin near Raisgill Hall Bridge.

Scratching the surface

During the last glaciation the Westmorland Dales lay under a huge ice sheet hundreds of metres thick. The ice was full of boulders, gravel and sand and acted like a giant sheet of sandpaper. It streamed over the landscape, deepening valleys, scouring the fells and scraping limestone pavements bare.

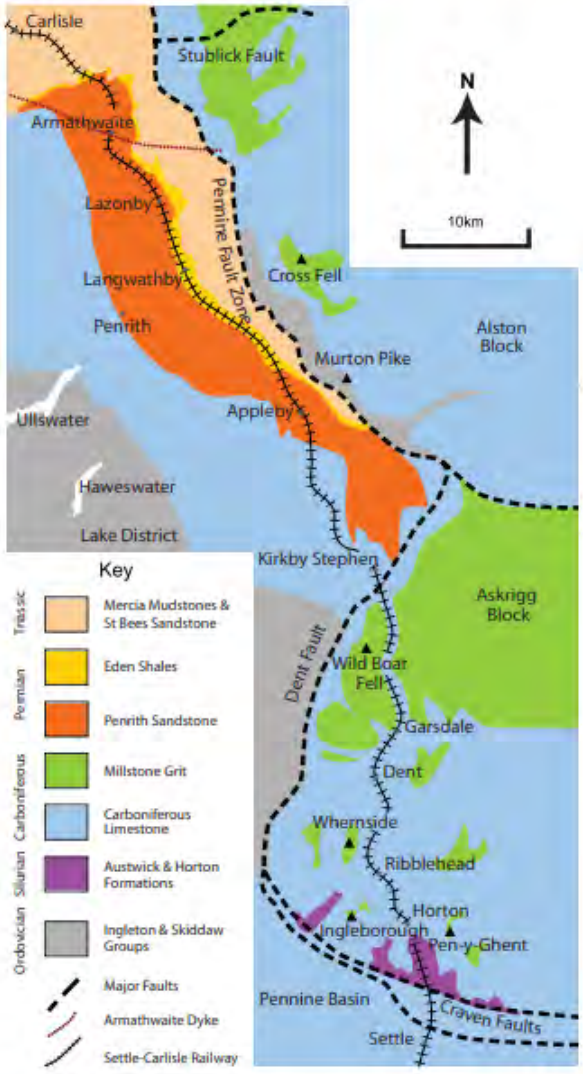
The Westmorland Dales has a complex glacial story, involving ice originating from the Lake District, southern Scotland and the Howgills. These ice flows waxed and waned, interacting with each other and at different times flowing in different directions, giving rise to intriguing patterns of glacial features.

Tills and hills

Ice smeared the landscape with a mixture of clay, silt, sand, gravel and boulders known as glacial till. Much of the Westmorland Dales below the higher fells is mantled in till, which is generally less than a few metres deep.

In places, till has been moulded into small hills known as drumlins. Drumlins formed at the base of moving ice and are streamlined in the direction of ice movement. They underlie much of the rolling countryside of the Eden Valley, and form clusters north of Tebay, around Kirkby Stephen and in the upper Lune Valley.

Map of the Geology along the Settle-Carlisle Railway

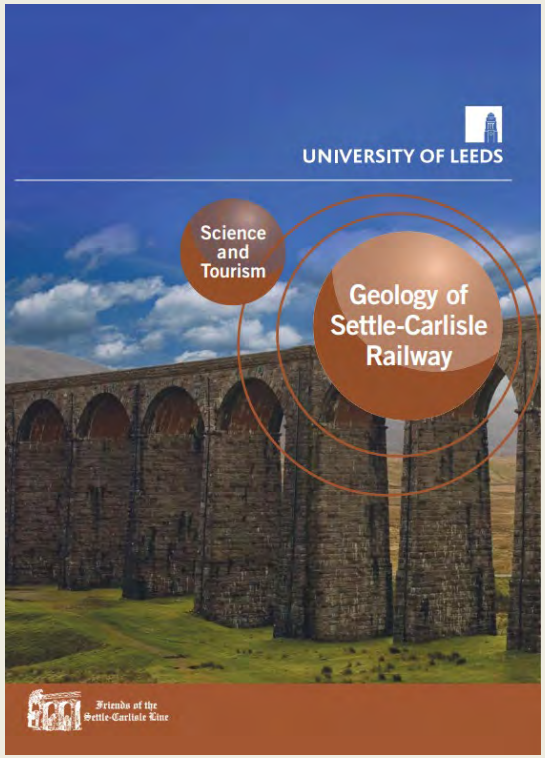


Thanks to Chris Darmon *Down to Earth*

Geological map created by University of Leeds for the Friends of the Settle- Carlisle Railway.

