Allen Banks is one of England’s most special places – a peaceful, unspoilt landscape with a rich history and vibrant natural beauty. In recognition of this it is designated as an Area of Outstanding Natural Beauty (AONB). The area is also a Global Geopark – an accolade endorsed by UNESCO.

**Allen Banks Geotrail**

Rocks, roots and rivers

The North Pennines is one of England’s most special places – a peaceful, unspoilt landscape with a rich history and vibrant natural beauty. In recognition of this it is designated as an Area of Outstanding Natural Beauty (AONB). The area is also a Global Geopark – an accolade endorsed by UNESCO.

**Find out more about North Pennine geology**

This leaflet is one of a series of geological publications about the North Pennines. These are part of the North Pennines AONB Partnership’s work to make the most of our special geological heritage. This work includes events, education resources, publications, displays and much more.

**About 20,000 years ago a thick ice sheet streamed across the area.**

This landscape owes much to the action of ice and water. About 20,000 years ago a thick ice sheet streamed across the area. This landscape owes much to the action of ice and water.

**Formation of the layered Carboniferous rocks.**

Most of the rocks you’ll see at Allen Banks are layers of sandstone, shale and limestone. They formed in the seas in which the skeletons of sea creatures accumulated as sand and eventually became sandstone and coal. Many of these rocks contain features and fossils which tell us about the seas and swamps and what lived in them.

**The cycle started again.**

Limestone again. This cycle happened many times, building sandstone, shale and limestone. They formed in the seas in which the skeletons of sea creatures accumulated as sand and eventually became sandstone and coal. Many of these rocks contain features and fossils which tell us about the seas and swamps and what lived in them.

**Formation of the Whin Sill from molten rock.**

About 295 million years ago molten rock rose up and spread underground to form hard, dark dolerite (or whinstone). This vast sheet of rock – the Whin Sill – is now exposed as crags in the landscape today; the River Allen is eroding its riverbanks in such as the one at Allen Banks. Water continues to shape the landscape; rivers and streams will carry away the weathered rock, which eventually will form new sedimentary rocks.

**A 2¾-mile circular walk at Allen Banks, exploring landscape, rocks, plants and evidence of an industrial past.**

North Pennines AONB Partnership

www.northpennines.org.uk

+44 (0)1388 528801

info@northpenninesaonb.org.uk

The AONB Partnership has a Green Tourism award for its corporate office.

North Pennines AONB

@NorthPennAONB

northpennines

All photos & illustrations unless otherwise credited ©NPAP/Elizabeth Pickett.

**May 2015**

**Supported by:**
Welcome to a special landscape... …shaped by millions of years of natural processes and centuries of human activity.

This lovely steep-sided valley along the River Allen has been looked after by the National Trust since 1942. It has extensive ancient and ornamental woodlands, rich in wildlife, and miles of waymarked paths.

The area has a fascinating geological story to tell – of tropical seas and swamps and what lived in them. The seas and swamps contain features and fossils which tell us about the seas and swamps and what lived in them.

Tropical North Pennines

Most of the rocks you’ll see at Allen Banks are layers of sandstone, shale and limestone. They formed in the Carboniferous Period, between 360 and 300 million years ago. Back in those distant times, the North Pennines lay near the equator. The area was periodically covered by shallow tropical seas in which the skeletons of sea creatures accumulated as limy ooze. Rivers washed mud and sand into the sea, building up deltas on which swampy forests grew. In time, the limy sea floor hardened into limestone, the mud and sand became shale and sandstone, and the forests turned to coal. Periodically, the sea rose, drowning the deltas and depositing sandstone, and the forests turned to coal. Periodically, the sea rose, drowning the deltas and depositing sandstone, and the forests turned to coal. Periodically, the sea rose, drowning the deltas and depositing sandstone, and the forests turned to coal.

This cycle happened many times, building up repeating layers of limestone, shale, sandstone and coal. Many of these rocks contain features and fossils which tell us about the seas and swamps and what lived in them.

Formation of the layered Carboniferous rocks of the North Pennines

1. The sea flooded the delta, depositing more limy ooze – and the cycle started again.
2. Muds washed in by rivers became shale.
3. Sandy deposits in river deltas hardened into sandstone.
4. Limestone was deposited atop the delta and eventually became coal seams.
5. Forests grew on top of the delta and eventually became coal seams.

Sculted by ice and water

This landscape owes much to the action of ice and water.

