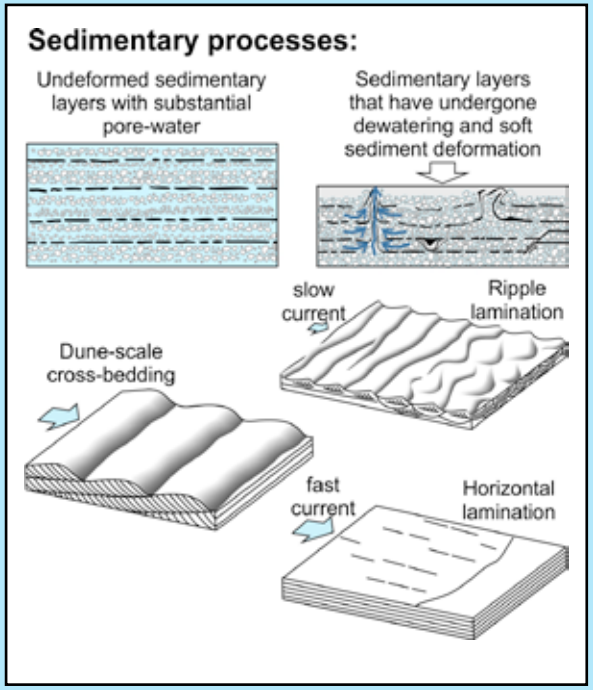

This walking tour crosses the historic centre of the small town of Dalkeith, in Midlothian, 10 km south-east of Edinburgh. The tour starts at the Corn Exchange on the High Street and ends at King's Park.

Parking is available at the Corn Exchange (Location 1), at the entrance to Dalkeith Country Park near St. Mary's Church (Location 2) and in two car parks near the town centre; street parking may be available further out. Several Lothian and East Coast buses serve the town.

The route is almost entirely on pavements, but take care and use pedestrian crossings where possible.

Further Reading:
Lothian & Borders GeoConservation leaflets including:
Building Stones of Edinburgh's South Side
The Esk Valley

https://www.edinburghgeolsoc.org/publications/geoconservation-leaflets/

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Images: Howard Turner and Kirsten Kennedy
Designed by Derek Munn
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Dalkeith's Building Stones

Lothian and Borders GeoConservation

Introduction

The historic Royal Burgh of Dalkeith has many interesting stone buildings and this walking excursion provides a chance to explore the region's fascinating geology. Dalkeith is underlain by sedimentary rocks belonging to the Coal Measures, which were laid down about 310 million years ago in the later part of the Carboniferous Period.

At this time, the Dalkeith area was located in equatorial latitudes. Sea levels fluctuated with time, so that the environment changed from dry land with rivers into estuaries, swamps and shallow seas. Sandstone, the most commonly used rock for building materials in the town, was originally deposited as sand in river channels. Finer grained sediment was carried out to sea, or deposited in lakes and lagoons to become mudstone or shale. Vegetation in swamps and estuaries rotted away to become coal. The remains of shellfish and plankton were converted into limestone in shallow seas.

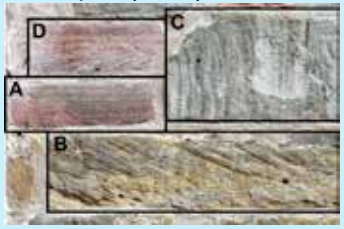
These are the youngest sedimentary rocks within the Midlothian Coalfield and consist of irregularly alternating beds of sandstone, siltstone, mudstone, limestone and coal. These layers are illustrated in the picture above, from the Blinkbonny opencast mine, now infilled. Plate tectonics are responsible for tilting these layers from their original horizontal position and for moving them from this hot wet equatorial environment to their present position.

Former local quarries provided the building stone. These included Cowpits, near the River Esk north of Dalkeith, and several lying to the south-east of the town, including at Shaws near Easthouses, at Lawfield, at Viewbank, Bonnyrigg and at Roans, Newtongrange. These have since been abandoned, infilled and sometimes built over. Cowden Cleugh east of Dalkeith, is the only one with rock still exposed.

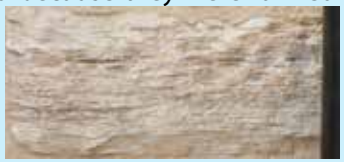
The walk

1. This walk starts at the recently restored **Dalkeith Corn Exchange**, 200 High Street, which was built in 1854. The front consists of yellow and brown sandstones, many of which have been 'stugged' with hand tools to give the surface a rough texture. The re-pointing during the restoration work used lime mortar (see Location 2).