A Geology Booklet

https://www.foscl.org.uk/sites/1/files/drupal/doc/attachments/GEOLOGY%209388-Settle-Carlisle%20Booklet3.pdf



The Eden Valley at the beginning of Permian times

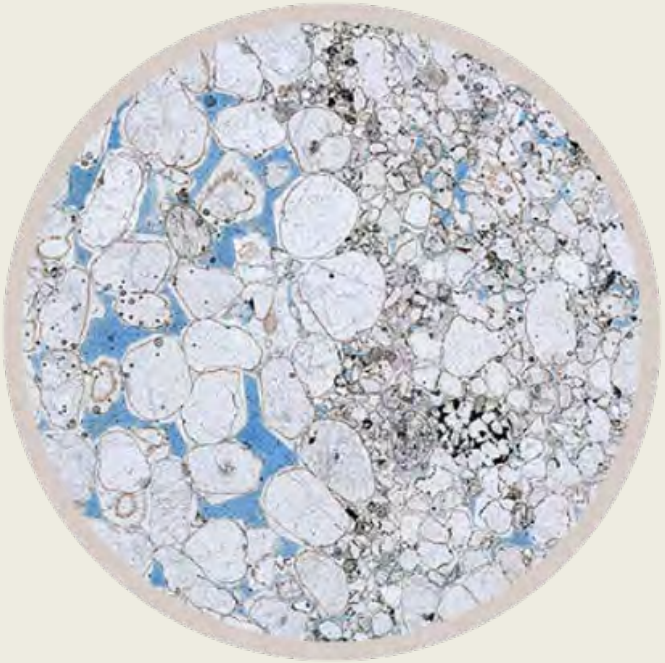
Original painting by Dr Elizabeth Pickett/North Pennines National Landscape

Showing the Pennine escarpment (Carboniferous rocks, limestone and sandstone, with desert reddening, being eroded), Brockram forming in fans. Sand dunes forming Penrith Sandstone. Salty lakes evaporating, leaving gypsum & Anhydrite.

Photomicrographs of Penrith Sandstone (left) & St Bees Sandstone (right)
Colour images by Paul Logan

‘Millet seed’ sand grains PS

Water lain sands & muds SBS




Eden Valley LGS from south to north
Starting on Wild Boar Fell above Mallerstang

Wild Boar Fell- landslips on the side of Mallerstang

The River Eden in Mallerstang, north of Pendragon Castle, along the bridleway, north to Kirkby Stephen

Catagill Scar (left)

Above- **Janny Wood-** an exposure of a junction between two Carboniferous time zones- internationally recognised

Upper Eden valley from Fell End. Pennine scarp in background
Jan 2019
(geology is good to see in winter)

JSCF Interpretation board at Bighill Cutting LGS, near Winton, KS. Carboniferous Robinson Limestone

Pennine (fault) Scarp seen from Great Asby.
Glacial till forms low hills and grows good grass

Information board at Murton Fell Gate

Edge of Eden

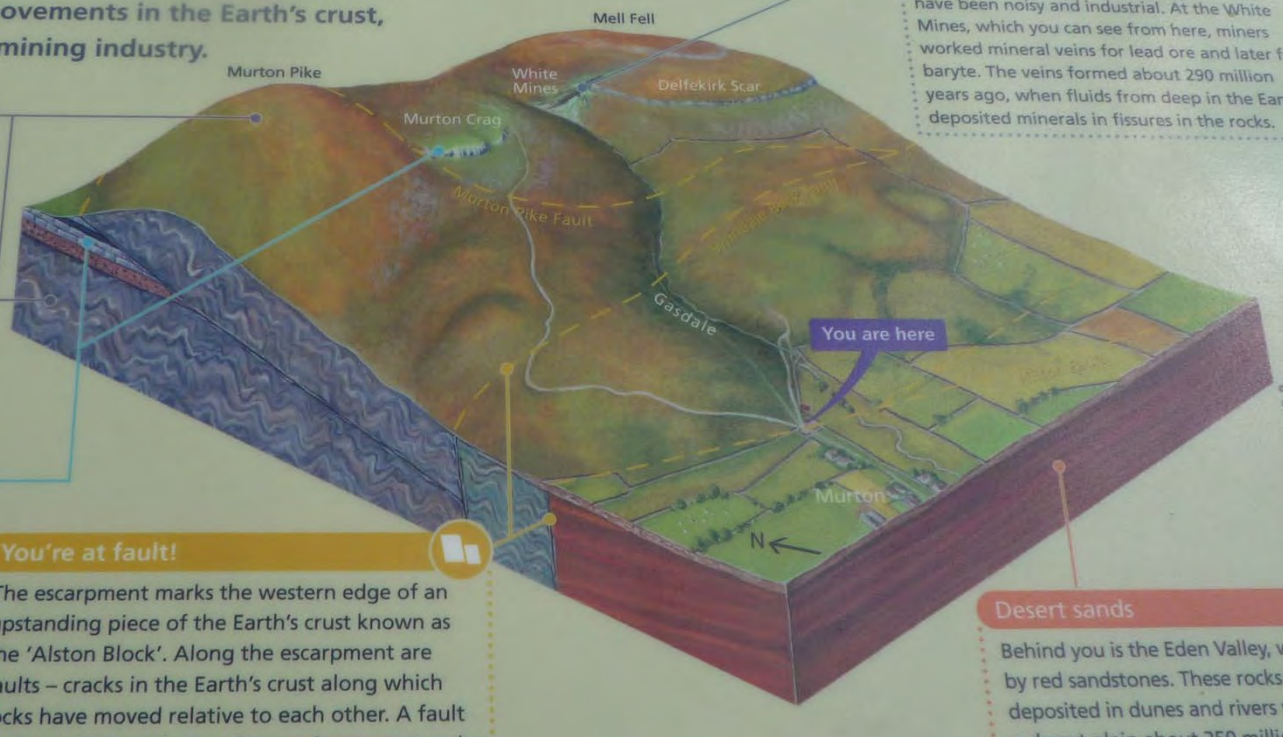
Ahead of you is the Pennine escarpment, which rises from the Eden Valley to the high fells of the North Pennines. The landscape here tells a fascinating story of movements in the Earth's crust, ancient environments and a past mining industry.

