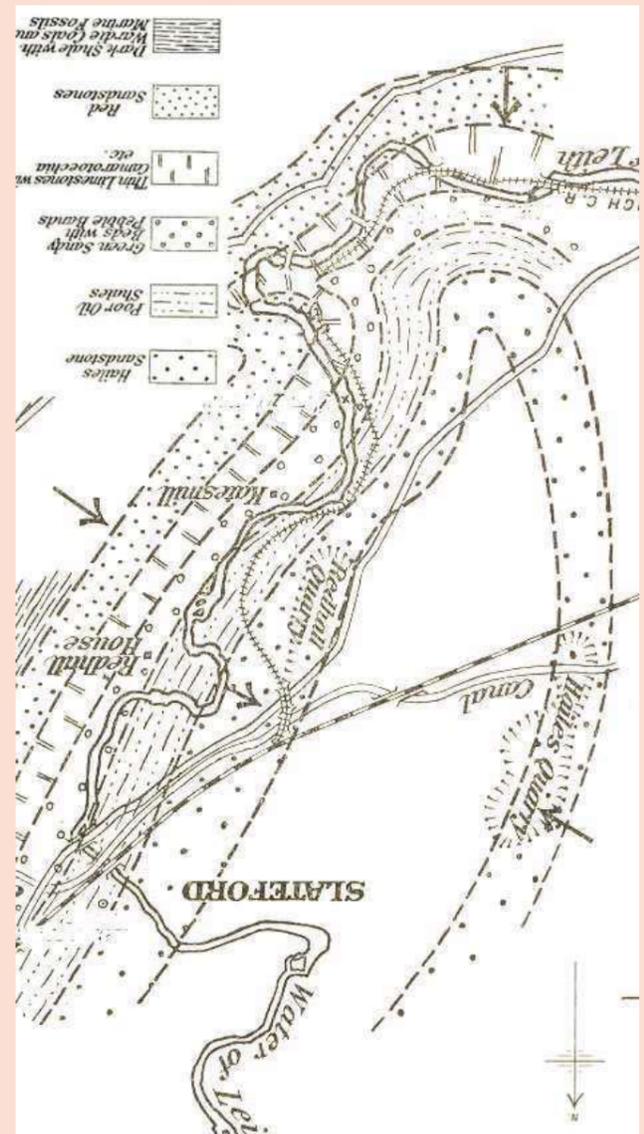


Geological map showing Hailes Quarry and Redhall [Old Quarry in relation to the Hailes Sandstone, published in the Transactions of the Edinburgh Geological Society in 1916. The arrows show the beds dipping to the north-west and south-east on the opposite limbs of the Hailes Syncline. Redhall New Quarry was located just north of the railway line, below the "ORD" or "SLATEFORD" on the map. The minor railway line marked "CH C.R." is the former Balerno branch line, which is now a cycle track.



## Quarries

Three important quarries were situated in this part of Edinburgh; Hailes and Redhall Old and New Quarries. Redhall Old Quarry was in use from before 1658, whilst Hailes Quarry was opened in 1750. By 1873, Redhall Old Quarry was virtually exhausted and the New Quarry was opened to the north of the canal and railway. It was worked until 1895 but was then abandoned and by 1914, both Redhall Quarries were being used for landfill. Hailes Quarry was worked until the 1930s but latterly only for mudstone for brickmaking. The bricks were made at Hailes Brickworks, on the site now occupied by the Lothian Bus Garage at Longstone. The sites of all these quarries are now public parks; Hailes Park, Redhall Public Park and the playing field at King'sknowe.

All three quarries were important sources of sandstone for building. Geologically the stone at all three is from the same horizon, known as the Hailes Sandstone, but Hailes and Redhall lie on opposite limbs of the Hailes Syncline (see panel "Synclines, Anticlines & Ice") and stone from the quarries has distinct characteristics. Sandstone from Hailes Quarry has a finely laminated structure, giving it a banded appearance, and occurs in two colours; "blue" (grey) and "pink" (buff). It splits easily into layers and was thus often used for steps and pavement. Sandstone from the Redhall Quarries occurs in more massive beds and lacks the laminated structure. It is known as freestone and was much prized as a building stone. A massive dark buff sandstone found at Redhall was known as liver rock.

