

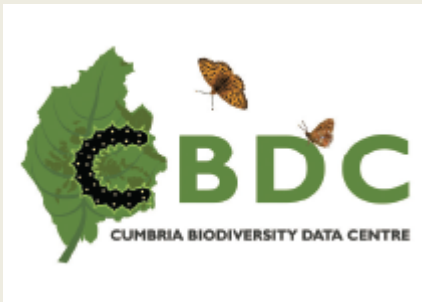
# Geological Record Highlights 2022

*Sylvia Woodhead*

*Geological co-ordinator*

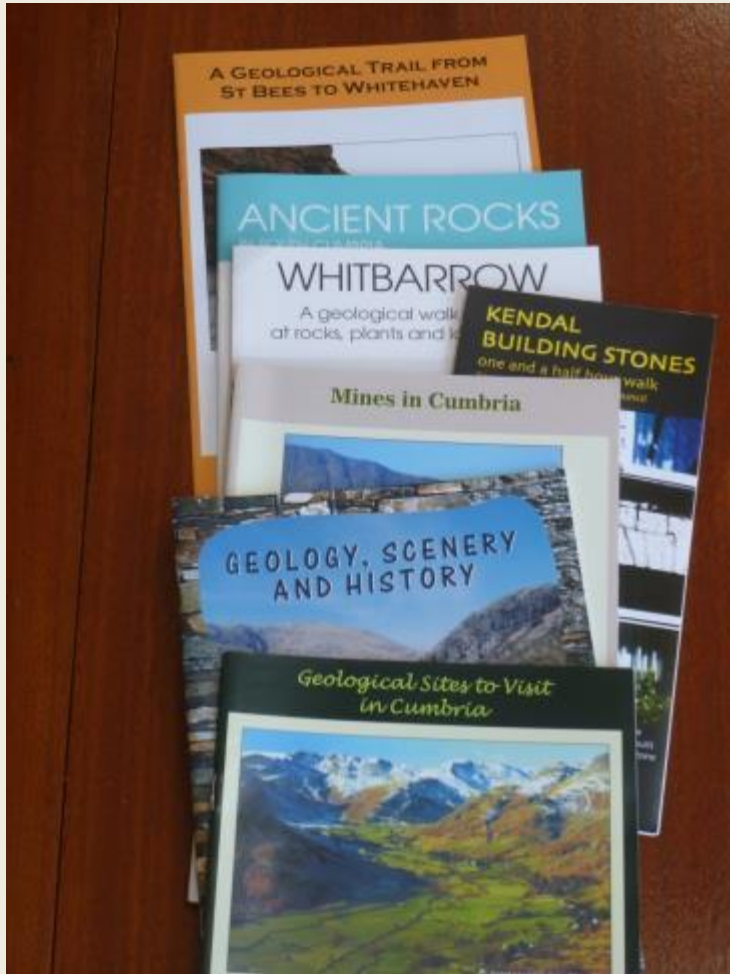
*Cumbria GeoConservation*

*CBDC Recorders' Conference Feb 23*



# Cumbria GeoConservation

Many leaflets and trail guides



- Specialist group of Cumbria Wildlife Trust
- Members are volunteers
- Current aims are to modernise recording & storage of site data- on-going
- To ensure protection through the planning system
- To inform & educate the public about LGS & geology of Cumbria
- Our records are held by CBDC
- CBDC hosts our web site
- Involved in **Westmorland Dales**
- **3 new GeoTrails**



# The Westmorland Dales Landscape Partnership

## Geology Project 1.1 Revealing the Foundations



**Cumbria**  
Wildlife Trust



Little Asby Scar – a new LGS

# Timescale and Funding

## *Development phase:*

- *February 2017 – August 2018 (Round 2 HLF bid)*
- *£317,000 including HLF, partners and volunteer time*

## **Delivery phase:**

- Spring 2019 –summer/ **autumn 2023**
- £3,455,000 including HLF, partners and volunteer time

## **Long-term legacy:**

- Benefits for heritage, people and communities as part of extended Yorkshire Dales National Park



# Geology Project

- Dr Elizabeth Pickett & designer Marcus Byron were appointed, with a view to
- Writing CBDC data sheets for the 7 existing & 11 new LGS
  - Flakebridge unconformity, Pinskey Gill, Bents, Potts Beck, Stone Gill, Ash Fell Edge, Marl Crag tufa breccia, Janny Wood, Waitby, Pate Hole, Trainriggs erratic
- [www.cumbriageoconservation.org.uk](http://www.cumbriageoconservation.org.uk)
- Producing 14 public information sheets for Open sites
- 10 Earthcaches- see Westmorland Dales web site
- Webinars, geology & Ice Age Walks,
- **3 Geo-Trails**
  - Orton
  - Smardale
  - Kirkby Stephen- Stenkrith- Nateby



# Cumbria Biodiversity Data Centre

[Home](#)[About Us](#)[Data Services](#)[Cumbria Wildlife](#)[Recording Wildlife](#)[Volunteering & Events](#)[GeoConservation](#)

## Cumbria GeoConservation

Cumbria GeoConservation Group (CGC) is a voluntary geological conservation group working to record and look after important geological sites. Currently there are about 280 recorded sites all of which have been evaluated by our members. Site details are logged with Cumbria Biodiversity Data Centre (CBDC) and are relayed to Cumbria County Council and planning authorities. CGC operates as a special interest group of [Cumbria Wildlife Trust](#).

