Advisory Visit

Smestow Brook, Wolverhampton

July 2019

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Smestow Brook, Wolverhampton on 29th July, 2019. Comments in this report are based on observations on the day of the site visit and discussions with Tarun Ingvorsen (Salmon in the Stour Project Officer) and Natalie Norton (Site Manager, Smestow Valley LNR) of Birmingham and Black Country Wildlife Trust (BBCWT).

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

2.0 Catchment Overview

The Smestow Brook is a tributary of the River Stour in the catchment of the River Severn. The Brook rises in the city of Wolverhampton and flows south, generally parallel to the Staffordshire and Worcestershire Canal, for approximately 12 miles to join the Stour near Stourton. The industrial history of the region has left its mark on the River Stour and its tributaries both through physical modification of the channel and pollution. The Stour catchment is the focus of the 'Salmon in the Stour' project led by BBCWT in partnership with the Environment Agency (EA), Worcestershire Wildlife Trust and Severn Rivers Trust (www.bbcwildlife.org.uk/salmoninthestour).

The upper catchment of the Smestow Brook is located in an urbanised area and is designated as a heavily modified waterbody under the Water Framework Directive (Table 1), and has an overall ecological potential of moderate. It is currently rated as failing for the specific pollutants nickel and its compounds and tributyltin compounds.

River	Smestow Brook
Waterbody Name	Smestow Bk - source to conf Wom-Penn Bk
Waterbody ID	GB109054049340

Management Catchment	Severn Middle Worcestershire - Stour Upper Worcestershire Rivers and Lakes
River Basin District	Severn
Current Ecological Potential	Overall potential of **Moderate** in 2016
U/S Grid Ref inspected	SJ8947800283
D/S Grid Ref inspected	SO8878799435
Length of river inspected	~1100m in total

Table 1 Summary of Water Framework Directive assessment from https://environment.data.gov.uk/catchment-planning/WaterBody/GB109054049340

The section of the Smestow Brook visited was within Smestow Valley Local Nature Reserve (LNR) in Tettenhall, Wolverhampton. The LNR is council-owned and managed by BBCWT.

A number of overflow structures discharging to the brook were observed during the visit. Some were probably surface water drainage or canal overspills whilst others were likely to be combined sewer overflows. No evidence of pollution was observed around these discharges during the visit (which was after heavy rainfall in recent days), although the presence of sewage fungus and debris have apparently been recorded. Misconnections (foul water connections to surface water drains) are reported to be high in the Wolverhampton area. Good water quality is essential if the habitat improvement recommendations in this report are to have a meaningful effect and pollution prevention should be pursued with the relevant partners in parallel to physical improvements.

3.0 Habitat Assessment

The course of the Smestow Brook through the LNR is entirely straight, sandwiched between the Staffs & Worcs Canal on the left bank and the former Great Western Railway (Wolverhampton & Bridgnorth line) on the right bank (which crosses the brook and canal at the downstream limit of the visit). Inspection of historic maps shows the brook was in its straightened course alongside the canal in 1886, prior to the construction of the railway line in the early C20th. A meandering course to the brook just downstream

of the site inspected (near the Graiseley Brook confluence) is present on early C20th maps but is straightened on the 1955 OS map (https://maps.nls.uk and www.old-maps.co.uk).

The straightened channel of the brook has resulted in very little variation in depth and width and the absence of a pool-riffle sequence; in-stream habitat is therefore poor (Photo 1). The depth is uniformly shallow (ankle depth) apart from the occasional pool associated with in-stream structure as noted below. The channel width is around 3m. The river bed comprises large amounts of fine sediment (sand and silt) with some areas of fine gravel (up to approximately 10mm diameter).

Photo 1 A wide, shallow, heavily shaded channel dominated by fine sediment.

The river channel is bordered by high, steep embankments on each side. Upstream of the A41 road bridge, there is a low berm approximately 5m wide alongside the channel on the right bank (Photo 2), whereas elsewhere the channel is more closely bordered by the embankments. In the former area, the berm provides scope for introducing some sinuosity to the channel. There may be some large stone making up this berm beneath the soil (Photo 3); digging some test holes is recommended, as the composition of the bank will influence the techniques needed to increase sinuosity.

