Landslides in the Ironbridge Gorge, Shropshire

The River Severn flows through the Ironbridge Gorge (location map and Figure 1) which is located to the south of Telford in Shropshire and is a World Heritage Site. It is named after the famous Iron Bridge designed by Thomas Farnolls Pritchard and built by Abraham Darby III, the first arch bridge in the world to be made from cast iron (Figure 2).

The Gorge is thought to have originated some 10 000 years ago and is deeply incised in rocks of Upper Carboniferous and Silurian age, which are prone to landsliding, and have suffered a number of failures through its history. The valley sides rise steeply from 40 m at river level to over 140 m on the plateau above (Figure 3).

Figure 1 Ironbridge Gorge photograph taken in 1974 (BGS photo number P211697).

Figure 2 The Iron Bridge, Shropshire. Photograph taken in 2003 (P626433).

Landslides

There are over 20 landslides documented in the National Landslide Database in the area. Examples of two of the larger landslides in the Gorge are described here:

The Jackfield landslide

In 1952, a landslide (National Landslide Database ID 4335/1) occurred at the village of Jackfield, Shropshire, on the River Severn just over 2 km downstream of the Iron Bridge, destroying several houses (Figure 4) and causing major dislocations in a railway and road (Skempton, 1964). This landslide event was included in the Fourth Rankine Lecture (Skempton, 1964). The following quotation is taken from this paper:

"It is possible that previous landslides may have taken place along at least a part of the present slip surface, but the slope must have been more or less stable for a long time before 1950, when warnings of instability were observed in the form of a broken water main serving cottages near the river bank. Towards the end of 1951 further movement was noted, and by February 1952 the road was becoming dangerous. During the next month or two the landslide developed alarmingly. Six houses were completely broken up, gas mains had to be relaid above ground, the railway could be maintained only by daily adjustments to the track and a minor road along the river had to be closed to traffic. By this time the maximum downhill displacement totalled 60 ft . The strata, consisting of very stiff clays and mudstone, alternating with marl-breccia and occasional coal seams, dip gently in a south-easterly direction with the strike running roughly parallel to the section of the landslide. The slide,

however, was confined wholly within the zone of weathered, fissured clay extending to a depth of 20 ft to 25 ft below the surface. The slip surface ran parallel to the slope (which is inclined at 10º), at an average depth of 18 ft. The length of the sliding mass, measured up the slope, amounted to about 550 ft and in the winter 1952-53 ground-water level reached the surface at a number of points, although on average it was located at a depth of 2 ft".

In 1984, further ground movement occurred to the west of the 1952 area of landslide. Salthouse Road was carried into the river and was replaced by a temporary wooden roadway (Figure 5) constructed along the line of the former railway (High-Point Rendel, 2005a). Other movement events for the Jackfield landslide are documented in 1925 and 1931 (Giles, 2008).

