
Bathgate Hills Geotrail: Geology of the Bathgate Hills

(Front cover)

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The Bathgate Hills Geotrail

The Bathgate Hills are rich in geological and cultural history, situated between the towns of Bathgate and Linlithgow. Over the millennia, the region has been home to many communities of people as far back as Neolithic times. Many of the nearby towns were once mining communities who exploited the opportunity provided by the area's rich geological history. Many quarries produced limestone for use in agriculture and the production of limewash and mortar. Others quarried the hard igneous rocks for making roads. Sandstone, such as that from Binny Quarry, has been used in the construction of the Scott Monument and many of the buildings in Edinburgh's New Town. Coal, ironstone and clay were once extracted in the western parts of the area. To the south and east of the hills are red bings of spent shale, remnants of the once prosperous shale oil industry, which provided much of Scotland's oil. Even silver and lead were mined from veins associated with the igneous rocks found throughout the area.

Geodiversity

What is a Local Geodiversity Site (LGS)?

A Local Geodiversity Site is a landscape, landform or rock feature that has particular value for education and tourism; for academic research; for the history of science; or for its aesthetic appearance. In West Lothian, 51 Local Geodiversity Sites have been identified.

What are its planning implications? There are no statutory restrictions on the site but when planning proposals are considered, Councils will be aware of the value of the site.

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Geology of the Bathgate Hills

When you visit the Bathgate Hills, bear in mind that the landscape you see now was once very different. Around 330 million years ago, West Lothian was situated close to the Equator in shallow seas on the edge of an enormous continent known as Euramerica. This continent included what is now North America, Greenland, Ireland, Britain and Scandinavia.

Many of the features of the landscape today are the result of volcanic activity at that time, when this area witnessed many eruptions of runny basalt lava that built up islands within the sea and spread across the land surface, forming low volcanic hills. There were also volcanic explosions that showered the area with volcanic ash.

Later, magma seeped underground, cooling to form vertical dykes and flat sills of dolerite, a tough, crystalline igneous rock. Dolerite forms many of the high points of the landscape today, including Cockleroy and Binny Craig.

The volcanoes didn't erupt continuously, and in quiet periods limestone reefs formed in the warm shallow waters, creating a rich ecosystem filled with diverse lifeforms. Limestone beds with abundant fossils can be found in the Petershill Quarry, including large brachiopod shells, corals and fragments of crinoids. Since the site is a registered Site of Special Scientific

Interest (SSSI), please refrain from collecting your own fossils.

Inland areas were dominated by stagnant swamps, which would fill with the decaying remains of the former thick forests, eventually making coal. Sand, mud and silt were deposited by rivers that eroded and carried material from the surrounding land. At times the area was covered with a large lagoon, where algal life proliferated and died off. The resulting sediments were eventually transformed into the West Lothian oil-shale.

More recently (within the last 2.5 million years) glaciers slid slowly eastwards, scraping away softer sedimentary rocks and volcanic ash. In places, subglacial material was moulded into groups of low elongated mounds called drumlins. The more resistant volcanic rocks were left as prominent hills. One of these, Binny Craig, sheltered sedimentary rocks directly behind the hard volcanic rock, creating a crag and tail landform with the tail tapering to the east.

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Locations in trail:

1. Cockleroy Hill: [NS 98943 74362] One of several hills formed of resistant igneous rock, Cockleroy Hill provides a panoramic viewpoint. The hill is topped by the remains of a late Bronze Age / Iron Age fort known as "Wallace's Bed". A stone arrowhead was discovered nearby.
2. Hillhouse Quarry: [NT 00455 75073] This site is located within the Beecraigs Country Park three km south of Linlithgow. The Hillhouse Limestone has been mined using both underground and surface methods. The limestone is overlain by a sill of basalt with columnar jointing. Underground workings are dangerous. Do not enter.
3. Beecraigs Quarry: [NT 00422 74766] Located within Beecraigs Country Park, which boasts mountain bike trails, seasonal camping and a host of other outdoor ventures. A dyke of hard igneous rock within the park was once quarried for use in the building of roads.
4. Wairdlaw Quarry: [NS 99514 73093] The quarry at Wairdlaw was formerly worked for limestone that lies within the lavas of the Bathgate Hills Volcanic Formation. Well-preserved lime kilns can be seen near Wairdlaw Farm.
5. Witchcraig Wall: [NS 99080 72753] At the bottom of the hill is the Scottish Korean War Memorial. At the top is a "Geology Wall", which contains 43 different rocks gathered from around Scotland's Central Belt. These demonstrate the region's diverse geological history, which can be seen in the grand view from the site.
6. Hilderston Mine: [NS990715] The vein of silver that once ran through this mine was of such purity that the mine was "nationalised" by King James VI in 1608. It is thought that the silver was used in the manufacture of the Scottish Crown Jewels or "Honours of Scotland", which are now on display within Edinburgh Castle.
7. The Knock: [NS 99048 71134] The resilient igneous rock of this step within a sill of dolerite, at 312m above sea level, marks the highest point in the Bathgate Hills. It provides a stunning view of the area. The surrounding sedimentary rocks, susceptible to erosion, have been scraped away by glaciers, leaving this prominent landscape feature.
8. Petershill Quarry: [NS 98490 69527] In Carboniferous times, this was the site of a reef in a shallow sea, teeming with aquatic lifeforms. Quarried for limestone in the 18th century, the site was later used as a reservoir. It was notified as a Site of Special Scientific Interest in 1974, and is owned and managed by Scottish Wildlife Trust.
9. East Kirkton Quarry: [NS 99030 69086] This site is of special significance as it marks the spot where Westlothiana Lizziae, better known as "Lizzie" was discovered by Stan Wood. The rocks formed by chemical precipitation in a small lake fed by volcanic hot springs around 338 million years ago. The water was too hot for animals to live in the lake, so the fossils are entirely land-dwelling creatures that must have fallen into the water – perhaps when trying to escape forest fires! Whether Lizzie is actually a reptile or an amphibian has been the subject of hot scientific debate, as it is impossible to tell from the fossil whether its eggs were laid on land (as with reptiles) or in the water (as with amphibians). In fact, it is impossible even to tell if Lizzie was male or female. While the site is owned by West Lothian Council, access can be difficult and care should be taken.
10. Binny Craig: [NT 04281 73497] A striking example of a crag and tail landform, much like Castle Rock in Edinburgh. The craig is formed by the intrusion of molten magma into the surrounding sedimentary rocks, which were eroded within the last 2.5 million years by glaciers.

11. Binny Quarry: [NT 05746 72870] Sandstone from this quarry was used in the construction of the Scott Monument and many of the buildings around Edinburgh's New Town. The stone was known for its uniform colour and the quarry location close to the Union Canal made it possible to transport stone into the city. The site is privately owned and access is not encouraged.

Human history

Cairnpapple Hill

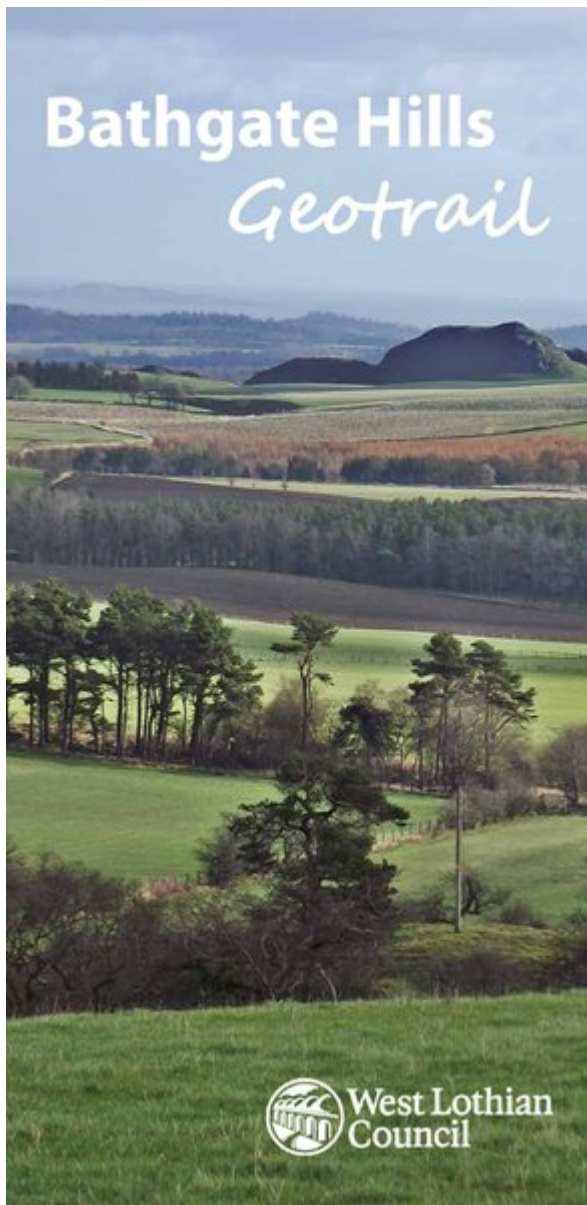
The spectacular views from this hill (Figure 3), formed of basalt lava flows, were obviously appreciated by the local people in late Neolithic times, about 5,800 years ago. They built a henge here, but unfortunately little remains to be seen today. Over subsequent millennia the site has been redeveloped and used for different purposes in the Bronze Age and in the early Christian era, as their burial sites testify. This significant archaeological site is now in the care of Historic Environment Scotland, and is open seasonally.