Photo 2 A 5m wide berm on the RHB gives scope for some re-meandering of the channel.

Photo 3 Large stone located below an outfall to the brook. This may be associated with the outfall or could be present throughout the bank.

Large Woody Material (LWM) in the form of fallen trees is present at around half a dozen locations throughout the reach inspected. In some locations this has resulted in localised scour to the river bed and banks, producing much-improved habitat (channel sinuosity, depth variation, sorting of bed substrate, vertical banks with kingfisher nest holes; Photo 4). The LWM has inevitably gathered litter, but the temptation to remove the structures should be resisted. The naturally occurring LWM is of a scale and stability which is very difficult to reproduce with introduced structures. The approach should be to preserve the structures and their considerable habitat benefits and manage the litter problem (which would also occur with introduced structures).

Photo 4 Upstream view of a fallen tree which has shifted the channel course, created a scour pool, exposed a vertical bank (where kingfishers are nesting) and graded out coarser bed material, greatly improving habitat diversity.

Away from the naturally occurring LWM, woody structure could be introduced to the channel. Brushwood shelves and hinged trees could be installed to increase localised scour and depth variation (Photo 5). Naturally occurring structures such as cross channel logs and leaning trees (Photo 6 and Photo 7) could be copied to achieve similar effects.

Photo 5 A typically uniform, shallow section suitable for introduced woody structure, such as brushwood shelves on alternate sides (as illustrated).

Photo 6 A deep pool has formed where the channel is pinched by the leaning tree: much-needed habitat variety.

Photo 7 The deepest pool observed on the visit was below a log wedged across the channel just above bed level. Similar structures could be created to mimic this effect, without increasing flood risk.

The channel is heavily shaded by trees and bushes throughout the reach inspected. Whilst shade is important to keep river temperatures down, excessive shading prevents the growth of aquatic plants. Introduced brushwood structures are intended to trap silt and colonise with vegetation, becoming consolidated and part of the bank; if shading prevents this, the structures will rot and disappear. Tree management to achieve a balance of light and shade is required, with in-stream structures located in the more open areas. Arisings from tree work (including all brushwood and whole tree trunks) should be kept on site for construction of in-stream structures.

The invasive non-native plant species Himalayan balsam and Japanese knotweed are abundant throughout the reach inspected. As an annual plant, balsam can be controlled by hand-pulling before it sets seed in mid-summer, but knotweed requires a more technical approach, such as herbicide spraying or injection, following appropriate training and licences. Some particularly dense stands of knotweed are located within private properties as well as on the publicly owned land; a coordinated approach with all landowners is required to tackle this.

4.0 Recommendations

- Retain existing natural LWM structures to preserve the good in-stream habitat associated with them. Carry out litter clean-ups around the structures (and more widely).

- Partially cut and 'hinge' trees which are located in suitable areas (directly alongside the channel) to create securely anchored LWM habitat structures (Photo 8).

Photo 8 Example of a tree partially cut and leaned over into the river channel.

- Reduce tree shading over the brook, aiming for a 60:40 ratio of shade and light. Retain brushwood and tree trunks on site for use in constructing in-stream habitat structures; examples are given below in Photo 9 and Photo 10, Figure 1 and Appendix 1.

Photo 9 A brushwood shelf, the aim being to trap silt, vegetate and narrow the low-flow channel.

Photo 10 Introduced log LWM structure, to increase flow variety and localised scour.