Read more [about us](#) and feel free to [get in touch](#) if you have any questions. See our Facebook page [here](#).

- › Cumbria Geoconservation
- › Geological Sites Map
- › Cumbrian Geology
- › Members Area
- › Geotrails & Views
- › Resources
- › Geology Publications
- › GeoWeek & Projects
- › Gallery
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[GeoWeek 2022](#)[NEW Geotrails](#)

[www.cbdc.org.uk/cumbria\\_geoconservation\\_home](http://www.cbdc.org.uk/cumbria_geoconservation_home)

# Westmorland Dales Geotrails 2022.



Three new geology walks in the Westmorland Dales for 2022. Produced by the Westmorland Dales Landscape Partnership Scheme with grant funding from the National Lottery Heritage Fund. Written by Elizabeth Pickett and designed by Marcus Byron with contributions from Cumbria Geoconservation.

Check out the Local Geological Sites that are on or near these walks, on our [Public Map](#).



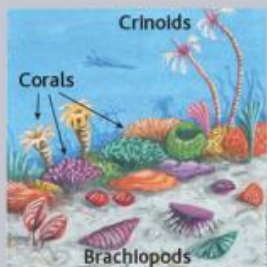


## ROCKY FOUNDATIONS

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 stunning limestone country around Orton tells a story of tropical seas, the action of ice and water, 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 fossil-rich limestone, which we see today as pale crags and gleaming pavements. Layers of sandstone and mudstone were originally sand and mud deposited in deltas that built out into the seas.



A Carboniferous tropical sea, full of creatures now preserved as fossils. Below are corals and brachiopod shells (curved shapes) in the old limestone quarries near Knott Lane.



## ICE AND WATER

In the more recent geological past the landscape has been sculpted by ice and water. The area's dramatic limestone pavements are the result of limestone gradually dissolving in rainwater, combined with the action of glaciers which scraped the rock bare. 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, and glaciers and torrential meltwater scoured the fells and dales.

Water continues to shape the landscape. Rainwater is gradually dissolving the limestone, and 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:** 5¼ miles / 8.4km, 2.5 - 3 hours

**Start:** Orton NY622082. Please park considerately.

**Terrain:** Public rights of way and Access Land, with gates, stiles and short road sections. Fairly strenuous with a sustained climb. Grassy paths and tracks, with exposed rock on the fells.

**Facilities:** Refreshments and toilets in Orton

**OS map:** Explorer OL19 Howgill Fells & Upper Eden Valley



Yorkshire Dales National Park  
(Westmorland Dales)

Yorkshire Dales National Park



**Cumbria**  
Wildlife Trusts

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[thewestmorlanddales.org.uk](http://thewestmorlanddales.org.uk) • [dalesrocks.org.uk](http://dalesrocks.org.uk)



WESTMORLAND DALES

## A geology walk around ORTON SCAR & KNOTT

5¼ miles / 8.4km



Made possible with

**Heritage**  
Fund



Look out for these features along the way!

**A** Look out for pinky grey boulders. These are glacial erratics of Shap Granite. They were transported here by ice from their source south of Shap (4 miles west of here) during the last ice age. You'll see more later on this walk. Shap Granite's colour comes from its distinctive large feldspar crystals.

**B** This spring marks the boundary between Ashfell Sandstone and the overlying Ashfell Limestone. Rainwater gradually dissolves limestone and flows underground until it meets a layer of impermeable rock such as sandstone, and emerges at the surface.

**C** Old limekilns like this date from the 18th or 19th centuries and were used to make lime by burning local limestone with coal as fuel. Lime was spread on fields to improve acid upland soils, and was also used to make traditional lime mortar.

**D** From here there are superb views on a clear day. South across the upper Lune Valley are the Howgill Fells. The Howgills are made of Silurian slates, which are around 420 million years old. The contrast between their rounded shapes and the layered limestone landscape on this walk reflects their very different geology.

**E** Limestone pavements are an iconic feature of the Westmorland Dales. They have formed as a result of limestone dissolving, combined with the action of glaciers in the ice age. Fissures known as grykes separate blocks or clints. The sheltered grykes provide an important habitat for specialised plants.

**F** This small disused quarry in Ashfell Limestone and another one a short walk uphill from here contain excellent fossils of corals and brachiopod shells. Limestone from these quarries would have been burnt in the old limekiln at the top of Knott Lane.

**G** Gamelands Stone Circle is thought to date from between 4,400 and 3,000 years ago. All the boulders but one are glacial erratics of Shap Granite. Spot the odd stone out! (Clue: it's the main rock type in this landscape.)



