

Cliffs, caves and curious rocks

A Magnesian Limestone Geotrail. Walk 4

A 4-mile walk on the Magnesian Limestone plateau

This walk is one of five self-guided trails that help you to explore East Durham, South Tyneside and Sunderland and find out how the geology has influenced the area's natural habitats and the lives of local people.

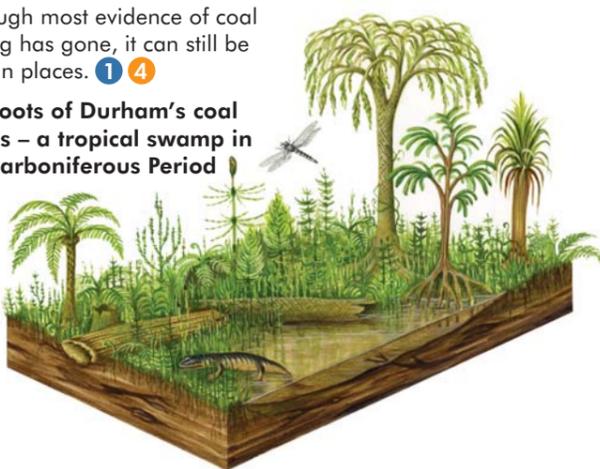
Together the walks offer a fascinating overview of the many processes that shaped the landscape you see today.

Introducing the geology of East Durham

The numbers in circles show which walk is best for seeing a particular geological feature.

310 million years ago, in the Carboniferous Period, this area was part of a large continent that lay across the equator. Low lying tropical swamps covered the land. Dead trees and other plants built up as a layer of peat, which was then buried under layers of sand and mud. Eventually the peat hardened to form coal seams. The coal was mined deep beneath the Magnesian Limestone Plateau in the 19th and 20th centuries. Although most evidence of coal mining has gone, it can still be seen in places. 1 4

The roots of Durham's coal seams – a tropical swamp in the Carboniferous Period

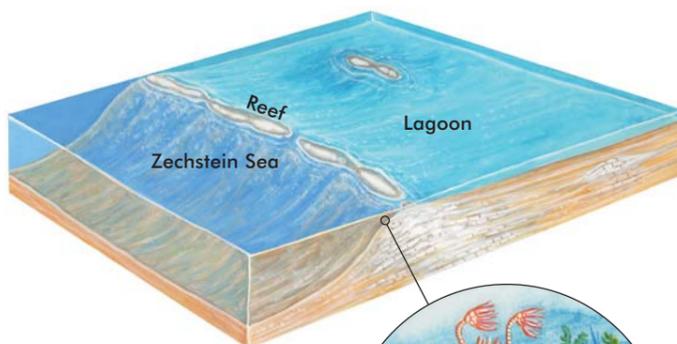


About 300 million years ago the land moved slowly further north of the equator and the climate became hotter and drier. This area became a barren desert covered by sand dunes. The remains of these dunes, the 'Yellow Sands', are quarried today for building sand. 5

A large part of the desert lay beneath sea level and around 295 million years ago, at the start of the Permian Period, water from the surrounding ocean flooded it to create a shallow inland sea, known as the Zechstein Sea. Over the following 50 million years the sea level rose and fell several times, causing the Zechstein Sea to periodically dry up.

A reef formed a barrier running roughly in a north-south direction, separating a shallow lagoon to the west from deeper water to the east. The reef can be seen today as a

number of hills in the area, including Beacon Hill (visited on this walk) and Tunstall Hills near Sunderland. 3 A large variety of animals lived on and within the reef. Tiny fragments of shell and skeletal remains built up as lime-rich mud on the sea floor. It is this limy mud that eventually became limestone. In places fossilised shells can still be seen in the rock.



The Magnesian Limestone reef and a close-up showing sea creatures such as cone-shaped bryozoans.