A vanished ocean

Murton Pike and the lower slopes of Mell Fell are made of slates and volcanic rocks. Nearly 500 million years ago these rocks were muds and volcanic ash at the edge of a wide ocean. When the continents on either side collided and the ocean closed, the mud and ash were crumpled and altered to hard slaty rocks. These rocks are exposed in a belt along the escarpment and form distinctive conical hills or 'pikes'.

pical seas and deltas

he skyline you can see Murton Crag and kirk Scar. These limestone crags are part of equence of limestone, sandstone and shale which makes up much of the North es. These rocks formed from limy ooze, d mud in the tropical seas and deltas that this area 330 million years ago.



Mineral riches

In the 1800s and early 1900s Gasdale would have been noisy and industrial. At the White Mines, which you can see from here, miners worked mineral veins for lead ore and later for baryte. The veins formed about 290 million years ago, when fluids from deep in the Earth deposited minerals in fissures in the rocks.

You're at fault!

The escarpment marks the western edge of an upstanding piece of the Earth's crust known as the 'Alston Block'. Along the escarpment are faults – cracks in the Earth's crust along which rocks have moved relative to each other. A fault lies buried beneath your feet and separates rocks of very different ages.

Desert sands

Behind you is the Eden Valley, which is underlai by red sandstones. These rocks formed from sa deposited in dunes and rivers when this area v a desert plain about 250 million years ago. M of the local buildings are made of these red

North Pennines AONB Partnership
ines.org.uk)

Much of the landscape to the south of Gasdale is part of Warcop Training Area, one of the largest Army training areas in the UK. There is open access to much of the land in front of you. You may also walk on Public Rights of Way within the Danger Area unless red flags are flying or red lamps are displayed.

For access information for the Danger Area please contact the Warcop freephone answer machine service on 0800 7835181 or visit www.access.mod.uk. OS Explorer Map OL19 shows the Danger Area and the areas of open access.

Supported through Defra's Aggregates Levy Sustainability Fund

NORTH PENNINES
Area of Outstanding Natural Beauty

Geopark

A GeoTrail produced as part of the Westmorland Dales Project

ROCKY FOUNDATIONS

The landscape of the Westmorland Dales has its foundation in the underlying rocks and is the result of millions of years of Earth history. The wonderful countryside around Kirkby Stephen tells a story of tropical seas, arid deserts, glaciers and the shaping of the landscape by people.

TROPICAL SEAS AND DESERT PLAINS

In the Carboniferous Period, 360 to 300 million years ago, Britain lay near the Equator and this area was periodically covered in shallow tropical seas. The remains of sea creatures built up, eventually becoming the limestone we see today in the local fells. By 270 million years ago, in the Permian, this area had become a desert with hills of Carboniferous limestone rising above dune fields. Rubbly scree accumulated at the base of the hills and hardened into a distinctive local rock known as brockram. The dune sands became red sandstones. During the following Triassic, 250 million years ago, rivers flowed across the desert plains, depositing sand which became more red sandstone.

Brockram (seen here in a wall in Kirkby Stephen) is made of fragments of Carboniferous limestone set in red siltstone and sandstone. It formed in alluvial fans in Permian desert landscapes.

ICE AND WATER

In more recent geological times the landscape has been sculpted by ice and meltwater. At the height of the last ice age, around 26,000 years ago, there would have been hundreds of metres of ice above you here. Glaciers moulded glacial deposits into small hills known as drumlins, which now form much of this area's rolling green countryside. Water continues to shape the landscape by eroding, transporting and depositing material. Impressive erosional features can be seen in the River Eden at Stenkrith Park.

EXPLORING THE WESTMORLAND DALES

This lovely part of east Cumbria forms the north-western corner of the Yorkshire Dales National Park. With support from the National Lottery Heritage Fund, the Westmorland Dales Landscape Partnership is working with Cumbria GeoConservation and other partners to reveal and celebrate the area's rich natural and cultural heritage, including its superb geology and landscape.