Shap Granite erratic north of Orton



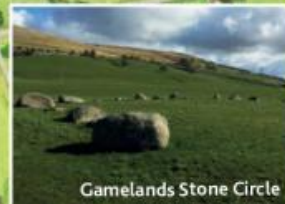
Spring north of Broadfell



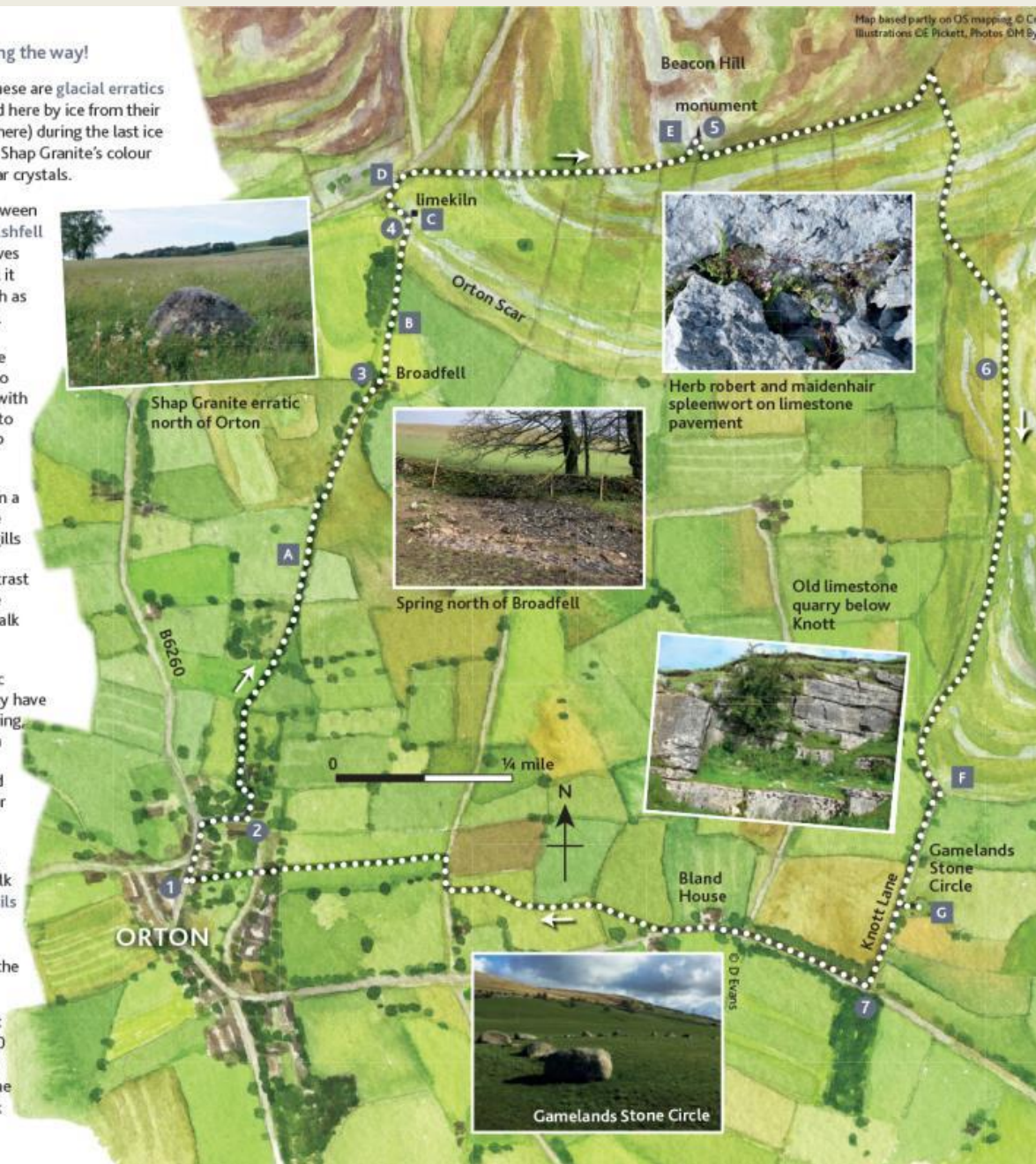
Herb robert and maidenhair spleenwort on limestone pavement



Old limestone quarry below Knott



Gamelands Stone Circle



**1** From the centre of Orton, walk north on the B6260 (Appleby road), pass Mostyn House on left and turn right over a small road bridge.

**2** Just before next bridge, turn left into the no-through road, signed 'Public brideway Orton Scar'. At next brideway sign ('Broadfell'), turn left into a narrow lane beside houses. Follow lane as it turns right and becomes a stony path. Follow the brideway through fields [↖F] to Broadfell Farm.

**3** Follow waymarkers through farmyard, keeping to left of main farm buildings. Continue uphill past a wood [↖B] and towards a stone structure (limekiln) [↖C].

**4** Bear left past limekiln, following the track up to join the B6260. On road turn right, then right again to follow grassy path beside fell wall, eventually climbing to a monument.