During periods of falling sea level, the hot arid climate caused the sea water to evaporate, making it much saltier. Salt minerals known as evaporites built up on the sea floor. Thick salt deposits still exist deep beneath the surface further south, but in this area they have dissolved, causing the rocks above them to collapse. 1 4

This area continued to drift north for 250 million years until it reached where it is today. We do not have any record of the geology of the area during that time as any rocks formed have been removed by the work of rivers and seas. Some of these 'missing' rocks have been quarried elsewhere and brought into the area for building stone. 2

Over the last 2.5 million years the climate alternated between colder periods ('ice ages') and warmer periods. At times, ice sheets up to 1km thick covered County Durham and the North Sea. The ice finally melted about 15,000 years ago. The action of the ice and meltwater were largely responsible for shaping the landscape you see today. Rivers and seas continue to wear away the land further altering the dramatic cliffs and coastline. 1 3 4 5

The Limestone Landscapes Partnership is working with many different people to conserve the landscape, wildlife and rich heritage of the Magnesian Limestone and to enable communities to learn about, enjoy and celebrate their local area.

This walk is one of five we have produced which introduce the unique geology of the Magnesian Limestone Plateau.

1 Marsden cliffs and Souter

2 Sunderland City Geotrail and Mowbray Park sensory trail

3 Tunstall Hills

4 Nose's Point, Seaham

5 Coxhoe



Please report any issues with paths on this route on 03000 265342 or email pr@durham.gov.uk

For more information on the Durham Heritage Coast call 03000 268131 or email heritagecoast@durham.gov.uk. Much of the land along this route is owned by the National Trust, a charity working to preserve and protect the Durham coast and other special places – forever, for everyone. To find out more visit www.nationaltrust.org.uk/durhamcoast

This project has been coordinated by Groundwork NE & Cumbria: Changing Places, Changing Lives – one green step at a time. Find out more at www.groundwork.org.uk/northeast or follow us on Facebook and Twitter.

We would like to thank Durham County Council, Durham Wildlife Trust, East Durham Heritage Group and the National Trust for their support.

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Limestone Landscapes

Making a positive difference to the unique environment of the Magnesian Limestone area



The lime-rich mud from which the rock was formed built up in layers on an ancient sea floor. Geologists call these layers 'beds'. You can see some of these beds in the horizontal layers in the cliff. Some of the beds have been affected by chemical changes forming 'concretions' (see over flap).

Bedded down



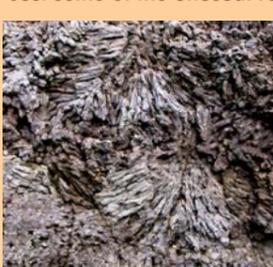
Worth seeing here are exposures of Magnesian Limestone beds with many types of concretions. The Waterside information centre and cafe, a fine row of limekilns and the restored liffboat house.

After your walk, try and find time to visit Seaham itself. As well as enjoying a coffee and a cake at one of the local cafes be sure to seek out some unusual rocks down at the harbour.

Curious concretions

You can see a variety of shapes and patterns in the exposed rocks at Seaham harbour. Some of these are the result of complex chemical reactions and erosion that have changed the structure of the limestones over a long period of time.

Just some of the unusual rock textures to look out for:

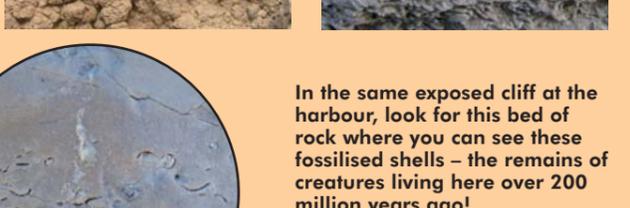


Left: 'Coralline' concretions So named because they look a bit like fossilised coral