Walk length/time: 4¾ miles/7.7km, 2.5 - 3 hours
Start: Kirkby Stephen public car park NY773089
Terrain: Public rights of way on grassy paths and farm tracks through fields, with gates, stiles and short sections of road.
Facilities: Refreshments and toilets in Kirkby Stephen
OS map: Explorer OL19 Howgill Fells & Upper Eden Valley

Yorkshire Dales National Park (Westmorland Dales)

Yorkshire Dales National Park

Cumbria GeoConservation

Cumbria Wildlife Trust

www.cumbriageoconservation.org.uk
www.cumbriawildlifetrust.org.uk
www.yorkshiredales.org.uk • www.friendsofthelakedistrict.org.uk
thewestmorlanddales.org.uk • dalesrocks.org.uk

WESTMORLAND DALES

A geology walk around

KIRKBY STEPHEN & STENKRITH

4¾ miles/7.7km

Heritage Fund

Look out for these features along the way!

A This distinctive building at the entrance to the churchyard is The Cloisters. Built in 1810, it is made of red sandstone which is such a feature of the Eden Valley. The local red sandstones formed in desert dunes and rivers in Permian and Triassic times.

B The walls of the lane are built of brockram. This is an example of breccia, a rock made of fragments of even older rock, in this case Carboniferous limestone. It formed as scree and rubble in a Permian desert.

C Near a field barn and when the water is low you can see outcrops of layered (bedded) red sandstone in the riverbed. This is St Bees Sandstone, which formed from sand deposited by rivers flowing across desert plains in the Triassic.

D The River Eden at Stenkrith Park is a great place to see excellent waterworn brockram. The river has carved impressive erosional features in the brockram, including circular potholes and a dramatic canyon under the bridge.

One of the potholes at Stenkrith Park, formed by boulders swirling around in times of flood.

E Here you can see the exposed contact between Carboniferous limestone and the overlying Permian brockram (see right). The surface between them represents a time gap of around 70 million years and is known as an unconformity.

F Between the river and Nateby you pass many good exposures of brockram, which are packed with limestone fragments. Near the village the brockram has been quarried, probably for use as a local building material.

G In this small beck there are deposits of buff-coloured tufa where water flows over small cascades. Tufa is a limy deposit (made of calcium carbonate) which forms at some lime-rich springs, aided by the action of mosses and algae. In the banks of the beck you can see red St Bees Sandstone.

1 At far end of car park turn left to follow footpath past auction mart. Cross road and keep straight on through alleyway. Cross road to Market Square and go past red building [A].

2 Keep straight on past public toilets and follow walled lane downhill [B]. Turn left down steps signed 'River Eden and Frank's Bridge'. Cross bridge and turn right along riverside path.

3 Through kissing gate bear right to leave tarmac path and follow edge of field with river on right (footpath signed 'Pod Gill' [C]. At end of field cross footbridge and follow path up through woods beside sunken lane. Keep on narrow path between fields.

4 At footpath sign take sharp right through gate (signed 'Kirkby Stephen'). Follow to a footbridge over river. Over bridge turn left (signed 'Stenkrith') to follow River Eden to Stenkrith Park.

5 Follow path through Stenkrith Park [D]. Climb up towards road. Before gate onto road turn left to cross footbridge over river. Turn right to go under road bridge and follow path up to small car park. Turn left and cross road bridge. Immediately turn left through gate (signed 'Wharton'), go down steps and along railed path. Climb to wicket gate into field. Turn left and follow path through two fields. Turn right to cross a stile and walk up edge of field to Halfpenny House.

6 Go through field gate, turn left and follow concrete farm track towards Wharton Hall. After cattle grid look out for a rock outcrop on the left [E].

7 Take footpath on left signed 'Nateby'. Go downhill, over bridge and turn left along field edge. After next gate bear right, climbing up bank past brockram exposures [F] to a gate. Cross next field to a metal gate, then aim for a wall corner. Follow narrow path between walls to road and turn left into Nateby.

8 Turn right in village to follow Swaledale road. Turn sharp left onto minor road beside small beck. Cross beck on one of the little bridges (or at ford) and take bridleway signed 'Hartley Lane'. Keep on track, turning right at a T-junction. Follow track over old railway bridge and across a small beck [G], eventually rejoining outward route. Return to Kirkby Stephen via Frank's Bridge.