The farmland below and to the west of the hill is dotted with mounds and hollows that reflect some of the earliest attempts to extract coal in the area.

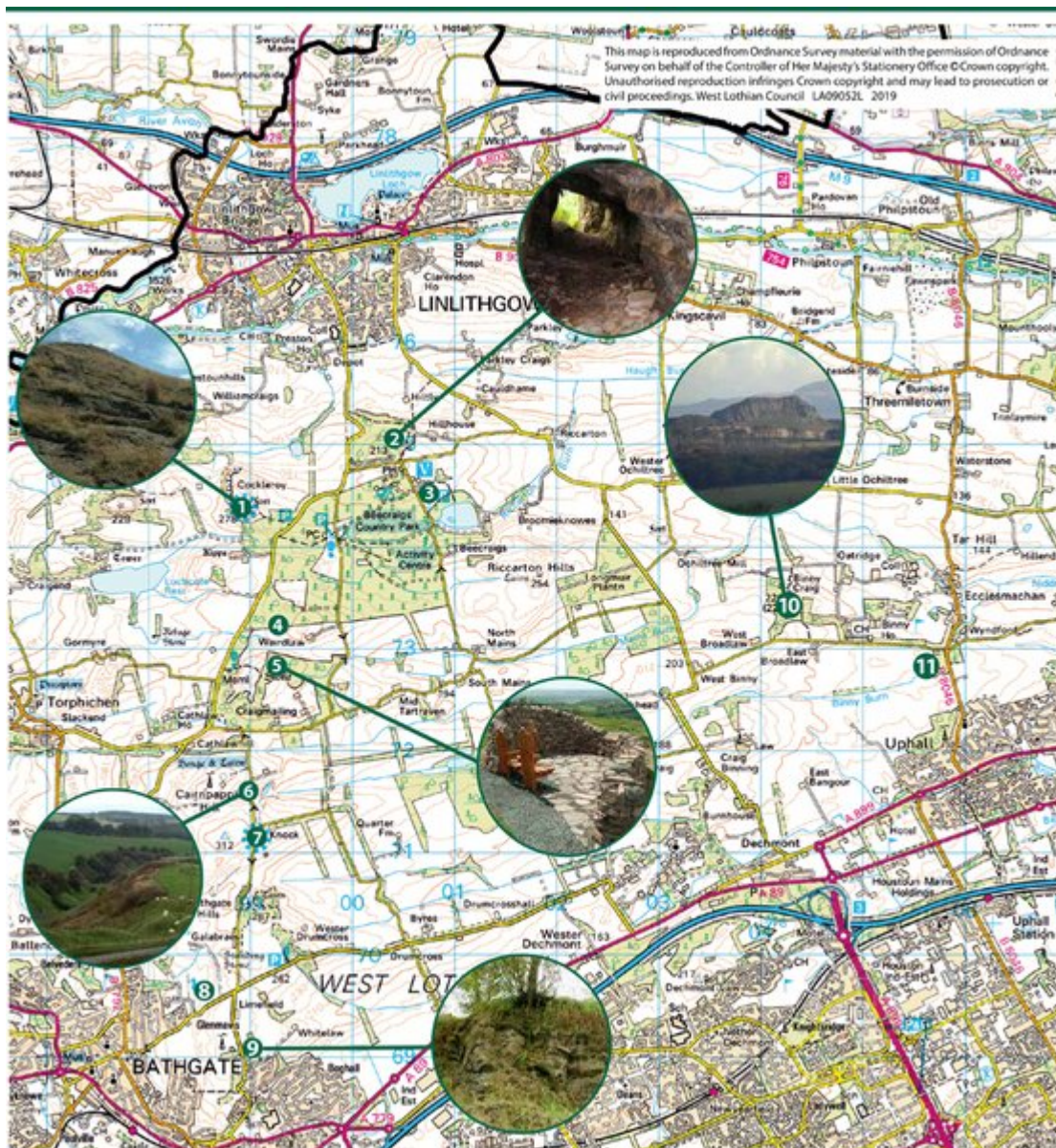
Mining

In more recent history, communities in the Bathgate Hills began to rely increasingly on the local rocks and minerals for their livelihood. The industrial revolution marked a momentous rise in the demand for coal and local oil-shales. By the early 17th century, outcrops around Hilderston were being quarried for their coal and by the 18th century, coal was being mined extensively to provide fuel for lime kilns at quarries that sprung up along the bands of limestone. Railways were constructed to transport the lime, coal, shale and iron.