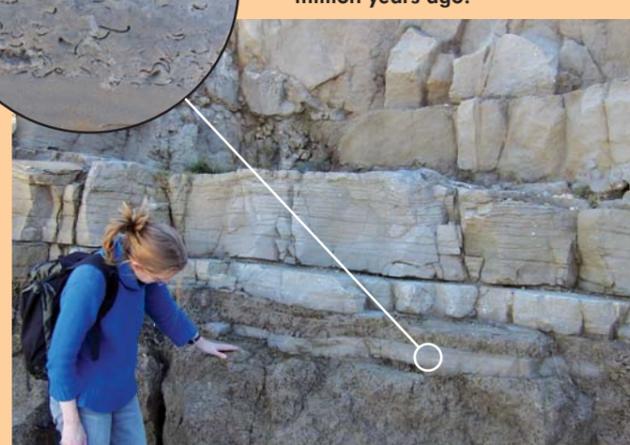


Below left: Canonball concretions These vary enormously in scale – the ones shown here are about the size of medium potatoes

Below: Calcinema permiana Not a concretion, but a fossilised algae



In the same exposed cliff at the harbour, look for this bed of rock where you can see these fossilised shells – the remains of creatures living here over 200 million years ago!



Walk information

Exploring the England Coast Path from Nose's Point near Seaham 4 miles/6km

The coastal path is fairly even and level. The path onto Blast Beach and the inland section are steep and rough in places.

⚠ There are steep steps down to Hawthorn Hive and a stream to cross. **If the tide is high or there has been heavy rain, consider the alternative route at * in point 3.** Please take care near the cliff edge and when crossing the railway. Children should be accompanied at all times.

⚠ Keep dogs under close control; preferably on a lead. Please pick up after your dog – there are waste bins at Nose's Point. You may encounter livestock on the route.

P Nose's Point GR NZ436 478

Bus Route 202 Seaham – Peterlee. Nearest stop to walk start: Dawdon Business Park www.simplygo.com

Coffee Several cafes in Seaham and the marina

Person The Waterside at the marina and Byron Place Shopping Centre (1 mile)

a Spoils of industry

Nose's Point was a hive of industry for over a century, with a bottleworks factory established in 1855, an ironworks in 1862, a chemical works built in 1865 and finally a colliery, which ceased production in 1991. The huge blast furnaces of the ironworks gave the beach its name.

The spoil that came out of the colliery was tipped over the cliffs onto the beach. Waves gradually washed away most of the waste, leaving the terrace you see in the image below. Action from the sea continues to erode and change this strange coastal landscape.



Colliery spoil on Blast Beach

b Keeping a look out

In 1940 a network of defences was hastily built all over the British Isles to help the fight against an anticipated German invasion. The most common of these defences were called 'pillboxes'. Named after their squat shape, these concrete forts were sited at road junctions, canals and other strategic points, including coastal locations such as here. Over 28,000 pillboxes were built across Britain, of which fewer than 6,000 survive. There is another example on the beach at Hawthorn Hive.

c Limestone at work

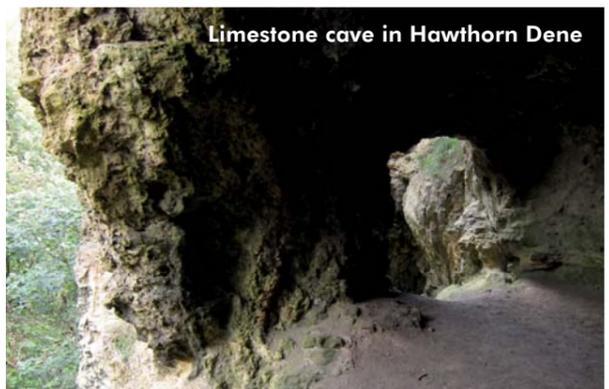
This is one of a few 18th century pot kilns found across the Magnesian Limestone. Crushed limestone was burnt in kilns to produce quicklime, which was mixed with water to make 'slaked' lime. This was used in agriculture to neutralise acid soils and in the building industry to make lime mortar, which was the main bonding agent before the harder, faster setting Portland cement was introduced in the late 19th century. At the north dock in Seaham is a row of well-preserved limekilns where you can find out more about this once vital industry.



The limekiln at Hawthorn Hive before restoration

d Caves in the cliffs

You can see caves of varying sizes in the Magnesian Limestone cliffs above you. They were probably formed when the sea level was higher than it is today. Wave action created these caves in broken and weaker areas of the limestone.



