



South Wales RIGS Group Site Record

RIGS Description

SECTION A

General	South Wales
Site Name: Priory Groves	File Number: AH_20
RIGS Number: 733	Surveyed by: AJ Humpage / R Kendall
Grid Reference: SO 04590 29060	Date of Visit: 16 February 2011
RIGS Category: Scientific, Historical, Educational, Aesthetic	Date Registered: Unknown
Earth Science Category: Stratigraphical, Sedimentological, Geomorphological	
Site Nature: Kettle hole	Documentation prepared by: AJH
Unitary Authority: Powys CC	Documentation last revised: 12 September 2011
OS 1:50,000 Sheet: 160	Photographic Record: See images attached to this report
OS 1:25,000 Explorer Sheet: OL12	
BGS 1:50,000 Sheet: 213 (Brecon)	

RIGS Statement of Interest: This site forms part of a network of important scientific geomorphological sites within the upper Usk valley that span the Late Glacial – Interglacial Transition.

At the end of the last ice age the Afon Honddu, which had previously flowed eastwards through Bishop's Meadow towards Groesffordd, found a new route southwards and excavated a gorge into the centre of Brecon, possibly because the original route was blocked by glacial deposits. The gorge is incised up to 25m below the former land surface.

The valley sides expose interbedded sandstones and mudstones of the Devonian St Maughans Formation. Some fallen blocks along the gorge show well-developed fossilised mud cracks. Well-developed tufas are actively forming at some locations along the gorge, the carbonate probably being sourced from calcretes within the St Maughans Formation.

This site is also important for its historical aspects. In the 18th Century, it was at the heart of early iron making (Parsons 2008), and once the trees in the Honddu valley were cleared, wood was imported from as far away as the Wye valley. The remains of the ironworks are still visible adjacent to Forge Farm. Nearer Brecon, the town's first waterworks were sited below the cathedral, and again remains of the small reservoirs are visible.

Geological setting/context:

The St Maughan's Formation comprises fining upwards alluvial cycles, in which basal sandstones and intraformational conglomerates overlie erosion surfaces cut in mudstones at the top of the underlying cycle. In total, the formation comprises over 300m of interbedded sandstones, siltstones and mudstones, much of the succession arranged in fining-upwards alluvial cycles. The sandstone beds are typically up to 3m thick, hard, fine- to medium grained and planar and trough cross-bedded, and range from red-brown to purple, green and grey. Sandstones locally attain 6m in thickness. Arthropod trackways are recorded in some beds, and desiccation (mud) cracks are common in the finer grained sediments.

The intraformational conglomerates, which are a characteristic lithology of the St Maughans Formation are generally up to 1m thick, purple, red-brown and green, and comprise mainly calccrete clasts, with lesser amounts of siltstone and sandstone clasts, in a calcareous cement. Some contain exotic quartz pebbles and fish fragments.

The Sediments of the Formation are interpreted as the floodplain deposits of a meandering stream system, with overbank deposits which periodically dry out before being inundated.

The Pre-Devensian landscape of the Honddu valley is not well understood, however, there is a presumption that the pre Devensian River Usk flowed east to west to the north of Brecon between Cradoc and Groesfford, and that Devensian ice flow followed this route (Barclay et al 2005). However, during de glaciation, this original route became blocked at Cradoc (see Cradoc Moraine RIGS) (Elis-Gruffydd 1972, 1977) diverting the Usk to the south of the site of the town. The tributary Afon Honddu, which previously entered the proto-Usk at Llandew, therefore cut a new course directly southwards to reach the present post-glacial course of the River Usk, forming the gorge now occupied by Priory Groves.

References:

Barclay, W.J., Davies, J.R., Humpage, A.J., Waters, R.A., Wilby, P.R., Williams., M. and Wilson, D. (2005). Geology of the Brecon district – a brief explanation of the geological map. *Sheet Explanation of the British Geological Survey*. 1:50 000 Sheet 213 Brecon (England and Wales).