**5** From the monument, continue following wall. Go through the second gate and follow a brideway ahead and then downhill. Keep straight on at the crossing of brideways.

**6** Follow the grassy track downhill to a gate [↖F]. Go through gate onto Knott Lane. Look for a wicket gate in wall on left to access Gamelands Stone Circle [↖G].

**7** At the road turn right and after about 1/4 mile take footpath on right signed 'Street Lane'. Follow the footpath through fields to a lane, turn right and take next footpath on left. This takes you back to Orton village.



## 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 beckes 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:** 4½ 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



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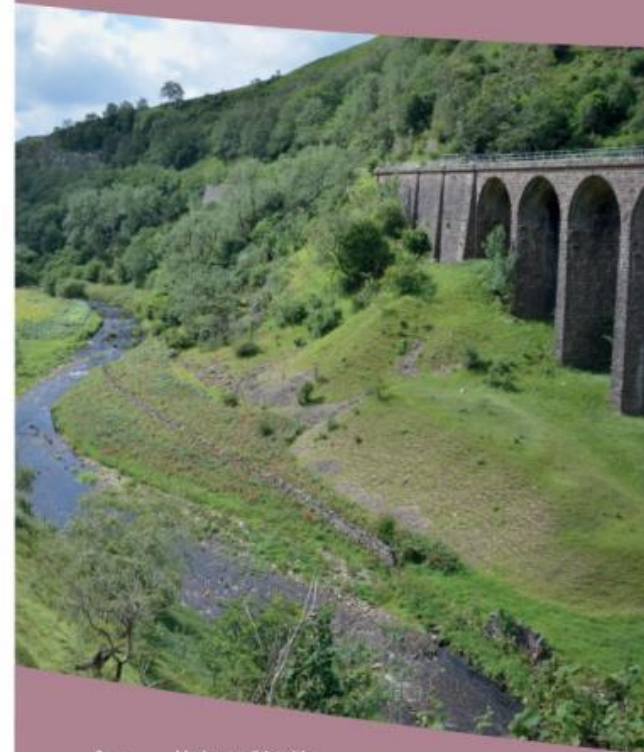
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WESTMORLAND DALES

## A geology walk around SMARDALE

4½ miles/7.5 km



Made possible with

**Heritage**  
Fund



👉 Look out for these features along the way!

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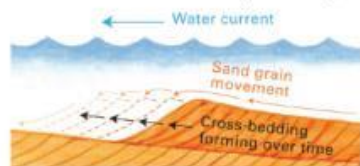
**A** The local stone walls are great places to spot **fossils** in limestone. Keep an eye out all around this walk and you'll see good examples of colonial corals and brachiopod shells.

**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 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.

Scotch argus butterfly



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



↑ Crosby  
Garrett

↑ Kirkby  
Stephen

Car park

Smardale  
Hall

↑ Waitby

Settle - Carlisle Railway

Smardale Gill

Scandal Beck

Smardale Gill  
Viaduct

Smardale  
Gill quarry

Old sandstone  
quarries

Smardale  
Bridge

Fossil coral in stone wall



Smardale  
Fell

OS Woodmill

Sandstone quarry near  
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.



## 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. Rubby 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 NY771084

**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



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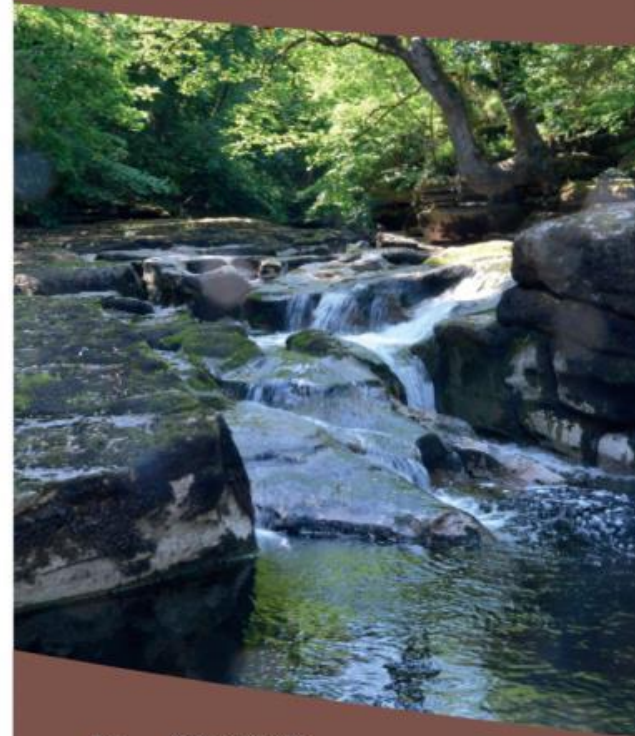


WESTMORLAND DALES

A geology walk around

# KIRKBY STEPHEN & STENKRITH

4¾ miles / 7.7km



Made possible with

**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].



**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].



Permian brockram  
Carboniferous limestone

**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.

Wharton Hall

KIRKBY  
STEPHEN

Frank's  
Bridge

Stenkrith  
Park

A685

Halfpenny  
House

NATEBY

River Eden

**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.



Small beck with  
tufa deposits

**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.

0 1/4 mile



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# Local Geological Sites, formerly RIGS

