Supporting bank slips and exposed tree roots

River Skerne
Location - Darlington, Co Durham, NZ301160
Date of construction – October 1995 / November 1996
Length – 40 metres, 9 metres
Cost – Bank Slip £3,000, Tree Roots £400

Description

Slipped slope
During works, water seepage from gravel at the bottom of a newly excavated river bank caused it to slip. As the bank was close to bunded industrial fill, repair was necessary. The route of a proposed footpath was also at risk if this bank remained unstable.

Exposed roots
The roots of a mature willow had been exposed during river bank re-profiling works and were being undermined by high flows and damaged by people. Although in no immediate danger, this tree had become an important resting place, providing the only shade along this bank. Positioned on the apex of a meander, it was decided to protect the roots using a simple revetment.

Design

Slipped slope (Figure 4.5.1)
To stabilise this slope it was reformed incorporating a rock layer using stone sized 0.3m ‘down’ as specified for use on nearby revetments (see Technique 4.2). Ledges of varying widths were introduced at metre intervals up the slope, above water.

The underwater rock layer added weight to the toe of the slope to help support it and was free draining. The upper bank re-profiling removed weight from the slope further stabilising it. The ledge closest to water level was subsequently planted with trees to add visual amenity as well as a longer term revetment via their root system. The upper ledge later incorporated a new footpath.
Revetting and Supporting River Banks

Existing ground, approx. 4m min

Lowest bed as dug 38.7m approx.

Estimated summer water level 40.33m

Rock layer 0.4m thick
Stone as revetment spec (0.3m down)

As dug (face slipped)
1:1 steepest

4m min

Varieties (1.0m min)

2.0m Ledge

1.0m Ledge

Ledge for machine access and future footpath

Figure 4.5.1 Profile of slipped slope

These techniques were developed to suit site specific criteria and may not apply to other locations
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Exposed roots (Figures 4.5.2 – 4.5.3)
The design had to ensure that people could continue to use the spot without further damage. Vertical fence posts were used to revet the bank before backfilling with soil. A geotextile, ‘Terram Access’, was placed behind the posts to prevent soil migration. Turf was placed on the surface to achieve an instant result.

Subsequent performance 1995 – 2001
The bank slip has remained stable and appears natural with no visible signs of support. Water continues to seep from the bank and maintains a small wetland habitat on the ledge above river level.

The revetment of the exposed roots has performed well, following many high flows since its construction. The roots are no longer exposed and the turf and other planting has grown to give added protection. Well used by a variety of people, the structure has become a seating area providing shade.

Vegetation establishment after 18 months