

Berkshire Geoconservation Group
Local Geological Site Information Sheet



This is a guide only – for more information contact BGG via www.berksgeoconservation.org.uk

Site Name	Barkham Iron-Rich Streams			
Grid Reference	SU 789 660	OS Map		
Local Authority	Wokingham Borough Council	BGS Sheet		
Designation Criteria	Education and lifelong learning	Yes	Scientific interest	Yes
	Aesthetic value	No	Historical interest	No
Access	Public access – within Rooks Nest Country Park (SANG). Entrance and car park on Barkham Ride.			
Suitable for visits ?		Yes		
Site ownership	Wokingham Borough Council			
Size of exposure / area of interest:		12.5 ha (extended area)		
Site Description:				
<p>Main interest: geochemical / hydrological. Source of natural iron rich streams at junction between Bagshot Sands and London Clay. The site is regionally important for iron rich groundwater monitoring.</p> <p>Barkham is situated in Berkshire about 3km south west of Wokingham. The surrounding area is flat lying and there are many drainage ditches. Some of these watercourses are orange in colour from the amount of iron that has leached into them from the adjacent bedrock of Eocene Sands.</p>				

The Bracklesham Group of sands are comprised of fine to medium grained (0.05-0.15mm) silica or silicate particles, originally sorted and deposited in shallow marine, lacustrine or estuarine environments. They have been buried under anaerobic or anoxic conditions. Secondary mineral phases such as hydrated iron(III) oxide and calcite are present along with organic detritus and partly reduced minerals eg pyrite, siderite (or iron stone) and glauconite. Local concentrations of these minerals can be high in the area with eg siderite as an iron pan at Camberley and glauconite elsewhere.

Sand is typically permeable to groundwater but where fine particles (<20µm) or fine layers exist this impedes flow and can give rise to stagnant layers or seepages from different levels. Because of impeded flow and changes in pH (activity of hydrogen ions) and Eh (activity of electrons) there can be accumulations of iron to form iron pans and small amounts of iron(III) may become mobile usually as colloidal sized particles or in complex species with humic substances (Barrott *et al*, 2013)

Groundwater emerging from the sands is typically colourless and clear but as it becomes oxidised it becomes increasingly cloudy and ochreous as iron(II) oxidises to iron(III) oxide. Biological and mineral surfaces onto which iron can adsorb act as catalysts to the reactions. Cushions or 'mats' of iron bacteria exist eg *Leptothrix ochracea* and *Gallionella ferruginea*. These bacteria are abundant in wetlands containing iron (II) which promotes their growth. This in turn provides mineral/organic support for the growth of other wetland species.

References

- Barrott J.J., Dudeney A.W.L. & Mason P.J. (2013) Spatial relationships between Eocene sand horizons and iron contamination in streams in the Thames Basin west of London, UK. *Geochemistry* **14**: 33-44
- Berkshire Geoconservation Group (2010) *A report on Iron Rich Streams around Barkham Berkshire*
- Carlile, M.J. & Dudeney, A.W.L (2000) Iron transport and retention in ochre-rich water courses. *Mineral Resources Engineering* **9**: 357-375.
- Carlile, M.J. & Dudeney, A.W.L (2000) A microbial mat composed of iron bacteria. *Microbiol.* **146**: 2092-2093.
- Ellison, R.A. & Williamson, I.T. (1999) *Geology of the Windsor and Bracknell District – a Brief Explanation of the Geological Map Sheet 269 Windsor* British Geological Survey, Keyworth, Nottingham.
- Lovely, D.R. & Phillips, E.J.P. (1986) Organic matter mineralisation with reduction of ferric iron in anaerobic sediments. *Applied Environmental Microbiol.* **51**: 683-689.
- Crawley, M,J (2005) The Red Streams of East Berkshire in *Flora of Berkshire* ISBN 0954334744 pp70-72

Additional documents:

- Barkham Iron Rich Streams base map.jpg
- Barkham Iron Rich Streams. location map.jpg
- Barkham Iron Rich Streams geology map.jpg
- Iron rich streams around Barkham Report Iron rich streams around Barkham Report.pdf

Date of this designation (if known): Originally 2011. Area extended 2014.
(Maps show current extent.)