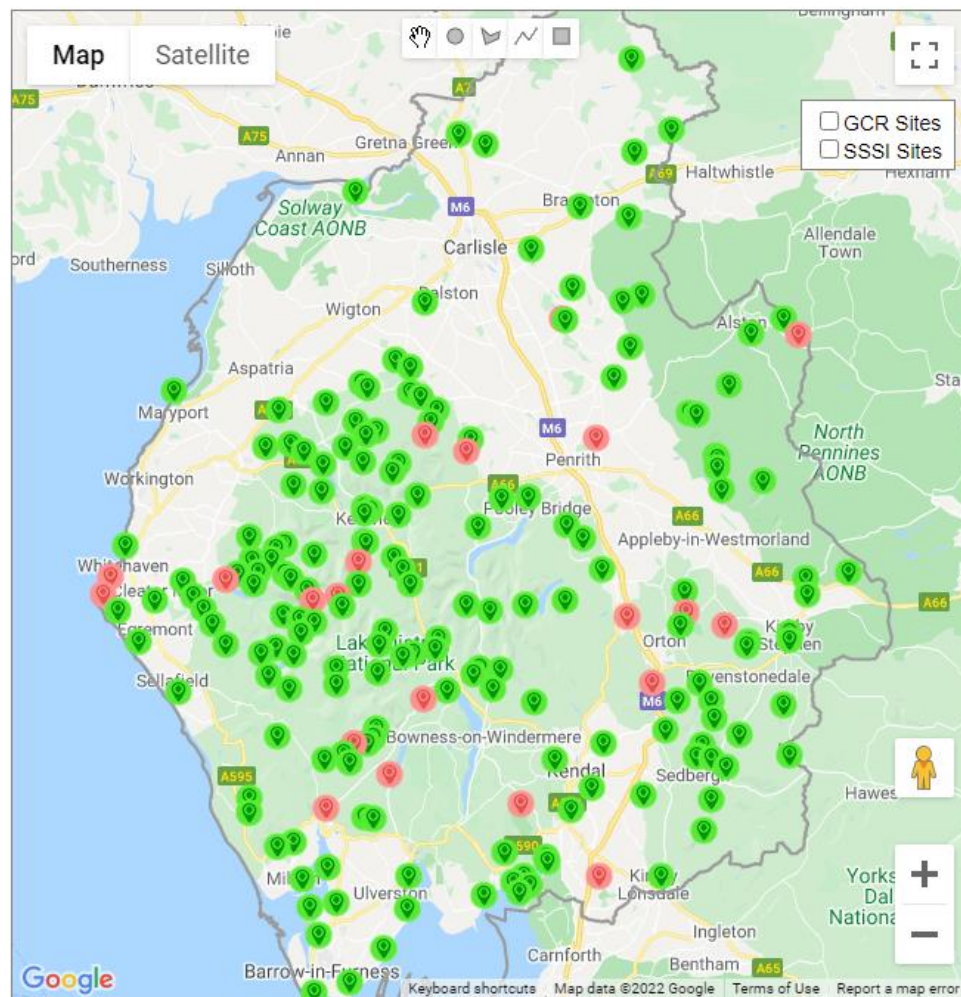
- Defra *Local Sites* 2006- RIGS became LGS
  - Geological equivalent to Local Wildlife Sites
  - **Guidelines for selection** (GCUK)
    - Value for education and lifelong learning
    - Intrinsic scientific interest
    - Landscape value & promotion of public awareness
    - Historical value and context of geological thinking
- Now around 300 LGS in Cumbria- details via CBDC
- Issues- obscured by vegetation, updated knowledge*





## CUMBRIA LGS SITES - ONLINE MAPPING TOOL

Google Map with drawing tools. Best browsed using [Google Chrome](#).



CBDC host our  
web site and  
LGS data

**3 new LGS**  
**3 new reviews**

Red = 5\* sites

Site name  Search  Keyword  Search

<b>Site Name:</b>	<b>Fell End Clouds</b>	<b>Site No.:</b>	<b>3.045</b>
<b>Location:</b>	Ravenstonedale	<b>Area:</b>	Eden
<b>Grid Ref.:</b>	NY 734 006	<b>BGS Map:</b>	40
<b>Easting:</b>	373932	<b>Northing:</b>	500056

**Access Description:**

Off road parking is possible near the small quarry at NY 734 006

**Mobility Access:** No

**Exposure Type:** Open fell

**Rating:** 3 Star

**Leaflet:** -

**Site Summary:**

Stennerskeugh & Fell End Clouds form upland areas of outstanding Carboniferous limestone scenery, with great variety of solutional features, including an eroded plunging anticline, mineral workings and fossils.