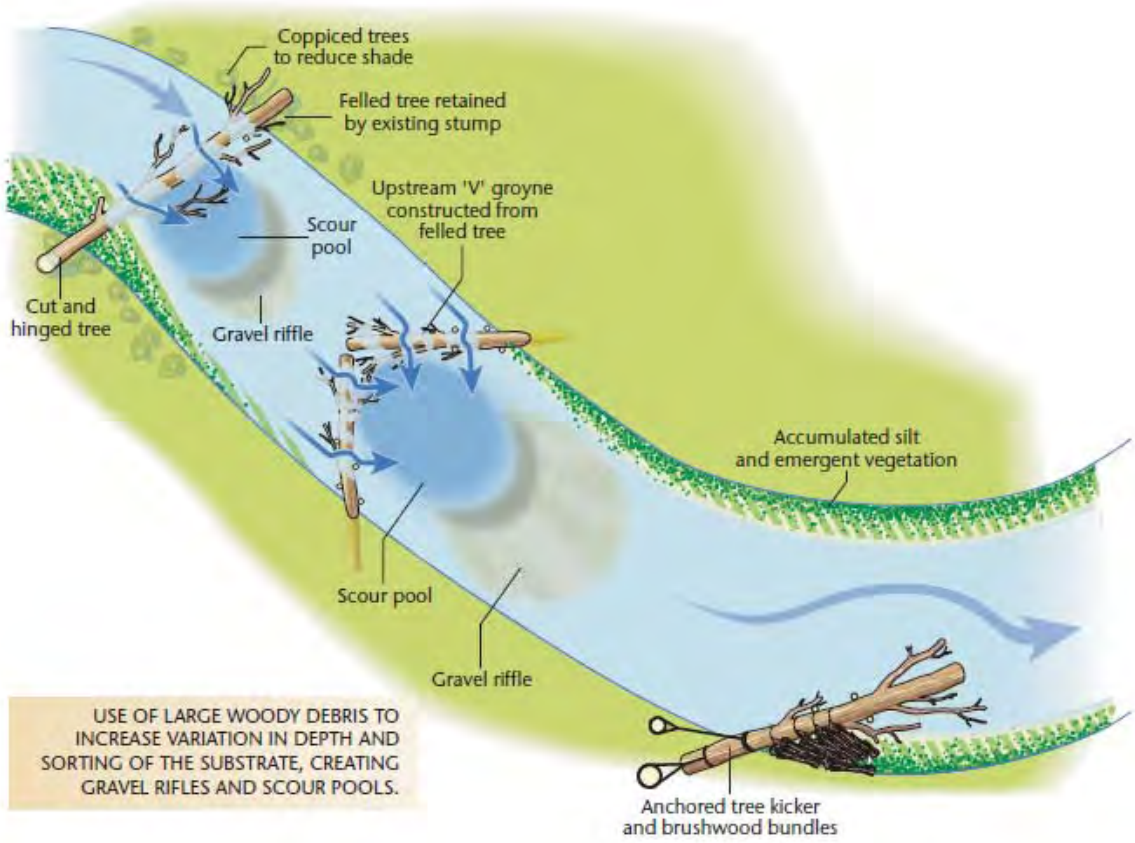


Figure 1 Examples of LWM structures and their effects.

