



REVETTING AND SUPPORTING RIVER BANKS

4.1 Willow spiling

RIVER SKERNE

LOCATION – Darlington, Co Durham, NZ 301160

DATE INSTALLED – November 1995 and May 1996

LENGTH – 75 metres

COST – £115/metre

NOTE: A full description of this technique is provided in the Environment Agency R & D Technical Report W83:– *Revetment Techniques used on the River Skerne Restoration Project (1998)*



Willow spiling 2 years after construction

DESCRIPTION

This revetment technique utilises willow poles woven around vertically driven stakes and is particularly suited to steep river banks that need both support and erosion protection.

Spiling was installed at both the entry and exit of a reach of river that was re-meandered. These locations were selected for spiling because the existing banks of the straight channels within which the revetment starts were near vertical due to erosion of the bank toe.

The technique often utilises osier willow because of its prolific production of long, slender, pliable poles suitable for weaving. Other species are less suited to weaving so the availability of indigenous river bank willow for spiling may be limited and other techniques might be more appropriate (see 4.2 – 4.3). The introduction of non-indigenous species, through revetment works, is rarely justified; osiers thrive in withy beds or plantations but less so in many river bank situations.

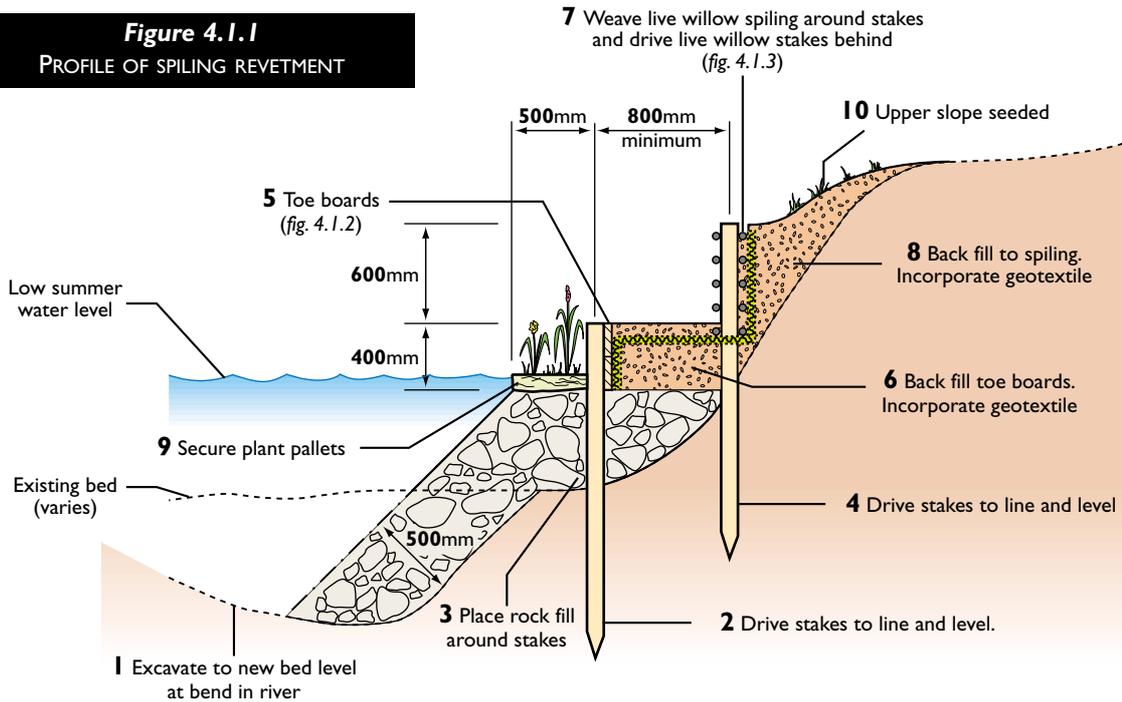
The technique is demonstrated at the Skerne because it is popular with construction teams and relatively easy to install. It is not necessarily best suited to the overall environment at this site, although it is otherwise adequate to protect the banks.

DESIGN

- Below water a densely graded rock matrix is used to line the bank having first excavated down to a designed bed level and to provide room for the rock without it protruding beyond the adjoining natural bank profile. (see 4.2 for the rock details);
- At the water's edge the rock is incorporated into a shelf formed behind toe-boarding;
- Spiling behind and above this shelf is formed from wooden stakes driven to line and level around which the osiers are densely woven. Vertical live willow posts can then be independently placed behind the spiling and can be of a different species. A nylon geotextile was utilised behind the spiling

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Figure 4.1.1
PROFILE OF SPILING REVETMENT



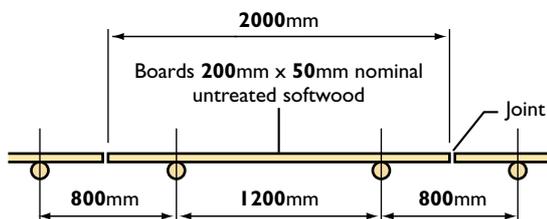
and the toe boarding to help stabilise the soil back filling which follows;

- The upper bank is then graded back to a safe slope that is un-revetted and either seeded with grass or turfed in extreme circumstances.

The basis of this design is to provide a stable underwater environment as a foundation for the spiling which is located just above water level where willows thrive best. The rooted osiers that develop from the woven poles will gradually occupy the underwater rock, and the marginal shelf, as the toe boarding rots away. Pre-planted pallets were placed in front of the toe boards to add to visual amenity and habitat diversity. Over time, the osiers will become dominant and will secure the river bank against further erosion whilst providing valuable habitat. Coppicing of the osiers is planned in line with normal procedure for maintaining the security and integrity of this species.

Commercially available woven willow hurdles can effectively replace the in-situ weaving, but more support posts will be needed. Live willow posts introduced behind the spiling can be allowed to mature

Figure 4.1.2
PLAN OF TOE BOARDS



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

into trees (if the osiers are coppiced sufficiently often) and these may be of an indigenous species intended to succeed the osier over time.

This technique does not have the intrinsic flexibility to accommodate bank settlement that is a feature of techniques 4.2 and 4.3 because it is, in essence, a vertical retaining wall. It is, however, less demanding of space which is sometimes advantageous.

SUBSEQUENT PERFORMANCE 1995/98

The river banks at both entry and exit sites are stable and silts are accumulating around a dense line of willow shoots up to 2.5m tall. The planted ledges are equally densely covered with marginal aquatic species that are similarly accumulating silts. Exceptionally, growth over one short length has been limited to the willow posts introduced behind the spiling. This is because the spiling poles, installed in the autumn, had been stored for too long in dry conditions.

Figure 4.1.3
PLAN OF SPILING