Walk around to the side of the building to find the stones illustrated below.These are above eye level in the first buttress and show excellent examples of sedimentary structures formed by rivers. Block A shows deposition of sand in thin layers, known as *laminations*. In this case the laminations are horizontal which means they were laid down by very fast moving currents. The layers of sand in Block B have been deposited at an angle and are therefore called *cross-bedding*. This is caused by sand sweeping over a sand bank on the river bed and coming to rest on the downstream side. The concave curvature of the layers on the right provide evidence of the direction of flow which was from left to right. Stonemasons usually laid the stones the same way up as they lay in the quarry. They knew from experience that the stones would last longer in this position. The large grey stone (C) is an exception though and is actually laid on its side. You are looking at the top of cross-bedding. Block D illustrates both horizontal and cross-bedding, indicating that the current changed.



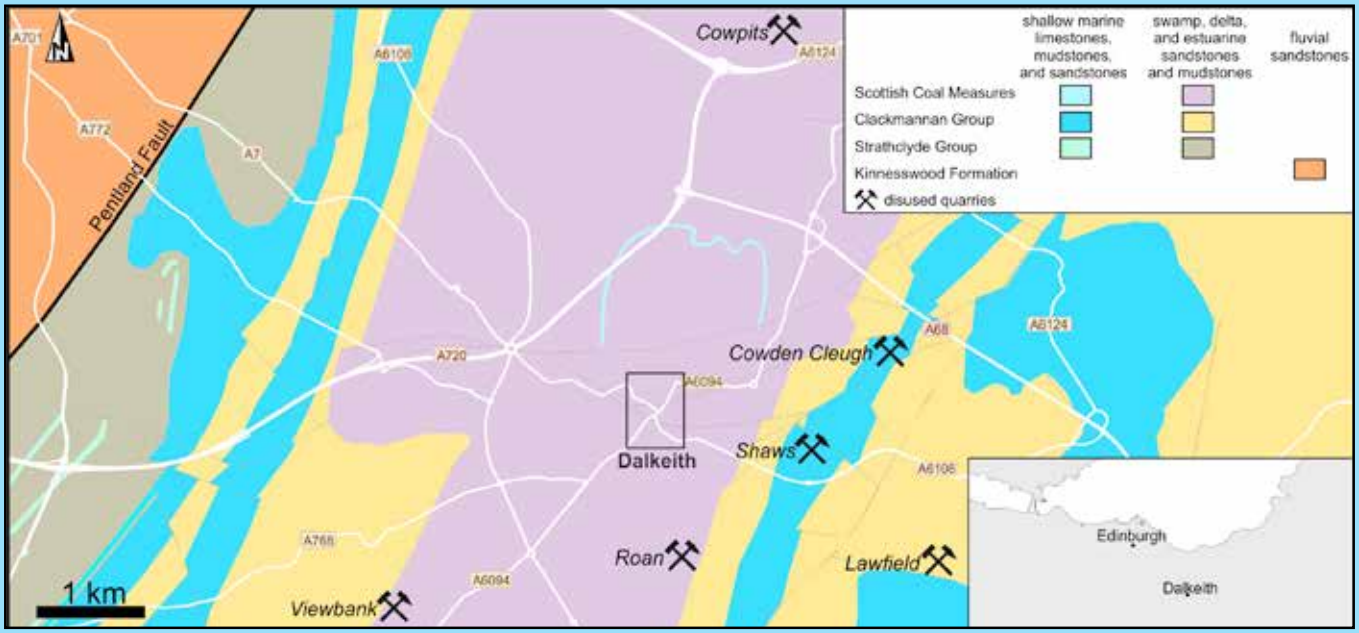
Many other blocks in the wall show superb examples of ripple laminations, so named because they were formed by gently flowing water creating ripples on the bed of a stream.



It is well worth visiting **Dalkeith Museum**, at the rear of the building, as it contains an interesting exhibition on old bricks, from works associated with the former coal mines.

2. St Mary's Church. This sandstone building has been much repaired, often badly. Sandstone is porous and will therefore absorb rain water. This evaporates in dry weather, but over time the continual repetition of this process weakens the rock and parts of the surface may break off. Here, on the east side, cement mortar has been used to repair the surface of the stones. This is less porous than the stone and also stronger. Consequently it has trapped moisture and enhanced the process of deterioration. Lime mortar would have been a better alternative. It has the advantages of being weaker and more porous than cement mortar and functions as a wick, drawing moisture to the surface, where it evaporates. It is easier to repair lime mortar joints than the stone itself (see 1, 5 and 6).

This stone in the south-east corner is a beautiful example of a *dewatering structure* (see diagram). Newly-deposited sediment often contains large volumes of water trapped within its pores. The pressure from yet more sediment being deposited on top squeezes water out from the lower layers. This process goes on under dynamic conditions and the underlying layers easily become deformed whilst still wet. They then retain these features as they are consolidated into solid rock. In this area, wet sediment accumulated quickly in river beds and deltas, with occasional earthquakes contributing to the process.