**Site Description:**

The roadside quarry shows near horizontal limestone, with palaeokarst bedding planes and much chert. Further up the limestone is folded into a N-S anticline, related to the Dent fault line. The limestone pavement is characterised by extremely narrow clints. It is a very attractive area, with views west across the Dent line towards Cautley Crags, a rare corrie feature in the Howgills. To the east, views open out towards the younger Yoredale rocks of Wild Boar Fell, source area for Devensian ice. It is an SSSI for both karst geology and biology.

**Reference:** Frankland H., CWT 2008 A Walk on The Clouds



Fell End Clouds anticline.

**More Photos:**

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_045\\_2.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_045_2.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_045\\_3.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_045_3.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_045\\_4.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_045_4.jpg)

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Fell End Clouds LGS- an eroded plunging anticline





<b>Site Name:</b>	<b>Bighill Cutting</b>	<b>Site No.:</b>	<b>3.066</b>
<b>Location:</b>	Kirkby Stephen	<b>Area:</b>	Eden
<b>Grid Ref.:</b>	NY 794 100	<b>BGS Map:</b>	31, 40
<b>Easting:</b>	379334	<b>Northing:</b>	509683

**Access Description:**

From the A685 north of Kirkby Stephen, drive through Winton, turn right. Park on the grass verge on the lower side of the entrance to Rookby Scar.

**Mobility Access:** No

**Exposure Type:** Railway cutting

**Rating:** 3 Star

**Leaflet:** -

**Site Summary:**

A greater thickness of Carboniferous Robinson Great Scar limestone than seen elsewhere, clearly exposed in a former railway cutting with a geological interpretation board.

**Site Description:**

The former Stainmore railway has cut through layers of 330 million year old Carboniferous limestone. On the southeast side of the cutting, the limestone layers dip into the cutting, and there is some slippage over interbedded shale layers. An unbedded area may represent a reef knoll. The rocks have been folded and moved along thrust faults. Solution has widened the joints, and there is some reddening as iron rich solutions have moved down from overlying rocks which have now been eroded away. The cutting provides a good environment for studying real and apparent dip.

**Reference:** -



Thick layers of Carboniferous limestone in the cutting.

**More Photos:**

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_066\\_2.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_066_2.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_066\\_3.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_066_3.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_066\\_4.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_066_4.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/3\\_066\\_5.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/3_066_5.jpg)



## **Bighill Cutting LGS**

John Strutt  
Conservation  
Foundation

Robinson Limestone-  
with thrust faults





<b>Site Name:</b>	<b>Askham Fell</b>	<b>Site No.:</b>	<b>7.09</b>
<b>Location:</b>	Helton	<b>Area:</b>	LDNP
<b>Grid Ref.:</b>	NY 495 215	<b>BGS Map:</b>	30
<b>Easting:</b>	349266	<b>Northing:</b>	522135

**Access Description:**

Park off unfenced road at NY497 214. The fell is Open Access with many footpaths, including links to the Ullswater Way. Access is also possible from Pooley Bridge to the north

**Mobility Access:** No

**Exposure Type:** Open fell

**Rating:** 2 Star

**Leaflet:** -

**Site Summary:**

An attractive open area with many sink (shake) holes into underlying limestone. A new sink hole opened in 2021.



Active sink hole on Askham Fell

**More Photos:**

[https://www.cbdc.org.uk/CumbriaLGS/Images/7\\_090\\_2.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/7_090_2.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/7\\_090\\_3.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/7_090_3.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/7\\_090\\_4.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/7_090_4.jpg)

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**Site Description:**

This area of open fell is underlain by Carboniferous limestone, little of which shows at the surface, which is dominantly drift covered. There are very many sink holes, some called Wofa Holes, are old enough to be named on the map. Little solid rock is seen in them, only some glacial erratics. A dramatic new sink hole opened recently. Remnants of small limestone quarries are seen at The Riggs. Flaggy layers of sandy limestone show some productid brachiopods.

**Reference:** -





Askham Fell LGS, reinstated, renamed

An active sink hole where drift is falling into a widened joint in the limestone below, is being monitored

25 Dec 2020



2 April 2022

<b>Site Name:</b>	<b>Lowhouse Woods</b>	<b>Site No.:</b>	<b>1.001</b>
<b>Location:</b>	Armathwaite	<b>Area:</b>	Carlisle
<b>Grid Ref.:</b>	NY515491	<b>BGS Map:</b>	18
<b>Easting:</b>	351597	<b>Northing:</b>	549130

**Access Description:**

Park on the minor road north of Low House at NY 509479, and take the footpath on west side of River Eden, for about 750 metres .

**Mobility Access:** No

<b>Exposure Type:</b> River section	<b>Rating:</b> 5 Star
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**Leaflet:** -

**Site Summary:**

This most northerly exposure of the fluvial facies of the Permian Penrith Sandstone Formation in the Vale of Eden is similar to the well-known Brockram deposits in the Appleby & Kirkby Stephen districts.