Limestone cave in Hawthorn Dene

Directions

- 1 Take the path leading away from the far end of the car park. Join main coast path, keep right then soon after turn left and follow path down to cross bridge over drain. Keep left on coastal path, through metal wicket gate (National Trust sign). Bear left to follow grassy path near to cliff edge.
- 2 You come to a small pond. At the far side there is an optional detour down a stone-stepped path to Blast Beach. Back on route, keep left to continue along grassy clifftop path.
- 3 As the path turns inland you rejoin main surfaced path. Turn left to walk through short wooded section next to railway. Out of trees look for stile over railway on right ***(to avoid the beach section, look and listen for trains before crossing railway ⚠, then follow instructions on map below)**. On the opposite side of the path to the stile are steps down to Hawthorn Hive. ⚠ Take care as the steps are very steep and can be slippery.
- 4 On beach turn right. ⚠ Cross stream where it is safe to do so – it is sometimes narrower nearer the sea. Turn right and follow stream back inland towards the viaduct, soon picking up a path. The path turns left uphill then right, to go under

the viaduct. Keep left uphill.

- 5 Turn left at path junction, heading back towards and then back under viaduct. Follow path right and through wicket gate.
- 6 After another metal wicket gate, look for stile on right over railway. ⚠ Take care as you cross the railway to a flight of concrete steps. Climb the steps, cross a stile and up onto an open field.
- 7 As path levels out look for stile in fence. Over stile turn right through wicket gate onto fell. Walk half right across to trig point. From trig aim half left towards fence which you follow down to the bottom of the field and a wooden wicket gate. Through gate follow the path as it bears right.
- 8 You come back to the path junction you were at earlier. Turn left down steps. Cross bridge and up steps on other side. Pass through metal squeeze stile out to meadow. Follow path up to interpretation panel. Through the hedge turn sharp right following path towards railway. The path turns left and follows railway to a bridge. Turn right to cross bridge. Over bridge turn left and follow path back to start.



***Route avoiding climb down to Hawthorn Hive**
After crossing railway bear left and through squeeze stile into woods. Go down steps to bridge and up steps on other side. Turn right and pick up instructions at 5 above.

f A view from a hill

Here at Beacon Hill you are on top of the great reef (see introduction). On a clear day you can enjoy fine views in all directions. To the south are the Cleveland Hills, made up of Jurassic rocks that are younger than the Magnesian Limestone. Look for Roseberry Topping, a distinctive cone-shaped hill.



The view south from Beacon Hill

g Hawthorn Dene

This deep gorge, typical of many on the Durham Coast, formed when the ice melted about 15,000 years ago. The land surface gradually began to rise when the great weight of the ice was removed from it. At the same time large volumes of water were released and powerful rivers cut down into the rising land to form deep gullies.

h Lime lovers

The special soils on the Magnesian Limestone support a community of plants which in turn attracts a wide variety of wildlife. Durham Wildlife Trust manages the Nature Reserve here at Hawthorn Dene. The grass is cut just once, late in the summer, which gives the plants a chance to release their seeds and so keep the cycle going (in some areas over 40 different lime-loving plants have been recorded within a square metre).



Dyer's Greenweed thrives here in the meadow and is an important food plant for moths



Small copper butterfly
Photo ©www.northeastwildlife.co.uk

e Left high and dry

Below you at point 6 is an important local geological feature known as the Easington Raised Beach. This is an area of gravel on the side of the cliff about 30 metres above the present beach. It is there because after the last ice age, when the huge weight of the ice sheet was removed, the land rose relative to sea level. Dating of shells from the gravel suggest the raised beach is between 200,000 and 240,000 years old.

⚠ Take care near the cliff edge, which drops steeply and can be slippery, especially after wet weather.



i Hawthorn Quarry

Limestone is used in the production of iron as a flux (which helps the metal ore melt and flow). Hawthorn Quarry was developed as the iron works at Dawdon expanded in the 19th and 20th centuries. The quarry, currently inactive, is now partially designated as a Site of Special Scientific Interest and is considered to be of national importance for its exposures of Magnesian Limestone.



Hawthorn Quarry in the 1950s
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