

How to get there



Image reproduced with permission of Ordnance Survey and Ordnance Survey of Northern Ireland. Licence number 100033582.

Barns Ness is located 4 km east of Dunbar, next to White Sands. From the A1 turn onto the A1087 at the Cement Works junction east of Dunbar, go past the entrance to the Cement Works and turn right on to a minor road after 400 m, signposted for the Caravan Site. Follow this road down to the beach. There's plenty of parking and toilets.

Safety and conservation

This is a rocky shore with low cliffs, and there is the risk of tripping, slipping or falling. It is best to plan your visit to avoid high tide, when it is possible to walk eastwards from the car park from the oldest to the youngest rocks following the Barns Ness Geological Time Trail. Information Boards are located at several points along the trail but the Limekiln is currently in poor state of repair, fenced off and its geological treasures currently not accessible.

Barns Ness is a Site of Special Scientific Interest and hammering is not encouraged. The **Scottish Fossil Code** provides detailed advice on best practice in the collection, identification, conservation and storage of fossil specimens found in Scotland. You can find out more at www.snh.org.uk/fossilcode/

What are Local Geodiversity Sites?

Local Geodiversity Sites (previously known as RIGS) are important local sites that have been identified by a local volunteer group as having significant value for educational and tourist information, academic research, for the history of science or for their aesthetic appearance. They might be a landscape feature, or particularly interesting rocks, or a good example of the local rock types.

Local Geodiversity Sites are indicated to the local council and in this area sites are designated by Lothian and Borders RIGS Group, which is a committee of the Edinburgh Geological Society.

Why do geological sites need looking after?

Geology has great influence on everyday life. Soils and rocks provide essential water and raw materials. Demand is continually increasing for land for housing, commerce, waste disposal, recreation etc. This can lead to the destruction, damage or burial of important geological features.

Text and images: Mike Browne, Andrew McLeish and Angus Miller

Designed by Derek Munn

Produced by the Lothian and Borders RIGS Group of the Edinburgh Geological Society, a charity registered in Scotland Charity No: SC008011

© 2010 Lothian & Borders RIGS Group

labrigs@bgs.ac.uk www.edinburghgeolsoc.org

Want to know more?

There are two books that describe Barns Ness in more detail. McAdam, AD & Clarkson, ENK(1996) **Lothian Geology** *Scottish Academic Press, ISBN 0-7073-0385-0*. Clarkson, Euan & Upton, Brian (2006), **Edinburgh Rock: the geology of Lothian** *Dunedin Academic Press, ISBN 1-903765-39-0*

Also: McAdam, AD & Stone, P, 1997, *East Lothian and the Borders: A landscape fashioned by geology*, *Scottish Natural Heritage*.

Barns Ness



Fossils



Geological Walk



Local Geodiversity Site



Mapwork based on Ordnance Survey Licence number 10003582

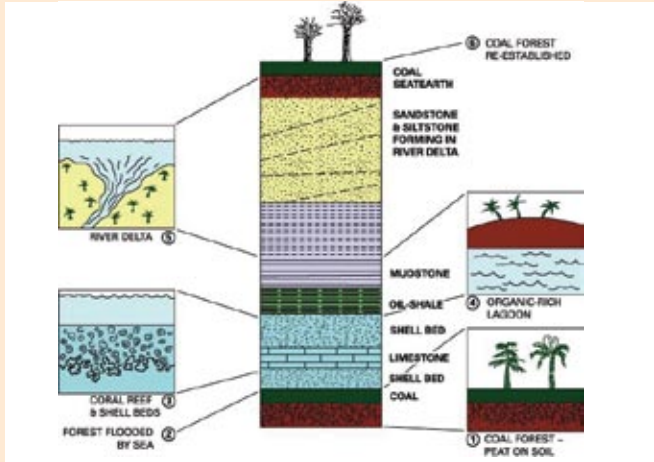


Lothian and Borders RIGS Group



What's so special about Barns Ness?

This short walk along the shore from White Sands to the Barns Ness lighthouse allows you to discover the most extensive limestone outcrops in central Scotland. There are also other sedimentary rocks including sandstone, mudstone and coal, and plenty of fossils.