**Site Description:**

The river section exposes the fluvial facies of the Penrith Sandstone. The section contains cross-bedded sandstones intercalated with water laid strata including fine-grained, flat-bedded sandstones, purple mudstones, siltstones and coarse conglomerates containing angular clasts of Carboniferous limestones and sandstones. The lenticular beds of conglomerate are infillings of old channels cut into the underlying sandstones and represent outwash fan deposits spread upon desert basin floor by flash floods. A particular highlight is a pronounced channel filled with Brockram conglomerate. The Brockram is generally finer with more rounded clasts than further north in the Appleby and Kirkby Stephen districts.

**Reference:**



Channel in Penrith Sandstone

**More Photos:**

[https://www.cbdc.org.uk/CumbriaLGS/Images/1\\_001\\_2.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/1_001_2.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/1\\_001\\_3.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/1_001_3.jpg)

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Lowhouse Woods, Armathwaite LGS  
Most northerly exposure of Brockram,  
along River Eden.  
Channels in red sandstone filled with  
Brockram



*Raised to 5\*, updated account, new  
photos*

**Site Name:** Hodbarrow Point

**Site No.:** 4.042

**Location:** Millom

**Area:** Copeland

**Grid Ref.:** SD183782

**BGS Map:** 48

**Easting:** 318093

**Northing:** 478316

**Access Description:**

Recommended parking at SD 182 783 and walk towards the shore

**Mobility Access:** -

**Exposure Type:** Coastal section

**Rating:** 4 Star

**Leaflet:** [https://www.cbdc.org.uk/CumbriaLGS/Leaflets/4\\_042.pdf](https://www.cbdc.org.uk/CumbriaLGS/Leaflets/4_042.pdf)

**Site Summary:**

The quarry exposes easterly dipping Carboniferous Martin limestone (to the east) and Red Hill limestone (to the west), with two major fault planes exposed and reddened by haematite mineralisation.

**Site Description:**

The quarry allows examination of small mineral veins and larger fractures, including No 1 Pit Fault and Lowther Fault, which allowed mineralising fluids to make contact with the limestone, to deposit haematite iron ore. Martin limestone exposed on the wave cut platform reveals sets of closely spaced mineralised faults, with calcite & barite gangue minerals. Good specimens of fossil corals, crinoids and brachiopods can also be seen. A great variety of rock types may be seen in the pebbles on the beach.

**Reference:** -



Lowther Fault, Hodbarrow Quarry

**More Photos:**

[https://www.cbdc.org.uk/CumbriaLGS/Images/4\\_042\\_2.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/4_042_2.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/4\\_042\\_3.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/4_042_3.jpg)

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Hodbarrow Point LGS Millom, quarry with Lowther Fault, and minor iron ore veins, and foreshore, with fossils



<b>Site Name:</b>	<b>Kiln Bank Cross</b>	<b>Site No.:</b>	<b>7.114</b>
<b>Location:</b>	Dunnerdale, Ulpha	<b>Area:</b>	LDNP
<b>Grid Ref.:</b>	SD208929	<b>BGS Map:</b>	38
<b>Easting:</b>	320843	<b>Northing:</b>	492954

**Access Description:**

Park in Ulpha, near SD 198 920. Allow a full day to visit all the localities. Do not attempt to enter the quarry near SD 202 932.

**Mobility Access:** No

**Exposure Type:** Open fell

**Rating:** 2 Star

**Leaflet:** -

**Site Summary:**

A walk from Ulpha Bridge to the summit of Stickle Pike (374m) shows a succession of varied volcanic rock types, erupted into a crater lake in Ordovician times, 460-450 million years ago

**Site Description:**

In Ordovician times the Duddon area near Ulpha was a rapidly subsiding basin or caldera, where an unusually thick succession of Borrowdale Volcanic Group rocks is preserved. The site extends from Ulpha Bridge SD 196 929, over the summit of Stickle Pike to Stickle Tarn SD 214 929. The lower most part of the succession comprises blocky andesite lava flows & tuffs of the Ulpha Formation. This is overlain by volcanoclastic sandstones and siltstones of the Dunnerdale Formation indicating the onset of lacustrine conditions in the subsiding basin. This formation is interbedded with the andesitic lapilli tuff of the Wallowbarrow Formation. Above, a series of rhyolite/dacitic ignimbrites of the Lickle Formation outcrop on Stickle Pike. Around Stickle Tarn the overlying the Caw Formation comprises low density ignimbrites, volcanoclastic sandstones and breccias.

**Reference:** -



Stickle Pike, Lickle Formation ignimbrites

**More Photos:**

[https://www.cbdc.org.uk/CumbriaLGS/Images/7\\_114\\_2.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/7_114_2.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/7\\_114\\_3.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/7_114_3.jpg)

[https://www.cbdc.org.uk/CumbriaLGS/Images/7\\_114\\_4.jpg](https://www.cbdc.org.uk/CumbriaLGS/Images/7_114_4.jpg)

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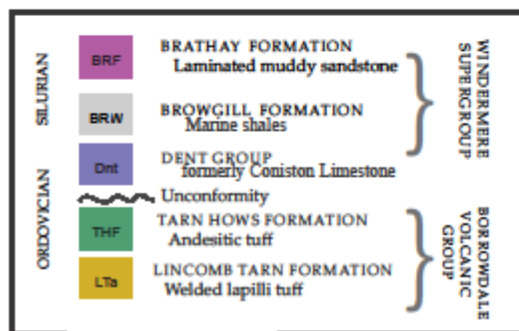




