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Revetting and Supporting River Banks

4.9 Brushwood mattress bank stabilisation on a tidal river

RIVER ROTHER

LOCATION – SCOTS FLOAT TQ92302213

DATE OF CONSTRUCTION – 2005

LENGTH – 200m

COST – £170,000

River Rother	Low energy, clay
WFD Mitigation measure	**Click Here** to view details
Waterbody ID	GB107040013670
Designation	SSSI
Project specific monitoring	Fixed point photography

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Rother embankment erosion threatening to cause a breach, prior to restoration works – 2004

Description

This tidal section of the River Rother has undergone many centuries of river management for land drainage and navigation. The channel is characterised by long stretches of deposited littoral sediments. These preferentially deposit on the inside of meander bends with resultant erosion through rotational slips on the opposite (outer) banks. In some places breaching of the flood embankment is a concern.

The aim of this project was to prevent further erosion and a subsequent breach of the flood embankment by working with natural processes to encourage deposition on the eroding bank.

These techniques were developed to suit site specific criteria and may not apply to other locations

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Design

A traditional brushwood mattress technique more commonly used on chalk streams was specified, to trap suspended sediment during tidal exchange and so stabilize the bank.

This technique can be used in estuarine environments with high sediment loads where the area is within the normal tidal range. The process of sediment deposition infills the mattress structure. Anaerobic conditions then develop which suspends decomposition of the internal woody skeleton, providing long-term integrity. There is nearby historic evidence from earlier stabilized areas that natural wood has remained intact for some 100 years.

Hardwood sweet chestnut (*Castanea staiva*) posts were used (minimum diameter of 0.125m). These ranged from 2.1m up to 4.5m in length to allow for the variation of the eroded bank profile and to ensure that at least 1.5m of each post was driven into the bank. The posts were installed in a 1m grid along a 200m section of bank, with an average width of 11m (*see Figure 4.9.1*) by a long-reach excavator. A hazel (*Corylus avellana*) brushwood mattress was then laid between the posts, using 3m to 4m long brush. Brush was installed to extend slightly beyond the last posts at the toe of the structure, to encourage sedimentation in this critical area by increasing roughness.

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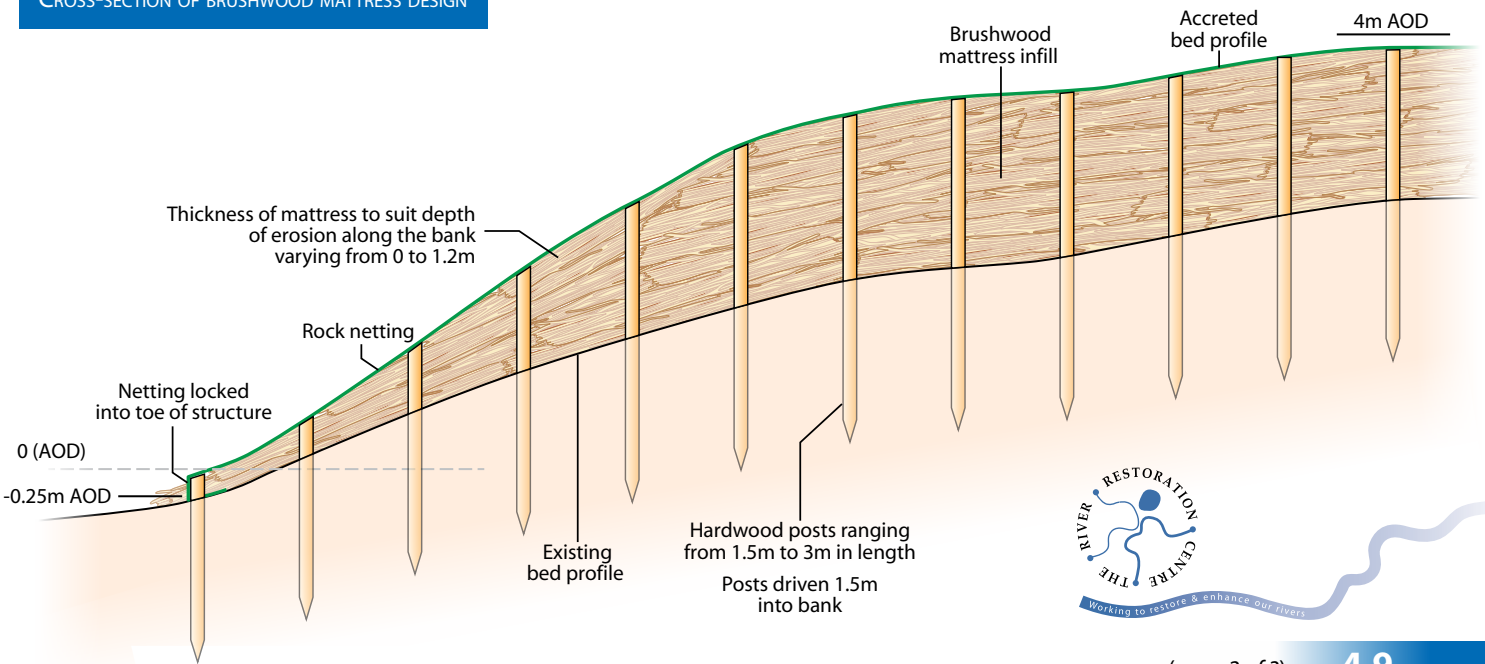
Installation of a matrix of sweet chestnut posts to secure the brushwood mattress – 2005

Figure 4.9.1
CROSS-SECTION OF BRUSHWOOD MATTRESS DESIGN



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Brushwood laid between posts to form a matrix to trap suspended sediment – 2005

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The brushwood created walkways and safe access across the site. Hexagonal galvanised rock netting (generally used on rock and chalk escarpments to prevent rock falls) was stapled to the posts across the whole surface of the structure to prevent any brushwood being lost whilst silt was depositing. Completing this as soon as possible was essential to minimise the risk of the structure failing during construction in the event of an extreme tidal event occurring before the whole structure was stabilised. The final slope of the repaired bank had a design angle averaging 40°.

Subsequent performance

Fixed point photography has shown that after seven years this technique is continuing to prevent erosion, with vegetation developing well, especially at the top of the bank.

Some of the brushwood became compressed by the weight of accreted sediment, leaving the netting standing proud above the brushwood. Cutting holes in the netting around the posts would enable it to settle with the compressed brushwood.

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Once brushwood mattress installation is complete, rock netting is secured to the posts to prevent wash out – 2005

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Section of bank post-restoration showing successful accretion of sediments across most of the structure, with some netting still exposed – 2005

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Seven years post-restoration the structure has continued to retain sediments and has been stabilised further by vegetation on the upper bank – June 2012

Contacts

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