3. At the **corner of the building adjacent to Bombay Lounge**, 202 High Street, is an example of modern yellow sandstone masonry with Liesegang rings. These are an unusual feature in sedimentary rocks and are formed by mineral-rich water (mainly iron-oxides) passing through the rock. Minerals are precipitated as the water chemically reacts with its surroundings to produce a pattern of rings.

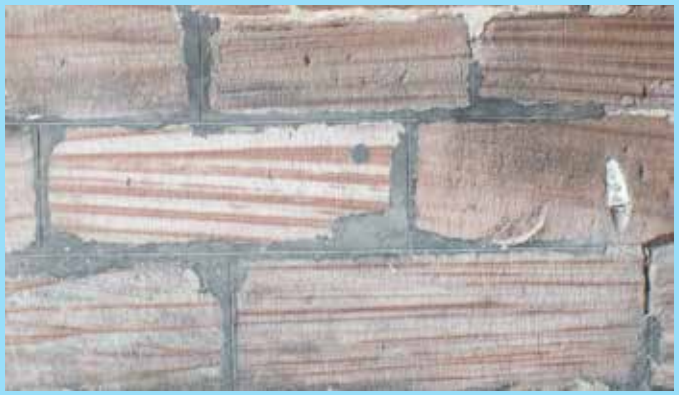
4. The Burns Monument was originally erected in the High Street near the junction with South Street, but was moved to its present position in 2003. It is of cast iron and stands on a plinth of grey sandstone from Appleton Quarry, Huddersfield. The subtle crescent-shaped patterning on the top and sides of the plinth are ripple laminations formed by river currents pushing sediment across the bed. The irregular curved shape indicates that the ripples had sinuous or arcuate crests.

5. The Tolbooth dates from the early 1700s. Ignore the date of 1648, which has come from another building. It has been much restored using yellow sandstone ashlar, or dressed stone, with lime mortar (see 2). Whilst this stone may be compatible with the original masonry in terms of porosity, it looks incongruous and does not have the prominent cross bedding.

The frontage has rusticated quoins. These are the big corner stones which are used to give the building strength, with their edges smoothed off to make them more attractive and to partially obscure the fact that they stand proud of the wall itself.

6. St Nicholas Buccleuch Church

The ruinous choir is built of multi-coloured sandstone including some with red and white cross-bedding and others displaying dewatering structures. The windows have been stabilised with additional masonry, which even includes bricks. Major restoration work was carried out in 1851-54, which included re-building the medieval nave and transepts. This work seems to have employed, or re-employed, similar red and white sandstone, spectacularly seen in the main south entrance to the church. The variation in colour has involved water moving irregularly through the partially consolidated rock. The original sandstone may have been entirely red or white and oxidation or reduction of iron has produced the present colour scheme. Some of the 2007 repairs to the stonework can be seen in the picture; these used lime mortar (see 2).



7. The wall on your right as you descend the **Edinburgh Road** displays numerous examples of deeply weathered and brightly coloured sandstones with abundant cross-laminations and dewatering structures. The weathering has been enhanced by salt spray from the road that crystallizes in cracks and pores, breaking apart the grains.

The best example of dewatering structures in town! This stone is in the low building by the roundabout near to Lugton Bridge.

8. The Old Burgh Chambers, at the corner of Buccleuch Street and Eskbank Road, were built of grey sandstone in 1882. The 1908 extension is in a yellower and muddier sandstone, with the former drinking fountain in granite. Around the other side of the block is a high wall built with local bricks.

9. The Itihaas Restaurant, at the junction of Croft Street and Eskbank Road, was built in 1906. It is constructed of red sandstone from the Permian Period, 299-252 million years ago which is younger than many other building stones in the town. The large scale cross-bedding, best seen in Croft Street, is indicative of deposition by wind within large desert sand dunes at a time when the climate was hot and arid. Some blocks show small scale ripple laminations, indicating water-borne sand. These stones came from Dumfriesshire, probably arriving at the old railway station across the road, where Morrisons supermarket now stands. Just inside Croft Street is a small area of horonized footpath: slivers of dolerite, an igneous rock, have been embedded in mortar.

10. The Skills Development Office, number 29, is clad in a polished, coarse-grained, intrusive igneous rock with blue crystals of feldspar giving an attractive irridescence. This is known as larvikite, because it comes from Larvik, south of Oslo, Norway. The rock originated in early Permian times about 298-292 million years ago, when a huge mass of magma solidified deep underground to form a batholith. Subsequent erosion has since removed the overlying rock exposing the batholith so now it can be quarried for building stone.

11. King's Park. Through the entrance from Eskbank Road, on the left, are ornamental blocks of limestone; these are not noticeably fossiliferous. The War Memorial, to both the First and Second World Wars, was erected in 1921. It is built of pinkish Carboniferous sandstone from Doddington, Northumberland. The memorial panels are of a light pink Peterhead granite from Aberdeenshire. This was formed 406 million years ago in the Devonian Period.