Kiln Bank Cross LGS, Ulpha, view of Stickle Pike, Dunnerdale- explosive BVG ignimbrites



# And finally another new GeoTrail round Tarn Hows for wheelchair users



## About Tarn Hows

*Owned and managed by the National Trust,  
Tarn Hows allows views over several of the  
major rock types of the Lake District.*

Stretch your mind while you take a tour around Tarn Hows.  
Take a Journey back in time to a 450 million year old  
volcano, a huge time gap in the rocks, and  
admire the ice-scoured scenery.

The rocks to the north-west of the tarn are **Ordovician Borrowdale Volcanic Group (BVG)**, a complex group of rocks formed by volcanic eruptions around 450 million years ago. As you go north you go over progressively older rocks. To the south-east side of the tarn are younger **Silurian** sedimentary rocks of the **Windermere Supergroup (WSG)**, which formed around 5 million years later in a shallow sea which deepened rapidly. The return route passes over the 5 million year time gap between the Ordovician volcanic rocks and the younger Silurian sediments that overlie them. The path down the east side of the tarn runs through these Silurian sediments, but to your right the tarn itself lies in the older volcanic rocks.

About 20,000 years ago, the climate was much colder than it is now and the whole of the Lake District was covered by ice, in what we now call the last Ice Age. The moving glaciers wore away some of the rocks they passed over into distinctive shapes. You will see several ice smoothed rocks which geologists call 'roches moutonnées'. As the ice flowed over the rock it smoothed the upstream side, but prised away fragments of rock on the downstream side. The name comes from the wigs that were popular in the 17th and 18th centuries, which had a smooth part on top and then curls lower down. The hair was smoothed with mutton fat, hence the wigs were called moutonnées.



This leaflet was produced by  
Cumbria GeoConservation.  
[www.cumbriageoconservation.org.uk](http://www.cumbriageoconservation.org.uk)

## TARN HOWS

A Geology and Landscape Trail  
(The trail is fully wheelchair accessible)



*From the car park cross the road carefully  
and take the main track left  
down to the small dam.*

Stop to look closely at the rocks either side of  
the path. Consider how the rocks have  
influenced the scenery.

Content by Sylvia Woodhead  
Design by John Shippen October 2022



## About Tarn Hows

Tarn Hows is one of the gems of the Lake District and one of the most visited places in the national park.

Lying just north of the villages of Conistone and Hawkshead, this tranquil lake is nestled between low fells and has fantastic views of the Cumbrian Mountains.

First time visitors may be surprised to learn that Tarn Hows is not a natural feature. In the early 1800's, landowner James Garth Marshall MP constructed a small dam at the southern end of the lake and this resulted in three small tarns being merged into the one lake we see today. In 1930, the estate was purchased by Beatrix Potter and then handed over to the National Trust shortly after.

Tarn Hows is designated a Local Geological Site for its variety of geological exposures and outstanding landscape. It is also a Site of Special Scientific Interest for its unique ecology associated with the acidic soils that underlie the volcanic rocks and with the calcareous soils that underlie the limestone rocks, formerly known as Conistone Limestone.

Hammering of the rocks is strictly prohibited.



Wetherlam forming the backdrop at the southern end of Tarn Hows.

### What is a tarn?

The word "tarn" refers to a small mountain lake and is derived from an old Norse word "tjörn".

## About the trail

**Walking length / time:** 3.1 Km (1.9 miles) / 1.5 hours, following a circular route, in a clockwise direction around the lake.

**Start Location:** Tarn Hows is easily reached by car, bicycle or on foot. The start of the trail is near to the National Trust car park at SD 326 995. Walkers can also approach the lake from a second NT car park just off the A593 (SD 321 998) and walk up the steep waterfall footpath to the tarn.

**Terrain:** Two thirds of the trail is on the gently undulating terrain around the lake's perimeter. The remainder follows footpaths onto the higher fell east of the Tarn which is steep and rough in places. The overall ascent is 110m.

If the steeper sections of this route are too much, why not follow our other guide that just takes in the perimeter footpath around the lake entitled, 'Tarn Hows - A Geology and Landscape Trail - suitable for wheelchair users'.

**OS map:** OL 7 (1:25,000)

**BGS map:** Sheet No. 33 Ambleside (1:50,000)



Written by Cumbria GeoConservation with support from the National Trust and Westmorland Geological Society, 2022.

[www.nationaltrust.org.uk](http://www.nationaltrust.org.uk)  
[www.cumbriageoconservation.org.uk](http://www.cumbriageoconservation.org.uk)  
[www.westmorlandgeol.soc.co.uk](http://www.westmorlandgeol.soc.co.uk)

## Tarn Hows

### A Geology and Landscape Trail

A circular walk around Tarn Hows taking in geological features and panoramic views

*(Suitable for adults and older children)*