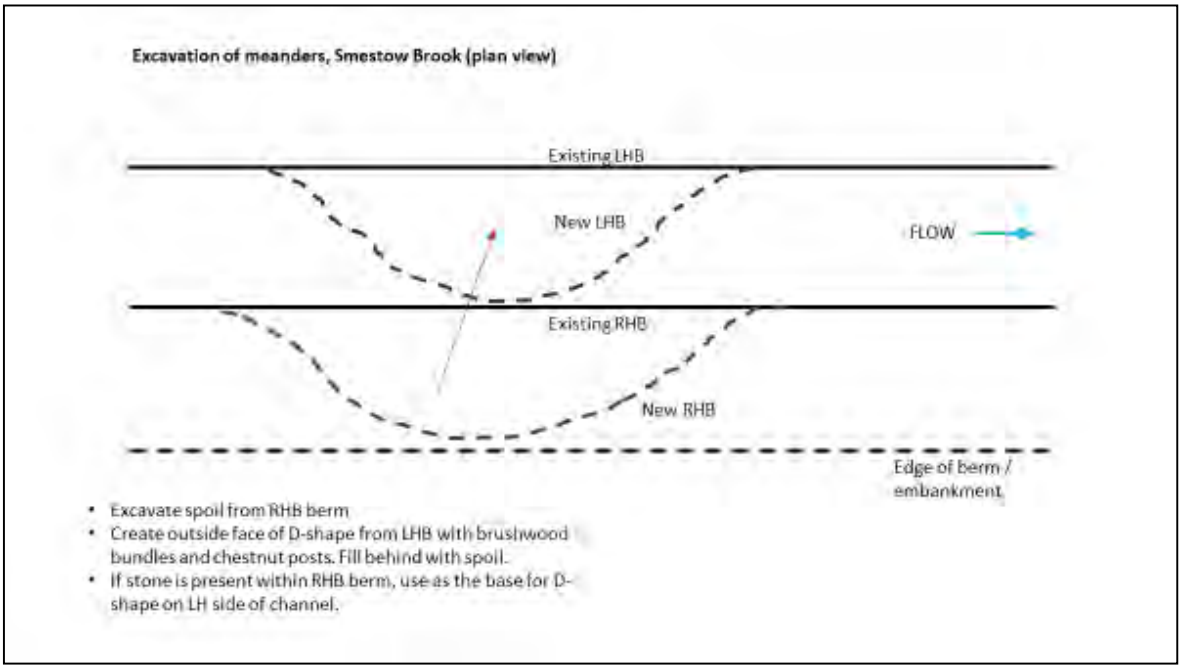
- Control invasive non-native species Himalayan balsam and Japanese knotweed. In both cases, efforts should be made to tackle these on a catchment scale: investigate how far up the brook both occur, and address them from the top of the catchment down to prevent recolonization of downstream areas previously cleared. Note also that in areas where tree shading is reduced, Himalayan balsam may respond vigorously to increased light levels.

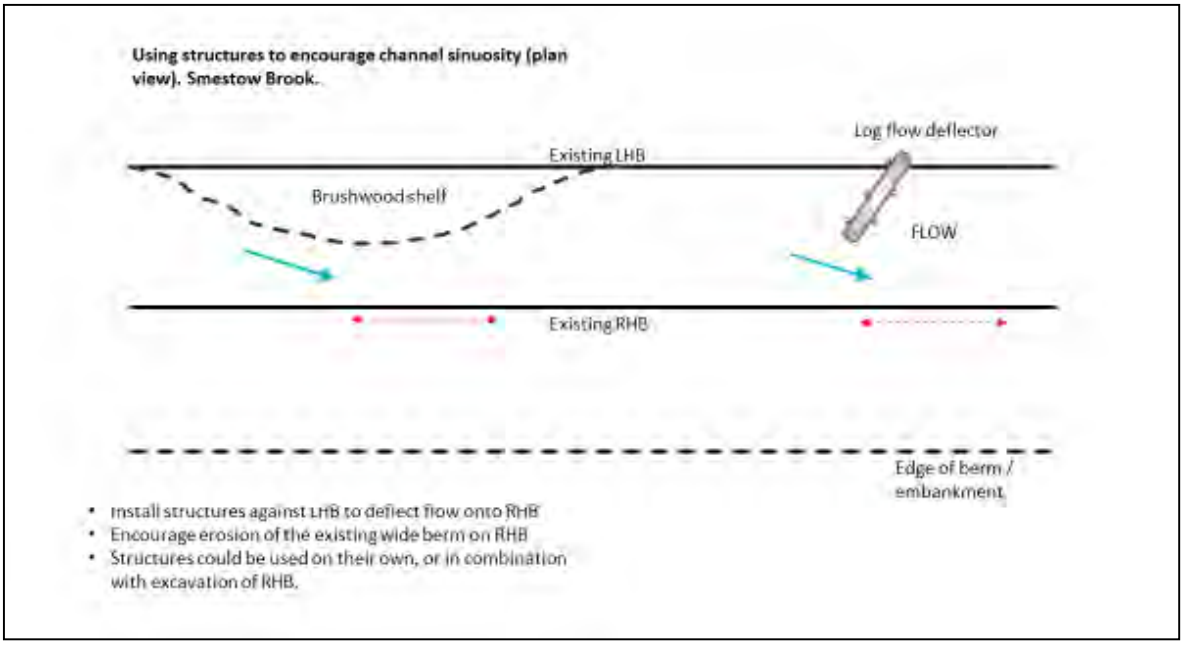
- Introduce more sinuosity to the channel in the areas where the wide berm is present alongside the channel:

    - Carry out a services search to check there are no underground utilities that could be affected.