Well-known Edinburgh buildings constructed from Redhall sandstone include St John's Church, Princes Street and Film House, Lothian Road. Hailes sandstone can be seen on Roseburn Primary School, Roseburn Road and Dairy Primary School, Dairy Road. For more information about Edinburgh's quarries and building stones, see Building Stones of Edinburgh by AA McMillan, RJ Gillanders & JA Fairhurst (pub. Edinburgh Geological Society 1999).

## Synclines, Anticlines and Ice

Redhall New Quarry in 1889, showing sandstone being worked for building stone, overlain by 3.6 metres of black mudstone and 6 metres of till or boulder clay, which infills a glacial gouge cut during the Ice Age.



Sedimentary rocks are normally laid down in horizontal or gently sloping beds, but subsequent movements of the Earth's crust can cause the beds to become folded or crumpled. When this happens, the beds often become more steeply angled. The angle made by a bed with the horizontal is known as its dip. A trough-shaped fold is known as a syncline whereas an arch-shaped fold is termed an anticline. Close to the present course of the Water of Leith there is evidence for a pre-existing valley which was eroded into the bedrock strata of the Hailes Syncline. At some stage during the ice ages (the last 2.6 million years) the valley became a 'buried channel' filled with rock debris, a mixture of ground-up rock, pebbles and boulders known as boulder clay or till. Thus at both Hailes and Redhall Quarries the quarriesmen had to remove a thick layer of boulder clay to reach the sandstone. Evidence of the boulder clay spoil-heaps can be seen around the sites of the former quarries. The movement of successive ice sheets helped to sculpt the present day landscape. In the vicinity of Craigleith Quarry (another important source of building stone in Edinburgh), the landscape is underlain by a dome-shaped anticline which has been eroded by the ice. Here the tops of the hills were 'planed off' by the moving ice, flattening the landscape and also revealing the edges of the Carboniferous strata close to the present land surface.

## Water of Leith



### Redhall

### Geological Walk Historic Quarries



## Local Geodiversity Site

## How to get there



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The Water of Leith Visitor Centre, where the walk begins, is situated on the A70 Lanark Road between the Craiglockhart Avenue and Inglis Green Road junctions, about 3 miles south-west of the city centre.

#### By bus

Lothian Bus numbers 34 and 44 towards Balerno stop close to the Visitor Centre.

#### By train

Disembark at Slateford station and walk south-west under the railway bridge and the canal aqueduct to reach the Visitor Centre in a few minutes.

#### By car

Parking is very limited at the Visitor Centre but there is on-street parking on one side of the A70 Lanark Road a few hundred metres south-west of the Visitor Centre, beyond the traffic lights.

#### Acknowledgements

Text: Beverly Bergman, Andrew McMillan and members of Lothian & Borders GeoConservation

Images: Beverly Bergman. Coat of arms image by kind permission of Bryce Morrison

Designed by Derek Munn and Beverly Bergman

The map overleaf is adapted from a photograph of the interpretation board at the Millennium Walkway. Every effort has been made to contact the copyright holder of the map but without success and we trust that they have no objection to our use of the map for this leaflet.

Lothian and Borders GeoConservation gratefully acknowledges the generous support of the Edinburgh Geological Society, Mr Tom Davies tommdavies@aol.com and others, without which this leaflet would not have been possible.

Produced by Lothian & Borders GeoConservation, a committee of the Edinburgh Geological Society, a charity registered in Scotland. Charity No: SC008011

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## Edinburgh Rock

The rocks underlying Edinburgh were deposited in the Carboniferous period, between 359 and 299 million years ago, at a time when Scotland was located close to the Equator. The area where Redhall is now situated experienced a changing environment of broad river deltas, lakes, coastal swamps, shallow lagoons and brief incursions of the sea, as the sea level rose and fell in response to climate change and changes in the land. Each of these environments resulted in the deposition of characteristic rocks, from which the history of the Earth can be "read" today.