From McAdam & Stone, 1997, *East Lothian and the Borders: A landscape fashioned by geology*

The rocks are over 320 million years old (the Carboniferous Period) and were laid down as soft sediment when Scotland was located just south of the Equator, and the climate was tropical, both hot and wet. Sea level kept rising and falling, so that at times this area was under shallow sea water, and at other times it was a flat coastal plain.

The sea level changes were caused by subsidence of this area and changing global sea-levels due to ice ages.

The abundant corals in the limestones indicate that they lived in tropical, warm, shallow, clear seawater. However rivers were flowing from the mountains to the north; they brought mud and sand to silt up the shallow sea and reclaim the land, producing muddy coastal swamps and deltas with low-lying sandbanks and river channels. Eventually this new land was colonised by lycopod forests (similar to mangrove swamps in the world today). Later, the land would subside once more or global sea-level would rise, drowning the forest and starting a new sediment cycle.

Barns Ness Fossils

Barns Ness is a great place to find fossils, the remains of the life that thrived in tropical seas 320 million years ago.



Body fossil: Colonial coral *Siphonodendron*



Trace fossil: *Zoophycos* (burrow)



Trace fossil: *Rhizocorallium* (burrow) – left of pen

At Barns Ness you can see *body fossils* - the remains of the actual animal or plant, and *trace fossils* which are the remains of the burrows or trails left by an animal.