    - Dig test holes in the berm to see if there is any large stone present.

- If stone is present, consider options for excavation and removal from site or re-distribution to create berms on alternate sides of the brook's course.
- If stone is absent, excavate new meanders and/or install woody structures to deflect flow against the berm and create scour.





Please note, it is a legal requirement that all the works to the river require a permit from the Environment Agency (for main rivers) or consent from the local lead flood authority, usually the County Council (for ordinary watercourses) prior to undertaking any works.

5.0 Making it Happen

The Wild Trout Trust can provide further assistance with implementing the recommendations by helping to obtain the necessary consents and assisting with practical delivery (volunteer days) of the works such as the flow deflectors and brushwood works.

We have produced a 70 minute DVD called 'Rivers: Working for Wild Trout' which graphically illustrates the challenges of managing river habitat for wild trout, with examples of good and poor habitat and practical demonstrations of habitat improvement. Additional sections of film cover key topics in greater depth, such as woody debris, enhancing fish stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop https://www.wildtrout.org/shop/products/rivers-working-for-wild-trout-dvd calling the WTT office on 02392 570985.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement: http://www.wildtrout.org/content/library

6.0 Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme in England, through a partnership funded using rod licence income.

7.0 Disclaimer

Appendix 1

Techniques for in-stream habitat improvement within the existing channel.

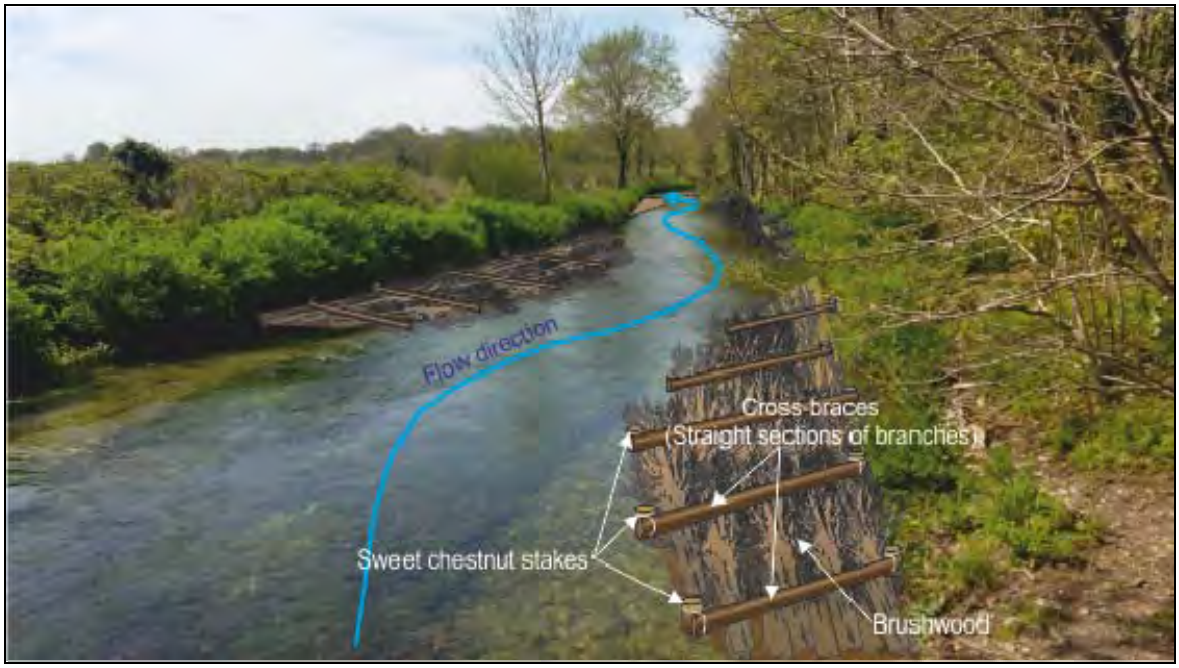


Figure 2 Example of brushwood berms installed on alternating sides of the channel to introduce sinuosity to the flow.