Not only do the rocks underlying the Edinburgh area provide a firm foundation for the city and shape its magnificent landscape, but they have also been of great economic importance. The extensive sandstone beds which were deposited in the mouths of the river deltas have been quarried for building stone which has given much of the New Town its architectural elegance, whilst oil-shale deposits from algae-rich lagoons and coal from coastal swamps have yielded fuel for industry, transport and domestic use. Even the mudstone deposits were used at Hailes for making bricks.

### Sir James Gowans

Sir James Gowans (1821-1890) was an architect and builder who held the lease of Redhall Quarry, in succession to his father Walter Gowans, from the landowner John Inglis of Redhall and Auchendinny. Gowans introduced an innovative method of quarrying involving drilling holes in the rockface, filling them with gunpowder and then detonating the gunpowder electrically using a galvanic battery, a forerunner to a method which is still in use today. Perhaps his best-known work was his own house "Rockville", an elaborate pagoda-like building on the corner of Napier Road and Spylaw Road. It was demolished in 1966 but his distinctive architectural style, using a variety of structural and ornamental stone, may still be seen today in the cottages at 4, 8 and 10 Redhall Bank Road (all in private ownership) which he built in the 1850s for his quarry clerk and workers at Redhall Quarry.



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## Locality 1 Slate Column

The walk starts outside the Water of Leith Visitor Centre. Cross the road at the pedestrian crossing and enter Craiglockhart Dell on the path to the left of the Blue Goose Country Pub. On the left-hand side of the path is a monolith of blue-grey slate, one of three pieces of artwork marking the completion of the Water of Leith Walkway, a Millennium Project, in 2002. The others are in Balerno and Leith. Slate is a metamorphic rock formed when mudstone is buried deep in the Earth's crust and subjected to heat and pressure. It is not found naturally in this part of Scotland and this example came from Burlington Quarry in Cumbria. It was formed in the Ordovician period, between 488 and 444 million years ago. Slate has been used here in recognition of the village of Slateford which grew up around the ford over the river. The ford was replaced by Slateford Bridge which today carries the busy A70 Lanark Road across the river.



Slate monolith

## Locality 2 East Grotto

Walk along the path by the river for about 300 metres to a stone grotto on the left of the path, pictured on the front of this leaflet. It is one of two grottoes which were probably built about 1830 for Dr Alexander Monro secundus, the owner of Craiglockhart House, when the gardens were laid out. They were built to provide shelter for ladies whilst walking in the Dell! The interior was originally decorated with seashells, a few of which can still be seen in the roof. The grotto is a domed building with a (damaged) trefoil window, and is constructed mainly from brick and sandstone. The entrance is in the form of a gothic arch. Above the arch, the sandstone shows careous (honeycomb) weathering, indicating that the sand grains may have been cemented together with calcium carbonate, rather than the commoner and more durable silica, which has been partially dissolved away by acid rain.



Heavily weathered sandstone above arch

## Locality 3 Oriel Cottage Burn

Look behind the grotto where a small burn (stream) tumbles down a steep, narrow valley. It is identified on old maps as the Oriel Cottage Burn, a minor tributary of the Water of Leith, and it marks the boundary between the former estates of Craiglockhart House and Redhall House. The sandstone in the stream bed shows prominent ripple bedding. The exposed rock in the side of the valley comprises alternating strata of thinly-bedded sandstone and mudstone. These rocks are part of the geological unit known as the Wardie Shales.



The Wardie Shales date from the Carboniferous period (between 359 and 299 million years ago) and lie below (i.e. are older than) the Hailes Sandstone beds in the geological sequence but are above (i.e. younger than) the important building sandstone quarried at Craighleith. They include deposits of oil-shale, which can be seen at Locality 7.