British Geological Survey (2005). *Brecon. England and Wales Sheet 213. Solid and Drift Geology*. 1:50,000. British Geological Survey, Keyworth, Nottingham.

Elis-Gruffydd, I.D. (1972). *The Glacial Morphology of the Upper Usk Basin (South Wales) and its right-bank Tributaries*. Unpublished Ph.D. Thesis. University of London.

Elis-Gruffydd, I.D. (1977). Late Devensian glaciation in the Upper Usk Basin. *Cambria*. 4 46-55.

Parsons, H. (2008). *A Brecon Revealed*.

Pedley, M.; Rogerson, M.; Middleton, R. (2009). "Freshwater calcite precipitates from in vitro mesocosm flume experiments: a case for biomediation of tufas". *Sedimentology* 56 (2): 511–527.

SECTION B

PRACTICAL CONSIDERATIONS: Please score Accessibility and Safety Red Amber or Green			
Accessibility:			X
Comment: Accessible. Footpaths through woods.			
Safety:			X
Some vertical faces			
Conservation status: This RIGS is within the boundary of the Brecon Beacons National Park. The River Honddu channel and banks are within the River Usk (Tributaries) SSSI.			

OWNERSHIP/PLANNING CONTROL: Owner/tenant: Private Property - ? Camden Estate / Church of England Planning Authority: Brecon Beacons National Park Authority Planning status/constraints/opportunities: There are no known planning constraints or opportunities
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CONDITION, USE & MANAGEMENT: Present use: Woodland with access Site condition: Generally good. Potential threats: Site Management: Current usage should be maintained.

SITE DEVELOPMENT: Potential use (general): An important showing late glacial gorge formation. Potential use (educational):

Other comments: The beech woods of Priory Groves were once part of a large estate. The paths and woodland glades were laid out in the late 18 th Century, replacing trees cut down to feed the ironworks. Lord Camden allowed public access and the Groves soon became a fashionable place to stroll and relax. In 1787, one visitor even mentions a tearoom and ornamental temple in the Groves! Old walls on the left of the riverside path and a dry leat running parallel to the river are all that remains of Brecon's first waterworks. Water was drawn out of the river from a weir upstream, and flowed down the leat to be pumped to a reservoir at the top of the slope. From here, the water was piped to 185 houses in the town. Unfortunately, the water quality was poor, largely because raw sewage and manure entered the river

upstream of here! Two cholera outbreaks in 1849 and 1854 saw many sanitary improvements, and today Brecon's water is obtained from boreholes.

Modern calcareous tufas are encountered within Priory Groves. **Tufa** is a variety of limestone, formed by the precipitation of carbonate minerals from ambient temperature water bodies. Modern tufa is formed from supersaturated alkaline waters, with raised concentrations of dissolved CO_2 . On emergence, waters de-gas CO_2 due to the lower atmospheric pCO_2 , resulting in an increase in pH. Since carbonate solubility decreases with increased pH, precipitation is induced. Supersaturation may be enhanced by factors leading to a reduction in pCO_2 , for example increased air-water interactions at waterfalls may be important, as may photosynthesis.

Recently it has been demonstrated that microbially induced precipitation may be more important than physico-chemical precipitation. Pedley et al. (2009) showed with flume experiments that precipitation does not occur unless a biofilm is present, despite supersaturation.

Calcite is the dominant mineral precipitate found; however, the polymorph aragonite is also found.

Photographic Record



Entrance to Priory Groves



Exposed interbedded sandstone and mudstone in the walls of the gorge. Quarries in the gorge provided building stone for many of the Brecon's buildings



Further outcrops of St Maughan's Formation



Desiccation cracks preserved in mudstone



Former building stone quarry in St Maughan's Formation



Modern tufa precipitating from seeps on the gorge walls.



Remains of former Brecon ironworks weir across Afon Honddu