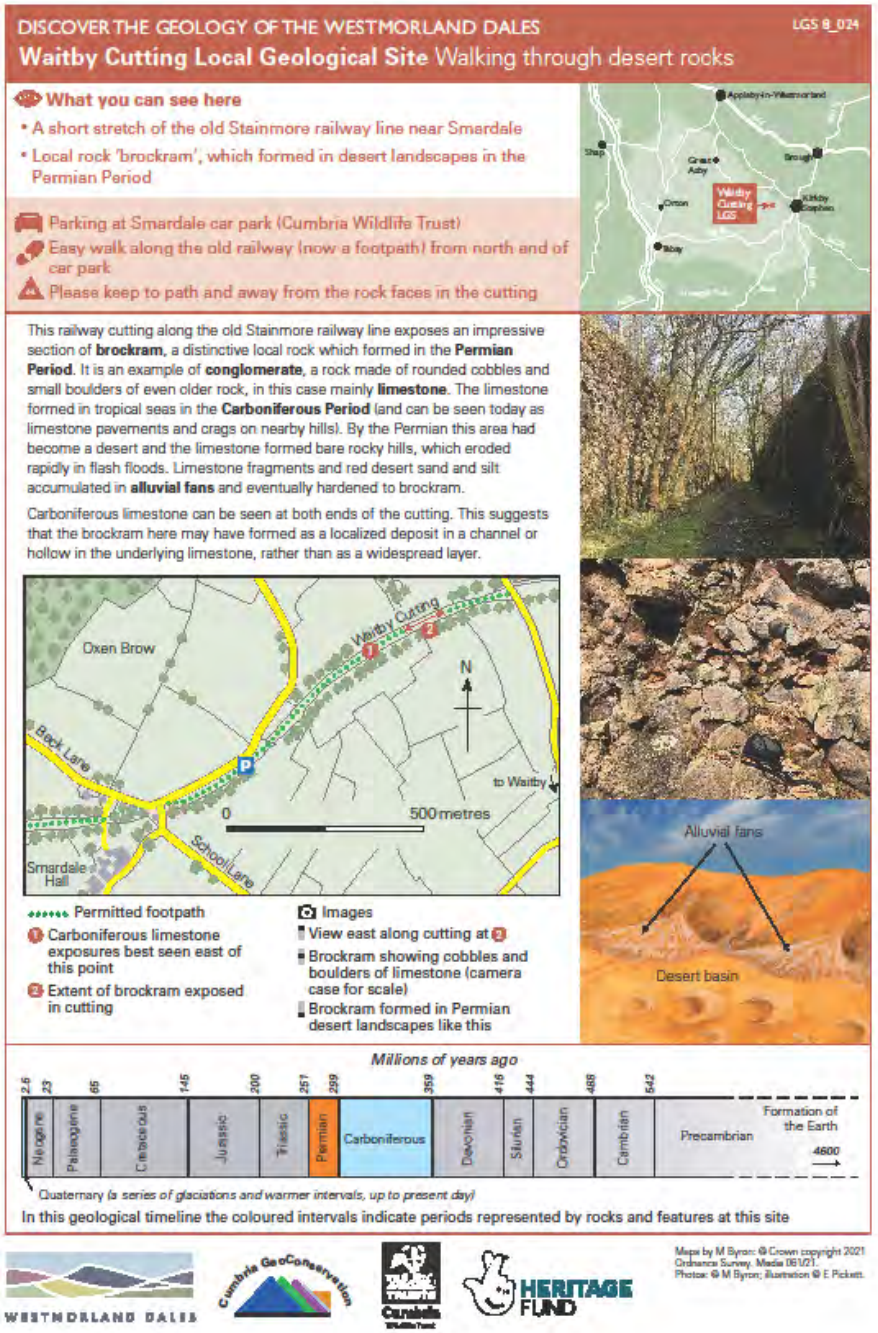
KIRKBY STEPHEN
Car park
Frank's Bridge
Stenkrith Park
Halfpenny House
A685
River Eden
NATEBY
Railway Station
Wharton Hall
0 ¼ mile
N

Permian Brockram in the River Eden at Stenkrith

Brockram outcrops at Nateby (above). Wall & barn of Brockram in KS

View of Brockram at Nateby

Geological interpretation boards at Smardale



Access this fact sheet from www.cumbriageoconservation.org.uk

Waitby Cutting – Accessible Trail (Earthcache)

Waitby Cutting-

Brockram

ROCKY FOUNDATIONS

The landscape of the Westmorland Dales has its foundation in the underlying rocks and is the result of millions of years of Earth history. The beautiful countryside around Smardale tells a story of tropical seas, glaciers and the shaping of the landscape by people.

SUN, SEA AND SAND

The Westmorland Dales is largely made up of layers of limestone, sandstone and mudstone which formed between 350 and 320 million years ago in the Carboniferous Period. Northern England lay near the Equator and was periodically covered in shallow tropical seas and swampy river deltas. Limy, shelly mud on the sea floor hardened into layers of limestone, which we see today as pale grey crags, dramatic pavements and in quarries. Layers of sandstone and mudstone were originally sand and mud deposited in the deltas that built out into the seas. Over the centuries the local Carboniferous limestone and sandstone have been quarried for a variety of uses, as you'll see on this walk.

Left: A Carboniferous tropical sea, full of creatures now preserved as fossils.
Below: A colonial coral (left) and a brachiopod shell (right) found in stone walls around the walk.

ICE AND WATER

In more recent geological times the landscape has been sculpted by ice and water. At the height of the last ice age, around 26,000 years ago, there would have been hundreds of metres of ice above you here. Glaciers and torrential meltwater scoured the fells and dales. Water continues to shape the landscape. Rainwater is gradually dissolving the local limestone, and the area's becks and rivers are constantly eroding, transporting and depositing material.

