

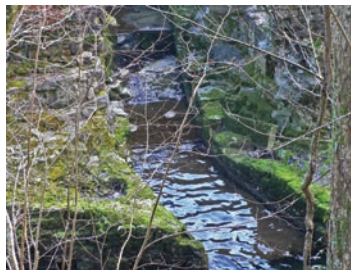
Water Mills at Force Falls on the River Kent

The fast-flowing River Kent is said to have the steepest fall of any English river, in its short 32 km course from its source in upper Kentmere, to the sea at Morecambe Bay. The energy of the falling water has long been harnessed for water mills (corn, bobbin and paper mills), and its flow has been controlled by many weirs, such as the one below Force Falls. A bridge over the River Kent at Force Falls was recorded as needing repair in 1692. In 1773 an iron forge was established just below Force Bridge. This fell into disuse in 1816, leaving a great amount of debris from the furnaces all down the river.

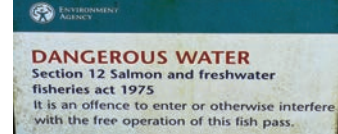


The river's power at Force Falls was the site for the **Basingill Gunpowder Mill** Scheduled Monument (*left*), which is seen on the east side of the river just 150m below the waterfall. It was built in 1790 to support the older Sedgwick gunpowder mills. Water was channelled from the River Kent a short distance upstream and taken along a leat. At the mills it was diverted at 90° to power the **water-wheel** (*below*).

A tunnel carried water downstream to further mills and a second water-wheel. The mill used local ash wood for charcoal, while saltpetre and sulphur were imported via Milnthorpe.



The ingredients were crushed under massive water powered rollers. The gunpowder was used in local mines and quarries. The mill closed in 1935, after which the wooden-framed buildings were burned to remove explosives, leaving the thick stone blast walls, which can still be seen, as can the water management structures.



A **corn mill** was first established at Force Falls Fish Pass in 1345 (*left*).

River erosion

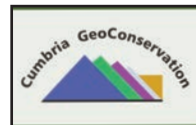
Force Falls is a short stretch of bedrock channel in the lower course of the River Kent. The River Kent has cut down through the overlying less resistant Carboniferous Park Limestone into the Dalton Formation below, forming a deep gorge, which recedes upstream as the rock layers are undercut by the river's force, at a series of waterfalls. Undercut and overhanging rock layers can be seen from Force Bridge.



Undercutting the limestone by the River Kent. (*above*). Possible Park Limestone on the right of the picture, with a resistant bed on Dalton Limestone on the left. The river is eroding and deepening its bedrock channel of limestone by the power of hydraulic action. Fast flowing water dissolves the limestone and removes fallen blocks.



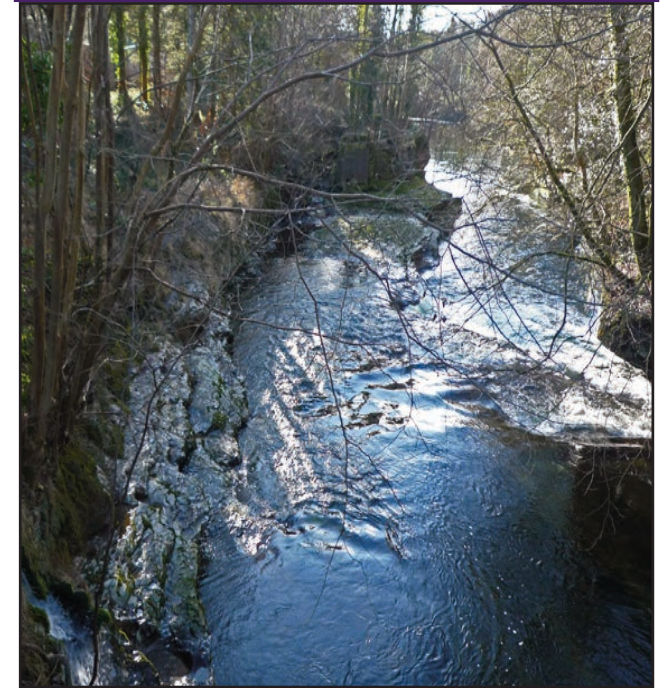
Force Falls is a **Local Geological Site LGS 5_035**, designated by **Cumbria GeoConservation**, a Special Interest Group of **Cumbria Wildlife Trust**.



www.cumbriageoconservation.org.uk

FORCE FALLS SEDGWICK

A short road walk with a view of a gorge and waterfall on the River Kent



Flowing south from Kendal towards the sea, the River Kent crosses a resistant outcrop of Carboniferous Dalton Limestone in a series of waterfalls which, in the past, powered water mills.

**Park on the roadside at SD 507 869
by the River Kent**

Look at the river from both sides of the bridge. Take the old road for a short walk south to the Fish Pass Falls, and on to an underpass under the A 590. From here you can do a circular walk round Levens Park if you wish. You will need the **OS map OL7** for this extended walk

Content by Sylvia Woodhead **Design** by John Shippen
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1. View of the Kent Gorge SD 50700 86864 looking east.