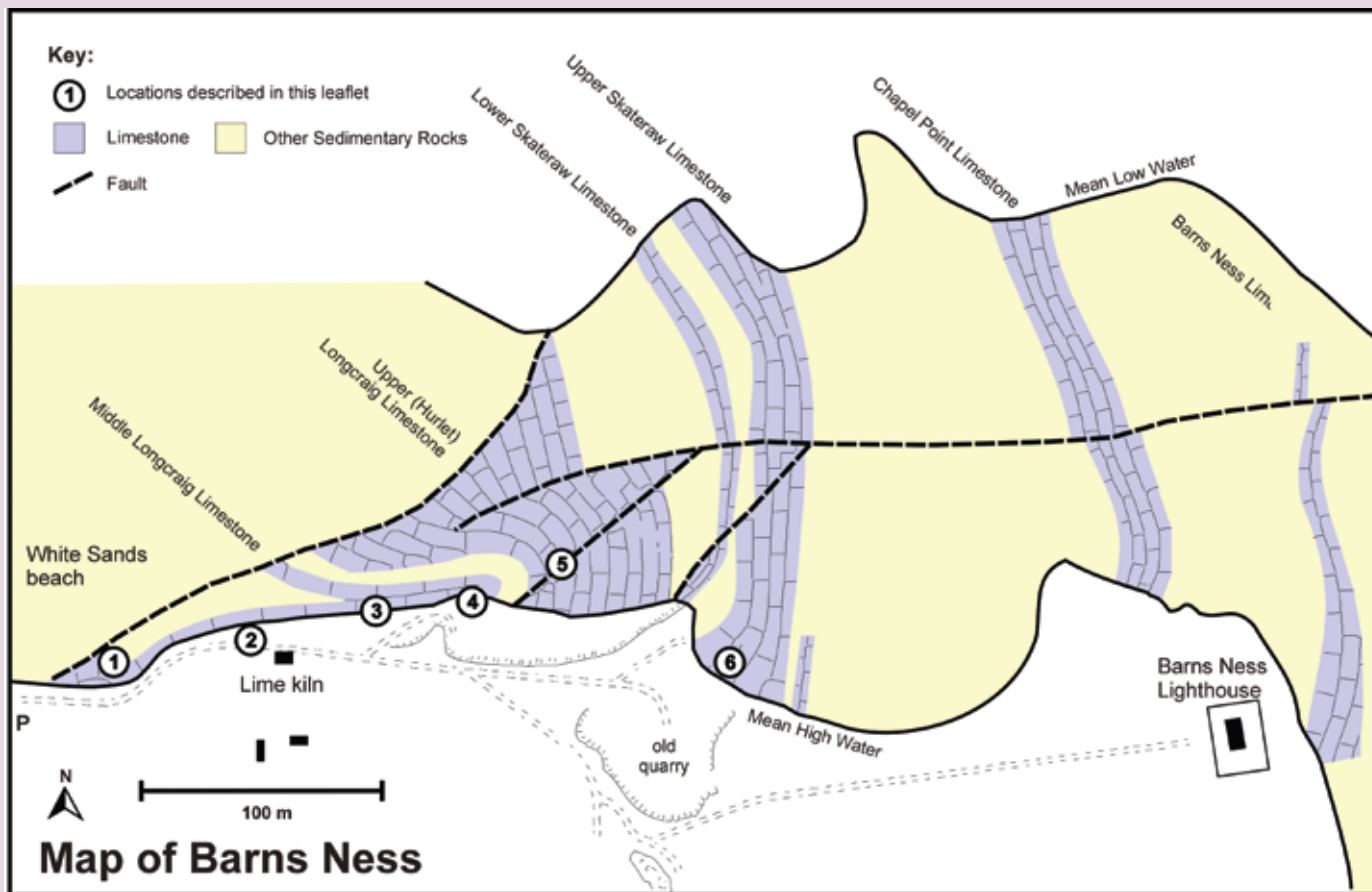
Body fossil: Solitary coral



Body fossil: Crinoid *Parazeacrinites* sea lily



Trace fossil: *Thalassinoides* (burrow)



The importance of limestone

Barns Ness is a good place to appreciate the agricultural and economic importance of limestone. The lime kiln at the back of the beach was one of many in the Lothians, where layers of coal and limestone were burnt to create quicklime for agriculture. This was a dangerous and labour-intensive process, but proved its worth in increased crop yields.

In the distance to the south, you can see the tower and chimney of Dunbar Cement works, which processes local limestone and mudstone to produce cement. This is the only cement works in Scotland with the capacity to produce one million tonnes of cement a year.



From McAdam and Clarkson, 1996, *Lothian Geology*.

Stop 1: Limestone and sandstone

The limestone forms a prominent platform extending from the east end of White Sands. The rock is creamy white in colour, and looks lumpy. It is full of fossils including colonial corals that look like spaghetti, large solitary corals, brachiopod shells, and crinoids.



Beneath the limestone is a layer of dark brown sandstone. It contains trace fossils; both U-shaped tubes and *Zoophycos* 'cocks tails'. These features are the result of unknown animals searching for shelter or food just under the seabed, before the sand was converted to rock.



Walk along the top of the limestone. You may spot parallel scratches on the rock surface caused by rock moving against rock during an earthquake. The yellow colour of the limestone is due to small amounts of iron.

Stop 2: old jetty and limekiln



The jetty is on the shore a short distance west of the limekiln. There is a curious layer on top of the limestone here, which looks quite solid, and contains shells and sand just like layers in other parts of Scotland that formed when the sea level was high after the last ice age. Look closely however and you'll find bricks and other human debris.

Stop 3: Hollows in limestone

This extensive area of basin shaped hollows, each about one metre across, is the most impressive geological feature of this trail. Look closely in the hollows and you'll find some are partly filled by a grey rock called "seatearth". This is a fossil wetland soil, full of preserved roots. The hollows are an original feature of the limestone, perhaps formed when the sea receded to expose the top of the limestone allowing a forest to grow on the newly exposed land. Perhaps each pothole is the location of the roots of an individual tree.



Stop 4: coal seam and fossil mudstone

In the small cliff above high tide you can find a thin coal seam overlying the grey seatearth. Above the coal is a layer of mudstone with lots of fossil shells including *Eomarginifera* and the bivalve *Streblopteria*, along with crinoid debris. The top layer is another limestone.



Stop 5: Fault line

When the tide is low, a discontinuous wall of limestone runs out to sea. This marks the position of a small fault line. Along the fault some of the limestone has converted to dolostone that resists weathering better than the unaltered limestone. You can find some good crystals of dolomite along the fault.



Because the dolostone forms a wall, it has been previously confused as a dyke of igneous rock.

Stop 6: Decorative Dunbar Marble

Walk along the pebble beach to the rocks at the far end, and search for a bed full of solitary corals, called *Koninckophyllum*. What unusual conditions gave rise to this amazing death assemblage is not known; did they all die in a storm? Over 100 years ago, this attractive but relatively soft stone was quarried as a decorative marble for fireplaces.



Proceed around the small headland of lumpy limestone and look out for rare fossils called *Chaetetes*. This is a demosponge and was a common reef-building organism of the Carboniferous. Look closely and you can see tiny holes similar to a bath sponge.