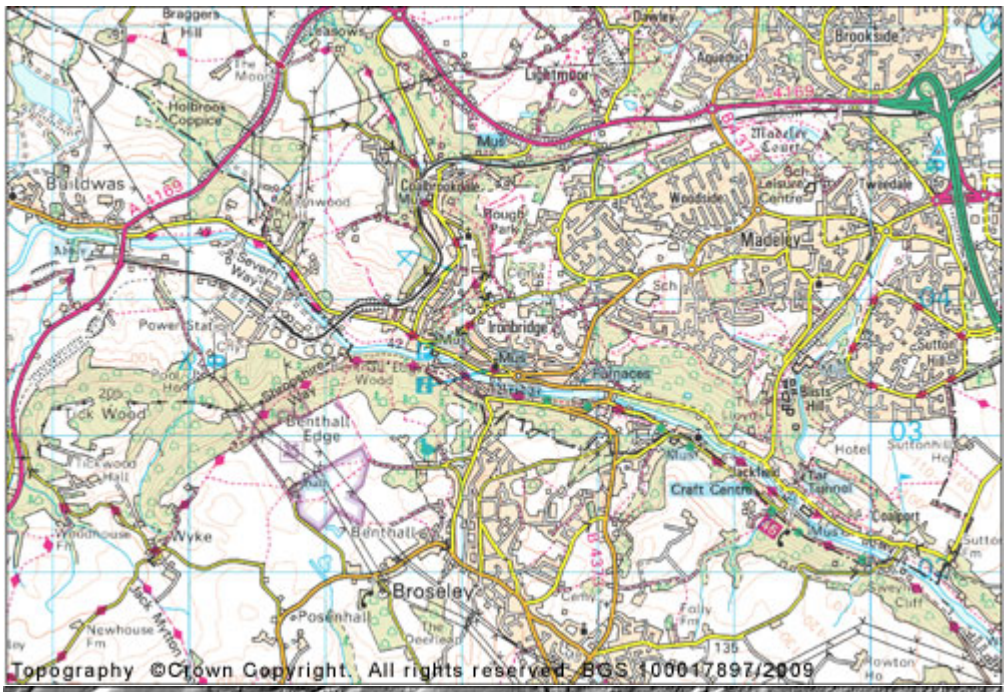

Figure 3 Ironbridge Gorge map (Left); Hillshade relief map (Right) taken from NEXTMap Britain elevation data from Intermap Technologies.

The Lloyd's Coppice landslide

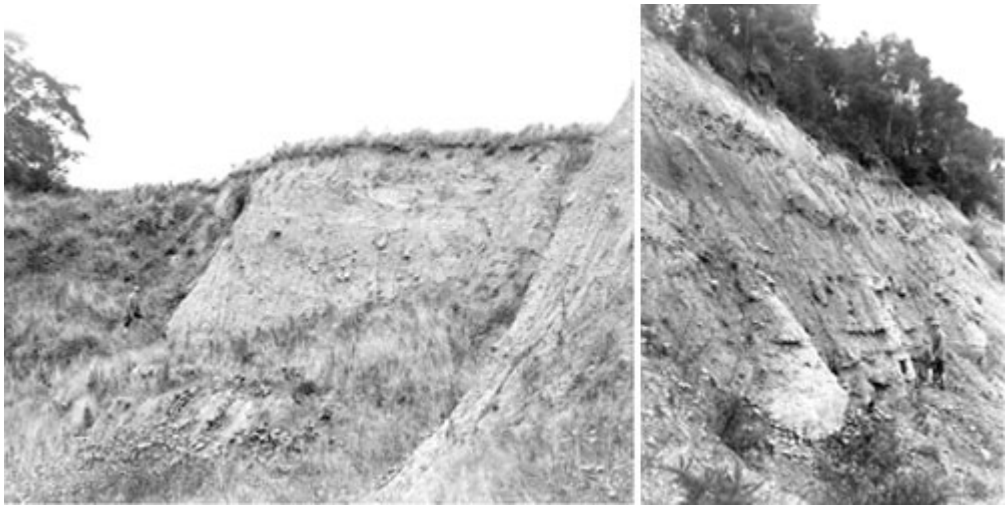

Figure 6 The backscarp of Lloyd's Coppice landslide from 1924

This landslide (National Landslide ID 4338/1) is actively moving as a series of rotational and translational slides. Crags of sandstone have moved down from their outcrop near the top of the hill, bringing with them the overlying thick till. Geological faults, ground water, surface water, the nature of the geology, construction and mining are all associated with the instability of this slope.

The backscarp of this landslide was photographed in 1924 (Figure 6)

This landslide is within the Halesowen Formation which is particularly susceptible to movement in this area as it includes more silty strata and less sandstone than elsewhere. Buildings and roads have been affected by the landslide (e.g. Figure 7).

Figure 7 Movement of a house within the Lloyd's Coppice landslide. The greenhouse is vertical.

Considerable investigative work has recently been undertaken by Telford and Wrekin Council on this landslide to develop appropriate management plans to anticipate and mitigate the effect on the land usage.

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