Between the trees is a glimpse of white rock. This is a bed of Carboniferous Limestone. The river has cut down into lower and older layers of limestone, leaving a gorge. Note how Force Bridge has been built

where the river channel is narrow.

Walk across the bridge & look to the north

2. View north from Force Bridge You are looking down on

layers or beds of nearly horizontal Carboniferous Dalton Limestone. They are relatively thin, many less than 1 metre thick, and separated by weaker shale layers. The river has cut down into successive layers, undercutting the weaker layers. This part of the gorge was formed by waterfalls which have receded further upstream.



3. Drumlin seen from Force Bridge

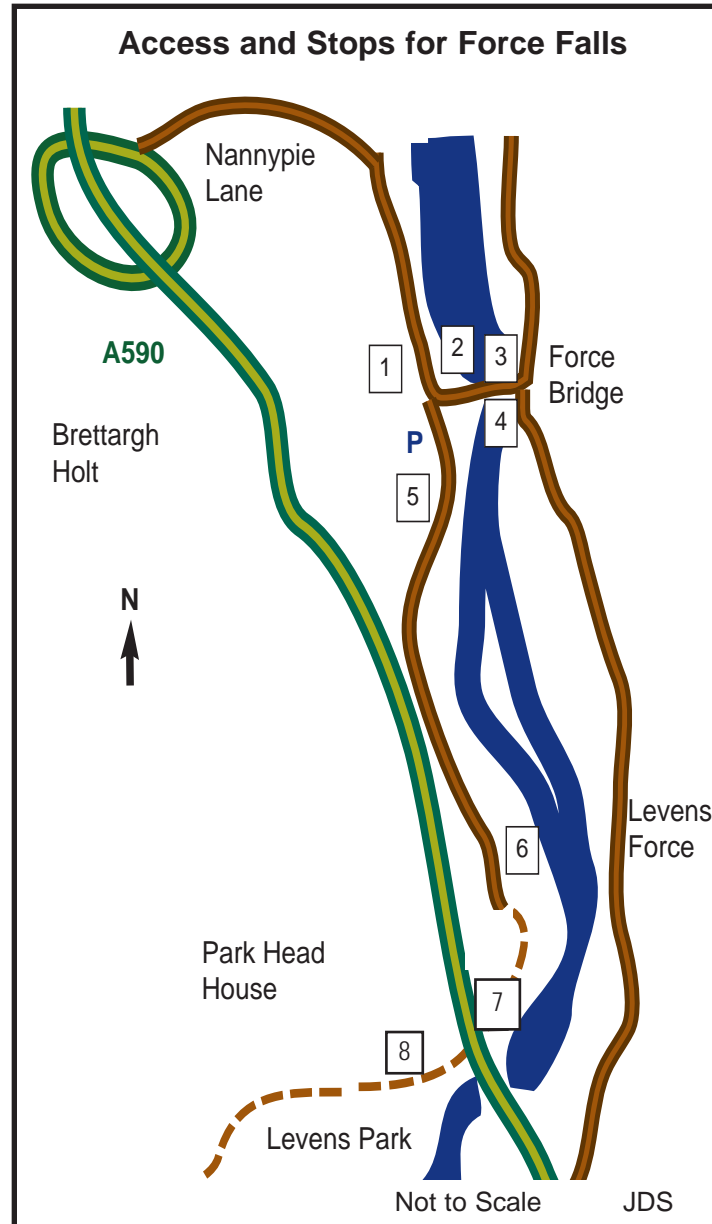
Looking east from the bridge, the green fields beyond the fence are part of a drumlin, a small rounded hill formed of glacial debris shaped as ice flowed over it. The river's gorge here may have been



formed as a channel under the ice in the last phase of the Ice Age. *Cross the bridge and look south down the river*

4. River Kent south of Force Bridge The river has found a

weakness in the rock possibly a large joint, and has cut down to a lower layer. The rocks to the west have been greatly undercut by the river. *Walk south from Force Bridge on the old road to the west of the river, where, in winter, there are good views of Force Falls. The old gunpowder mill remains can be seen on the east bank.*



5. Force Falls SD 50730 86820



This is the main waterfall, at right angles to the river's flow, stepping down a layer in the limestone. Impressive bedding planes are exposed at low river flow. The river is undercutting here by hydraulic action.

Look across the river to see the remains of the waterwheel which formerly powered Basingill gunpowder mill. Continue along the old road, past the cottages to the Fish Pass for a view of the falls

6. Force Falls Fish Pass Falls SD 50765 86565

These falls provided the water power for the first corn mill at Force Falls, in 1345, and later in 1773 for an iron forge. There is no trace of the original corn mill visible. The River Kent is in a fast flowing narrow channel in this lowest River Kent waterfall. *Follow the road down to the underpass below the A590, and look south down the river.*



7. The original road to Levens Park was severed by the rebuilding of the A590. It has been replaced by a footway on a concrete balcony under the dual carriageway. *Up the steps you emerge on Park Head Lane, which can be followed for a circular walk through Levens Park.*

8 A wider, slower river downstream

The river has now completed its steep descent, and broadens out into a much wider channel, where the river has less energy and there is less downcutting.

Return to Force Bridge.