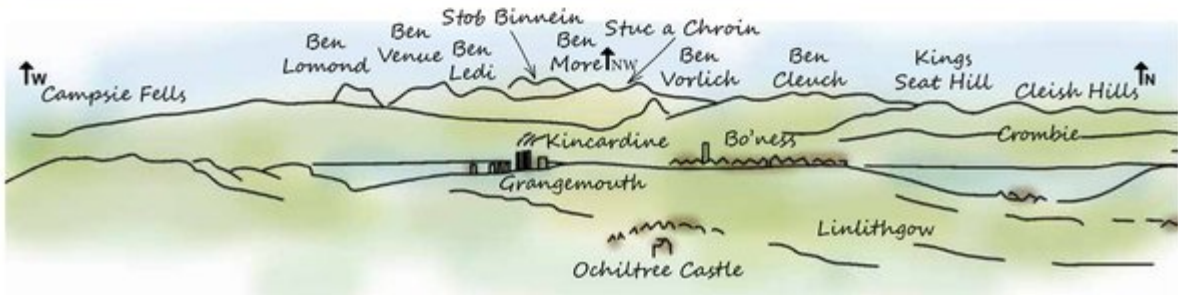
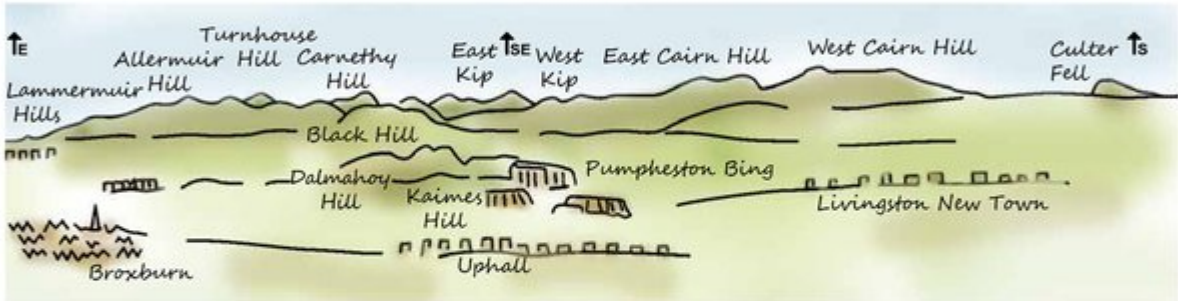
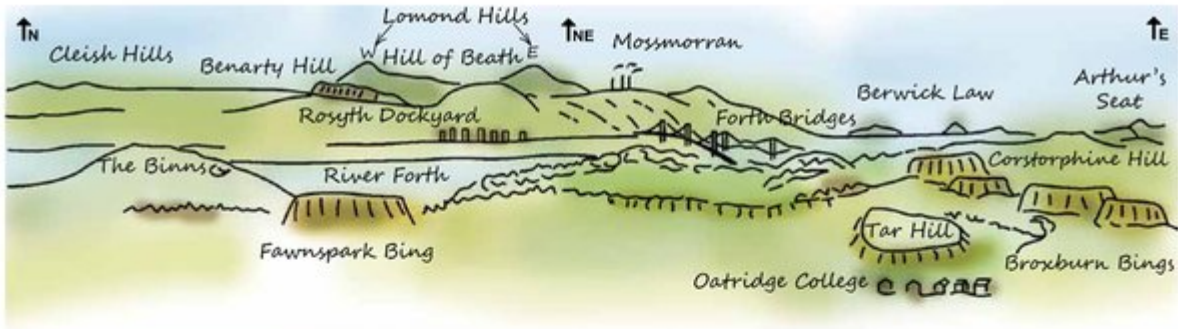
In the 19th century, whole new villages were built to house the working population. Often large groups of miners would board together in large lodging houses like that seen in Uphall. Fluctuating demand for oil shale meant the population was in constant flux, with workers coming and going with the changing demand for their labour. Mining and quarrying in the area has gradually declined over the last century, but the old sites now showcase the area's intriguing geology and an appreciation for the rich cultural heritage remains.



Bathgate Hills Geotrail: Geology of the Bathgate Hills. Front cover.



Map showing stops on the Bathgate Hills trail



View from Cairnpapple Hill