EXPLORING THE WESTMORLAND DALES

This lovely part of east Cumbria forms the north-western corner of the Yorkshire Dales National Park. With support from the National Lottery Heritage Fund, the Westmorland Dales Landscape Partnership is working with Cumbria GeoConservation and other partners to reveal and celebrate the area's rich natural and cultural heritage, including its superb geology and landscape.

Walk length/time: 4⅔ miles/7.5km, 2.5 - 3 hours

Start: Cumbria Wildlife Trust car park at Smardale NY742083

Terrain: Public rights of way across fields and open fell, a footpath along the old railway and short road sections. Take care near the quarry faces, limekilns and steep slopes.

Facilities: Refreshments and toilets in Kirkby Stephen

OS map: Explorer OL19 Howgill Fells & Upper Eden Valley

Cumbria GeoConservation

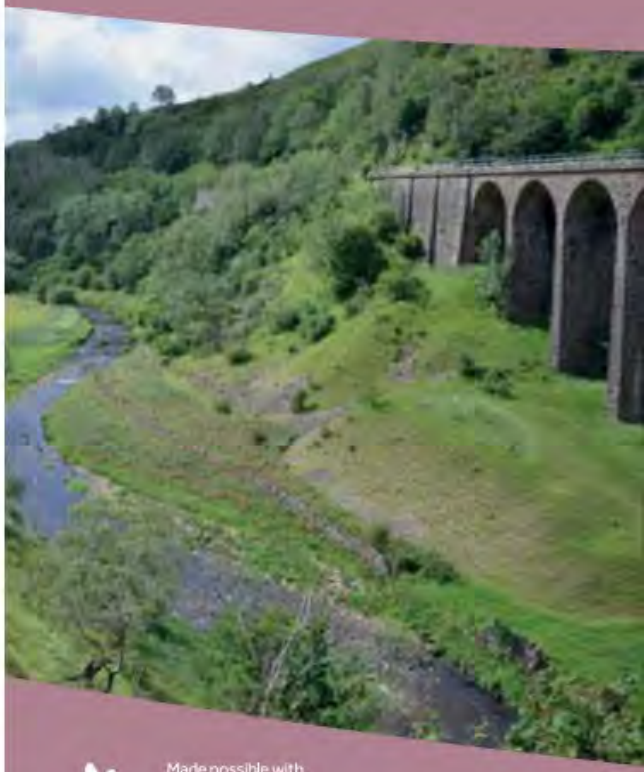
Cumbria Wildlife Trust

www.cumbriageoconservation.org.uk
www.cumbriawildlifetrust.org.uk
www.yorkshiredales.org.uk • www.friendsofthelakedistrict.org.uk
thewestmorlanddales.org.uk • dalesrocks.org.uk

WESTMORLAND DALES

A geology walk around SMARDALE

4⅔ miles/7.5km



Made possible with Heritage Fund

Look out for these features along the way!

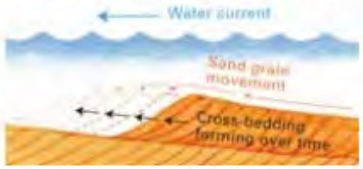
A The local stone walls are great places to spot fossils in limestone. Keep an eye out all around this walk and you'll see good examples of colonial corals and brachiopod shells.

B Small-scale quarrying of limestone in the past has left grassy hollows and low rock exposures. The limestone was used for walling and may also have been burnt to make lime for improving upland fields.

C There's a stepped hill profile on the skyline to your right (west). This reflects erosion of layers of harder and softer rocks. Limestone is hard and resistant, whereas mudstone and sandstone wear away more easily.

D The stone walls here include good examples of fossil-rich limestone and also blocks of the red sandstone quarried near Smardale Bridge and on the east side of Smardale Gill (see map).

E Near historic Smardale Bridge red Ashfell Sandstone was once quarried as building stone, including for the viaduct which carried the Stainmore railway from 1861 to 1962. Sloping layers in the rock are known as cross-bedding. This feature formed in Carboniferous deltas when flowing water caused sand ripples and dunes to move downstream (see below).



F Smardale Gill has existed since long before the last ice age, but not as we know it today. Drainage patterns have changed greatly over time and Scandal Beck has not always flowed here. Glacial meltwater in the last ice age deepened the gill and established the present drainage.

G Ashfell Limestone from Smardale Gill quarry was once burnt in the large limekilns and the resulting lime loaded onto trains. Some layers (beds) are rich in fossils of brachiopod shells and corals. Today the quarry is an important grassland habitat, where wild flowers attract butterflies including the northern brown argus and Scotch argus.

Crosby Garrett

Kirkby Stephen

Scotch argus butterfly

Car park

Smardale Hall

Settle – Carlisle Railway

Waitby

Smardale Gill

Limekilns and fossil-rich layers in limestone at Smardale Gill quarry

Scandal Beck

Smardale Gill Viaduct

N

0 ¼ mile

Fossil coral in stone wall

Smardale Gill quarry

Old sandstone quarries

Smardale Fell

©S Woodhead

Sandstone quarry near Smardale Bridge

Smardale Bridge

1 From the Cumbria Wildlife Trust car park take the track past the old railway waggons (including CWT information hut). Climb the ramp onto a road. Turn left and then keep right, passing Smardale Hall on your right, and go under a railway bridge.