Figure 3 Example of brushwood berms construction, the level being 10- 15cm above summer water level

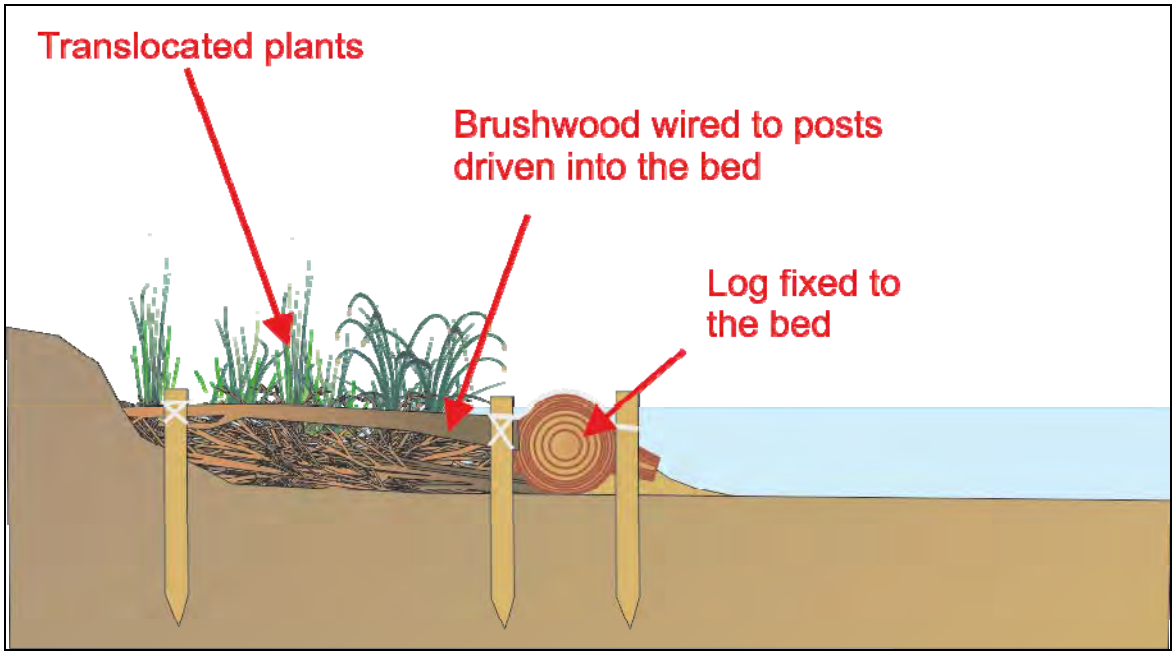


Figure 4 Cross-section of construction of brushwood berm – log and translocated plants optional.