## Locality 7 Redhall Marine Band



Retrace your steps along the path, past the back of Redhall House and rejoin the path alongside the Water of Leith in about 300 metres. Turn left and follow the riverbank upstream for about 10 metres and look to your left above the path. The flaky mudstone beds seen just above the path form part of the Wardie Shales. Some of the mudstone is a dark grey poor-quality oil-shale, formed from the sediment at the bottom of an algae-rich lagoon. When rubbed on a piece of paper, it leaves a characteristic brown streak. The exposure includes the geologically important Redhall Marine Band, a thin layer with fossils showing that this area was once under the sea. Unfortunately it is difficult to identify today as the bank has become eroded and overgrown.

## Locality 8 Glacial Erratic

About 30 metres further, alongside the path, is a large rounded boulder known as a "glacial erratic", which is composed of dolerite, an igneous rock. It has come from some distance away to the west, having been deposited here by an eastward-moving ice sheet during the last Ice Age.



Glacial erratic

## Locality 9 Hailes Sandstone

Retrace your steps and walk back downstream. Just past the bridge, look across the river to the opposite bank, where massive sandstone beds are exposed forming a long "wall" with vertical cracks known as "joints". This is the base of the Hailes Sandstone which was quarried at Redhall. Here the stone is of a deep buff colour, showing the presence of iron. Continue downstream along the path to return to the Water of Leith Visitor Centre.



## Locality 4 West Grotto

Retrace your steps for a short distance and ascend the hill by the zigzag path, following the left-hand (north-east) bank of the Oriel Cottage Burn. To the left of the path is the second of the two grottoes. Many different rocks have been used in its construction including pinkish baryte, quartz, granite and even some shiny black furnace slag! It also has remnants of decorative seashells in the interior of the dome.



## Locality 5 Redhall House Estate

Continuing up the path, note the hexagonal dovecot visible through the trees on the right, which can be accessed from the northern corner of Redhall House Avenue. It was built in 1756 and bears the coat of arms of Sir Adam Otterburn (d.1548) on a panel. Emerging from the path onto Craiglockhart Drive South, turn right towards Redhall House Drive. Beyond the modern housing development, Redhall House stands close to the site of Redhall Castle, which was built in the 13th century. The castle was badly damaged by Cromwell's troops in 1650 and was demolished a century later when the house was built. The old stone from the castle was re-used in the building of the house, its outbuildings and the dovecot, although it is concealed from view by the decorative harling on the house and the dovecot.

Beyond the newest development stand the derelict agricultural buildings and stables. They are due to be redeveloped, reusing the original stone and key architectural features. At least two types of sandstone are represented. Some of the structures are of a cream-grey sandstone which is in good condition. It contains brown iron-rich nodules, suggesting that it is from the nearby Redhall Quarry. Most of the buildings are constructed from a heavily weathered red sandstone which may be salvaged stone from Redhall Castle. The stonework around the windows in the agricultural block is typical of castle architecture. This red sandstone is thought to be of Upper Devonian age, geologically considerably older than the stone worked at Redhall Quarry, and may have been sourced from the former quarry on Craiglockhart Hill.

## Locality 6 Millstone Quarry

Rejoin the rough path behind Redhall House and turn left. Proceed for about 100m to the beginning of a low stone wall. Note the view to the south across Merchiston Castle School playing field to Allermuir and Caerketton Hills, formed from Lower Devonian lava flows, and to the east where the Lower Carboniferous volcanic plug of Wester Craiglockhart Hill can be seen. This is a typical "crag and tail" formation, with the steeper "crag" viewed "end-on". The start of the wall is close to the site of the millstone quarrier's cottage. The path which now runs along the side of the sports field was used by the horses which transported the millstones. Go to the right of the wall and note a quarter millstone, made of a coarse sandstone, which has been incorporated into the wall behind the large tree. To the right, the bank falls away steeply. This is the site of a millstone quarry which was known to be active in 1727 but had probably closed by the end of the 18th century. The descent to the quarry is steep and overgrown and should only be attempted by experienced ramblers. Within the quarry, which extends over about 40 metres, the remains of spoil-heaps can be seen along with a number of boulders including sandstone, dolerite and a coarse conglomerate.