About 20,000 years ago, the last ice sheet retreated from the North Pennines, leaving behind sinkholes, caves, eskers, drumlins and glacial troughs. The landscapes today show the power of ice and water on the landscape.

Industrial Allen Banks

It is hard to imagine now but until the mid-1800s parts of the peaceful woods of Allen Banks and Staward Gorge would have boomed with small-scale industry. There is evidence for quarrying, lime burning, mining for lead ore, iron ore and coal, and smelting.

Lead smelt mill ruins seen on this walk.

©Elizabeth Pickett
Start: From the National Trust car park follow the riverside path south.

1. Delta rocks
About 30m beyond the stone steps that join the path on the right, you’ll see layers, or ‘beds’, of buff-coloured sandstone and flaky grey shale. Look out for sloping lines in sandstone next to the path (see picture). Known as ‘cross-bedding’, these formed when sand was deposited in underwater dunes in ancient river deltas. Continue along the path for another 50m.

2. Haydon Bridge Dyke
Look out for a mossy rib of rock to the right. Close up there’s a small, freshly broken surface (see picture), which is dark and finely crystalline. This is dolerite (or whinstone) and is part of the Haydon Bridge Dyke which formed from molten rock around 295 million years ago. This may have been a feeder for the Whin Sill (see description overleaf). Continue along the path, passing the suspension bridge, until you reach a right bend in the river with the cliffs of Raven Crag on your right.

3. Shingle banks
This is a good place to find pebbles of different rocks. Local Carboniferous rocks, especially buff-coloured sandstone, are the most common. You can also find grey limestone and dark grey shale. If you are lucky you may spot fossil plant remains or worm burrows in the sandstone, or white shelly fossils in the limestone.

4. Raven Crag
These impressive cliffs are made up of beds of sandstone which were once layers of sand in Carboniferous deltas. Weathering has picked out features that give clues to conditions 320 million years ago. The beds high in the face are very thick and probably built up quickly. Lower layers show fine layering and some cross-bedding (see Stop 1). Continue until just past a junction with a path which joins the right.

5. Living fossils
If you’re here in summer, there’s a stand of giant horsetails beside the path. These are related to the horsetails – some up to 10m high – that grew in Carboniferous times. Back then, the rocks at Allen Banks were being deposited as sand and mud in vast deltas, which were periodically covered in swampy forests.

6. Lead-tolerant plants
As you emerge from woods into a grassy glade, look out for mountain pines in late spring and summer. This is one of several species that can tolerate metal-rich soil. Here, they may be related to nearby lead ore smelting (see next Stop 7).

7. Ancient woods and past industry
Briarwood Banks is an area of ancient woodland, managed by the Northumberland Wildlife Trust. By the Nature Reserve sign there is an overgrown ruin which was part of an old industrial complex, possibly related to lead ore smelting in the 1680s. Cross the bridge over the river and join the road at Plankey Mill.

8. Plankey Mill
Originally an 18th-century corn mill, these buildings are built of local sandstone and are roofed with thin sandstone slabs. Follow the road uphill for 100m. Turn left on to a track, keeping well clear of the steep drop to the left.

9. Roots – past and present
By the junction there’s an oak tree with gnarled roots growing into rock. Less obvious are the fossil remains of plants in the rock itself. Look for black flecks and streaks in the crumbly sandstone – this is carbon from plants that died 320 million years ago and were caught up in delta sands. Follow the track past the ruins of Plankey Farm and continue along the path. Descend a bank.

10. River terraces and floodplains
This steep bank is the edge of a river terrace, a relics floodplain from when the river flowed at a higher level, thousands of years ago. The river has cut down to a new level, leaving its old floodplain high and dry. Continue along the riverside and into woods opposite Raven Crag.

11. Fallen blocks and outcrops
Along the path you’ll weave around large mossy blocks of sandstone which have tumbled from the cliffs above. You’ll also pass outcrops of sandstone, some of which show cross-bedding (as seen at Stop 1). Follow the dark brown waymarkers, eventually descending to the suspension bridge. Just before crossing the bridge turn left and follow a path for a short distance and up some stone steps.

12. The Little Limestone
Look down to an area of flat rock in the river. This is limestone, which formed from the limy ooze that accumulated on a tropical sea floor 320 million years ago. Past miners and quarrymen called this layer the Little Limestone, to distinguish it from the thicker Great Limestone beneath it. Cross the bridge and turn right to return to the car park.