



AquaRockBag® project report: Yearls Weir River Derwent

Site location

The site is located on a reach of the river Derwent in Barepot, about 0.75km east of Workington, Cumbria, UK.

Initial situation pre AquaRockBag®

Following two major floodings (winters of 2009 & 2015) increased erosion had impacted upon key assets:

- Access track to the south of Yearl Pumping Station
- Bank between Yearl Weir and Yearl Weir Pumping Station
- Bank immediately upstream of Yearl Weir, threatening the structural stability of the Weir

The erosion processes were threefold:

- Severe bank erosion caused by toe scour
- Stripping back of the turf (sod) layer on the floodplain
- River began to cut a new channel on a shorter course across the floodplain, bypassing a large weir structure

On-site ground investigation

- Records of British Geological Survey indicate site is underlain by alluvium and river terrace deposits over carboniferous pennine middle coal measure
- Further ground investigation and geomorphological survey concludes that fine week alluvial soils that were highly erodible with the alluvium found to comprise 'dark grey' and 'brown' fine to coarse sands
- Vegetation structure was heavily grazed agricultural and the eroding banks were devoid of any vegetation cover at all



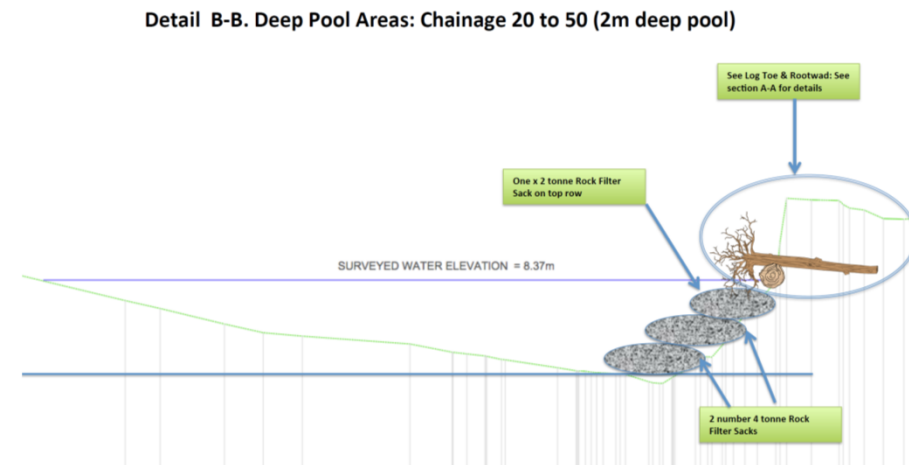
Solution (1)

Detailed bathymetric survey undertaken in late 2017, followed by hydraulic modelling of the existing channel and flood plain to build a map of bed, bank and floodplain flow velocities and map shear stress for 1:200-year flood return events

- Data informed the design process
- Once design had been agreed upon, a further model was produced to inform the client and statutory permit agency of any potential future channel change as a result of the bank reinstatement works

As an ecologically sensitive site the use of traditional hard engineered bank protection was not an option and bioengineered designs were favoured

- The scour pools provided a particular challenge, as bioengineering techniques would not control the rate of erosion in 2-3 metres of water
- Rip-rap stone ruled out due to geomorphological impact downstream and the adverse ecological impact
- The solution to controlling the erosion in the scour pools came in the form of AquaRockBags® combined with further bioengineering elements



Solution (2)

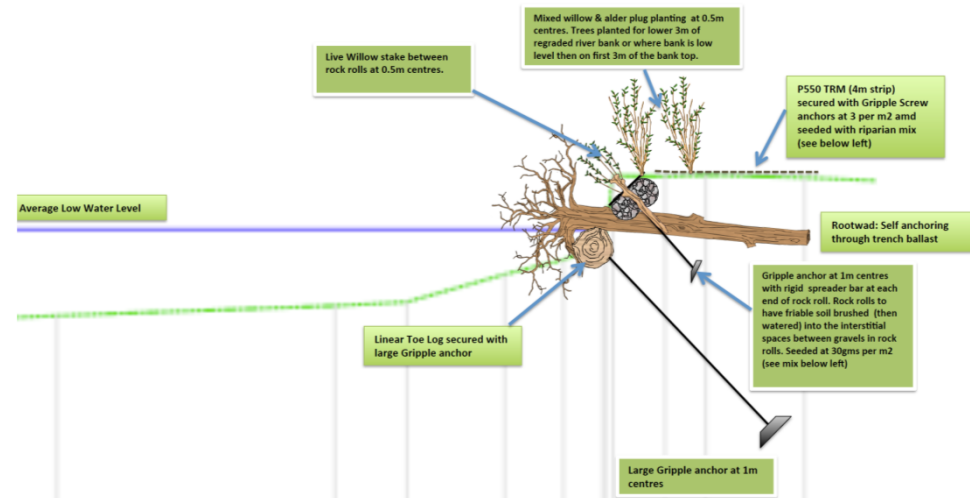
Further bioengineering solutions include

- Continuous run of liner toe logs, rootwads and live willow staking from average low flow water level
- Additional tree planting on the reprofiled river banks and the adjacent floodplain will slow flood flows and reduce erosive force in the future
- Banks also protected with a high performance turf reinforcement system: Combination of woven HP-TRM and ground anchors
- Matting was extended from the bank to also cover the area where avulsion process had created the new river channel in the floodplain and where future major floods would otherwise try to reform this channel feature



AquaRockBag® installation into deep scour pool. The bioengineering element can then be built up at and above average low water level.

Detail A-A (modified original section): Chainage 50m to 180m (less than 0.6m depth)



Yearls Weir River Derwent



Project pictures during installation



www.aquarockbag.eu

Yearls Weir River Derwent



Final result: 2 months post installation



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