2 Go through a gate onto the fell and keep right on a stony track past a plantation. Bear left to gate, and stay on what is now a faint grassy track to another gate, keeping the wall on right [A].

3 Follow grassy track, and stay on fell edge with wall on your right [B]. Follow the bridleway signed 'Coast to Coast Smardale Bridge' [C]. After around ½ mile go through a gate and down a track.

4 Go through another gate and follow the sunken stony track downhill [D]. Just before Smardale Bridge there's the option for a short detour on the left to an old sandstone quarry [E]. Retrace your steps to the track, turn left over bridge and then right, following Coast to Coast Walk up to a wide rough track. Just before bridge, cross stile and drop down to the old railway.

5 Turn right and follow railway path 2 miles back to Smardale, passing large limekilns and an old limestone quarry [G] and crossing the spectacular viaduct on the way. At Smardale turn left to road. Turn right and at junction follow path down ramp back to car park.

Smardale Gill Limestone Quarry (left) & Smardale Bridge Sandstone Quarry- Carboniferous Ashfell Limestone & Sandstone


Smardale


2015

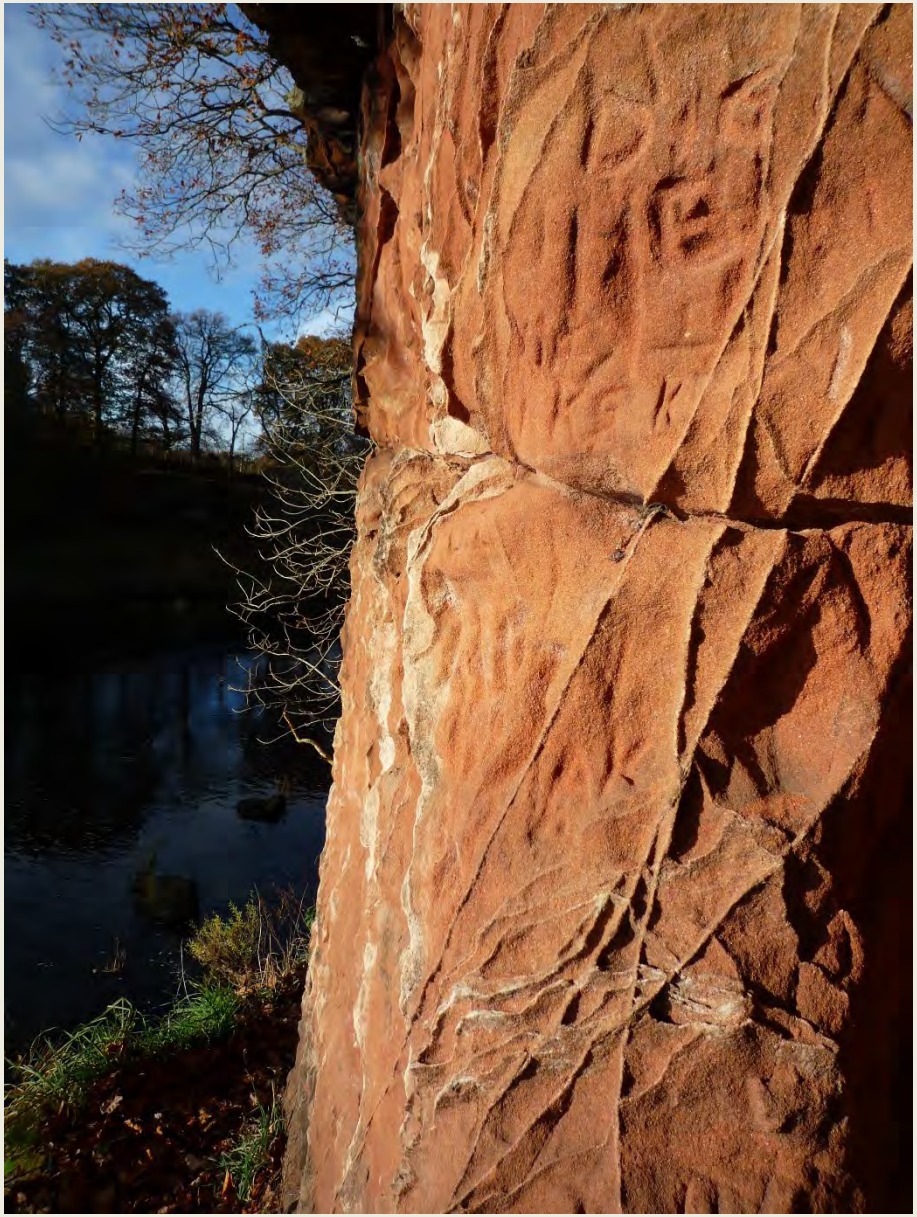
(Carboniferous) Ravenstonedale Rocks- a GeoTrail in the making