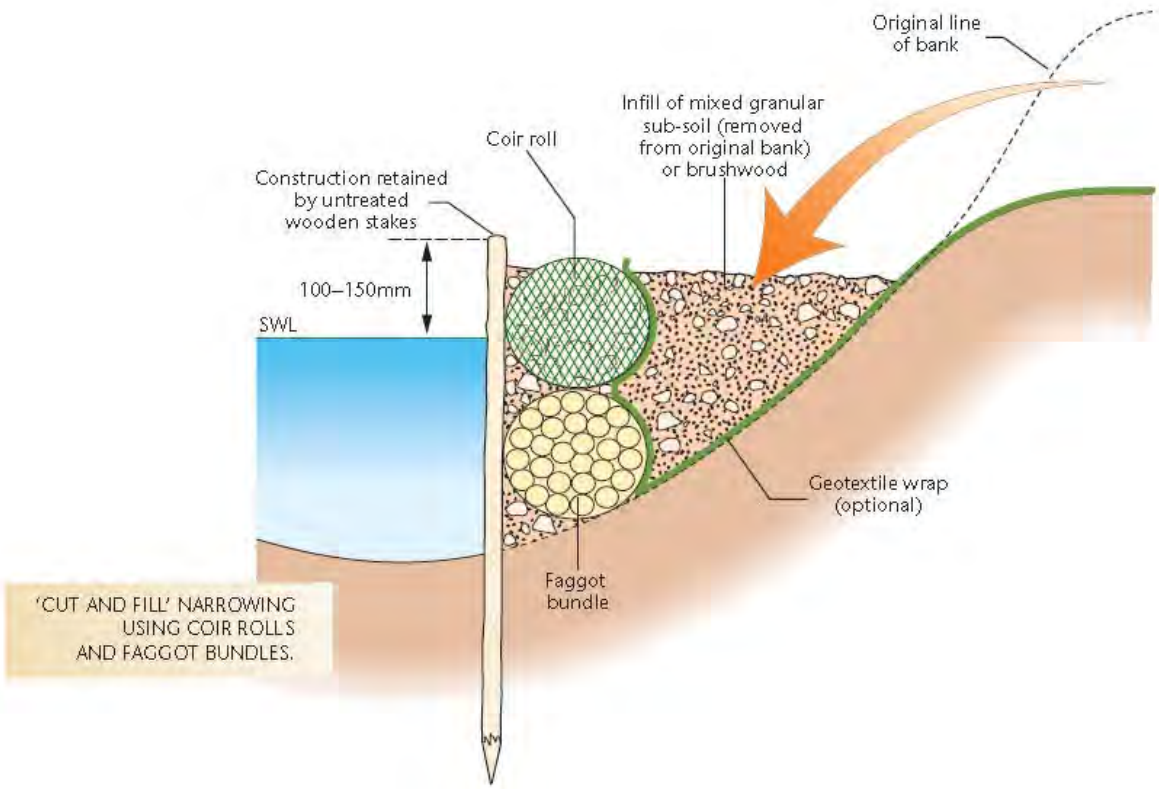


Figure 5 Bank re-profiling to create a two-stage channel – earth is taken from the high banks and deposited behind a bank-line of faggot bundles.

Figure 6 Riverside tree felled leaving a "hinge" of wood attaching it securely to the stump.

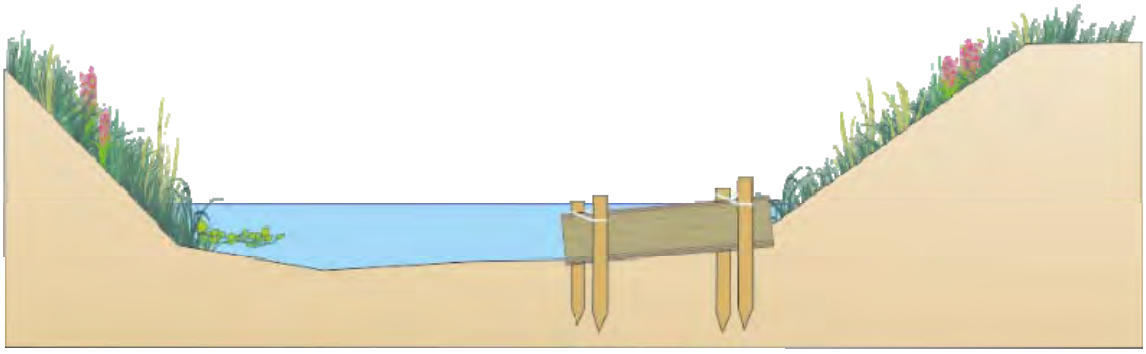


Figure 7 Log pinned to the river bed using stakes and wire.

Figure 8 Pinned log, showing deflection of flow perpendicular to the log.