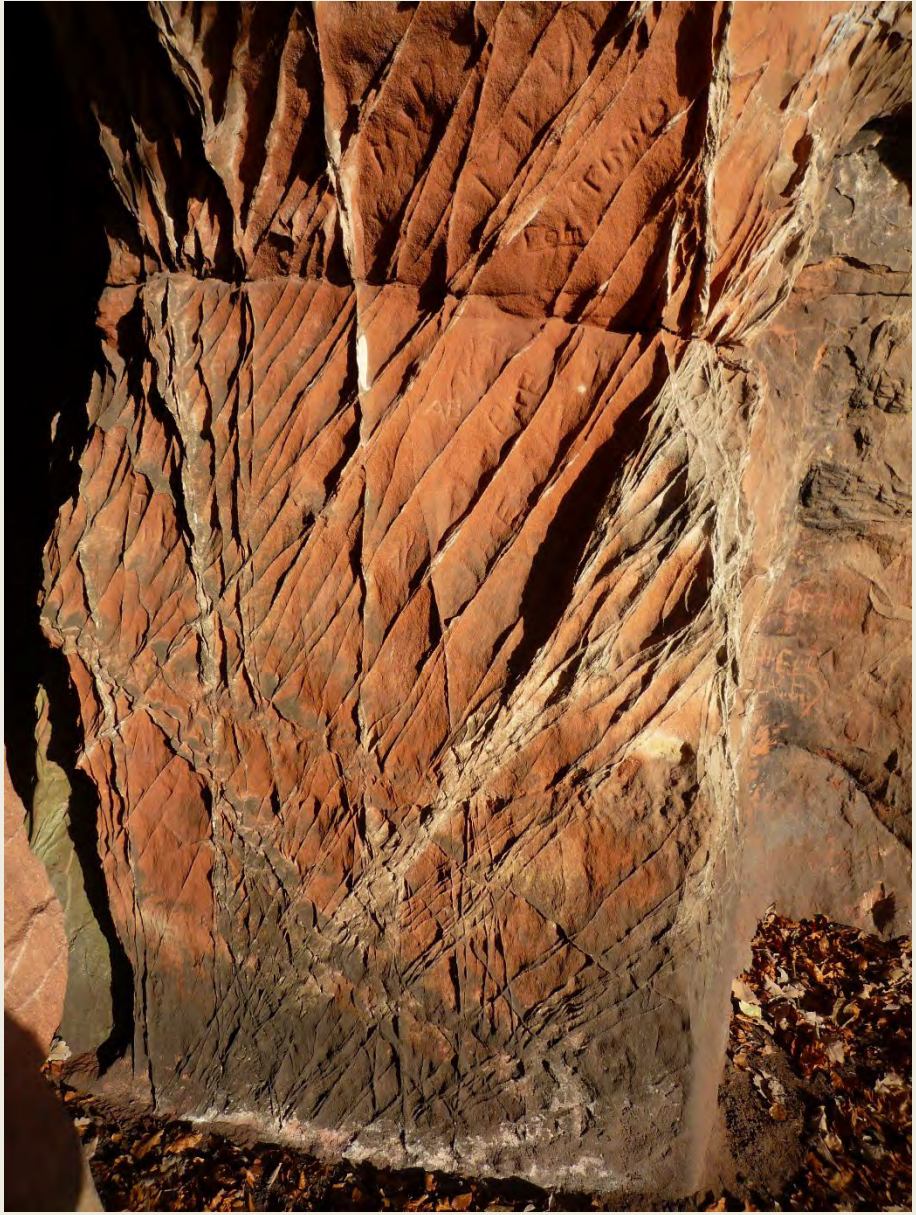
Bowberhead Farm, Ravenstonedale, CWT. Milk stand, revived meanders in Scandal Beck , & Chondrites fossil

Red bedded Penrith Sandstone in Cowraik lower quarry, Penrith

Penrith Sandstone Desert Sands- Very large trough bedding, Bowscar Quarry, Penrith

Lacy’s caves, excavated 1790. Penrith Sandstone near the River Eden





Quartz veining in the Penrith Sandstone at Lacy’s Caves

A spectacular channel at Lowhouse Wood LGS, Armathwaite, Penrith Sandstone

Dufton Ghyll Woods LGS St Bees Sandstone- fine grained sandstone with mica flakes (2017)

1_014 Wetheral Woods 16th March 2021

W

One of the few non-vegetated exposures

St Bees (Sherwood) sandstone: beds of varying thickness

Entrance to St Constantine's Caves

The youngest rock in Cumbria, 60Ma, Armathwaite dyke-all the way from Mull . Dolerite, related to the opening of the North Atlantic Ocean. Cooled underground

Long Meg (Penrith red sandstone) and her Daughters, Salkeld, glacial erratics.

Geological survey, Cumbria GeoConservation and volunteers, May 2023

Mauhanby Chapel, near Long Meg, built of Penrith red sandstone.
Look at the stones in buildings- easy to access & study.