

Use green engineering techniques instead of hard bank protection

Project Summary

Title: River Cole river restoration

Location: River Cole, Shard End, Birmingham, England

Technique: Removal of sheet piling and concrete bank protection

Cost of technique: £££

Overall cost of scheme: £££

Benefits: ££

Dates: 1992-1997

Mitigation Measure(s)

Use green engineering techniques instead of hard bank protection

Improve channel geomorphology to create habitat

How it was delivered

Delivered by: Birmingham City Council, Metropolitan Borough of Solihull

Partners: English Nature, Environment Agency, Wildlife Trust for Birmingham and the Black Country



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(1) Area of sheet piling prior to works (1994); (2) The same section of bank after removal of the piling and a period of natural development (2011).

Background and issues

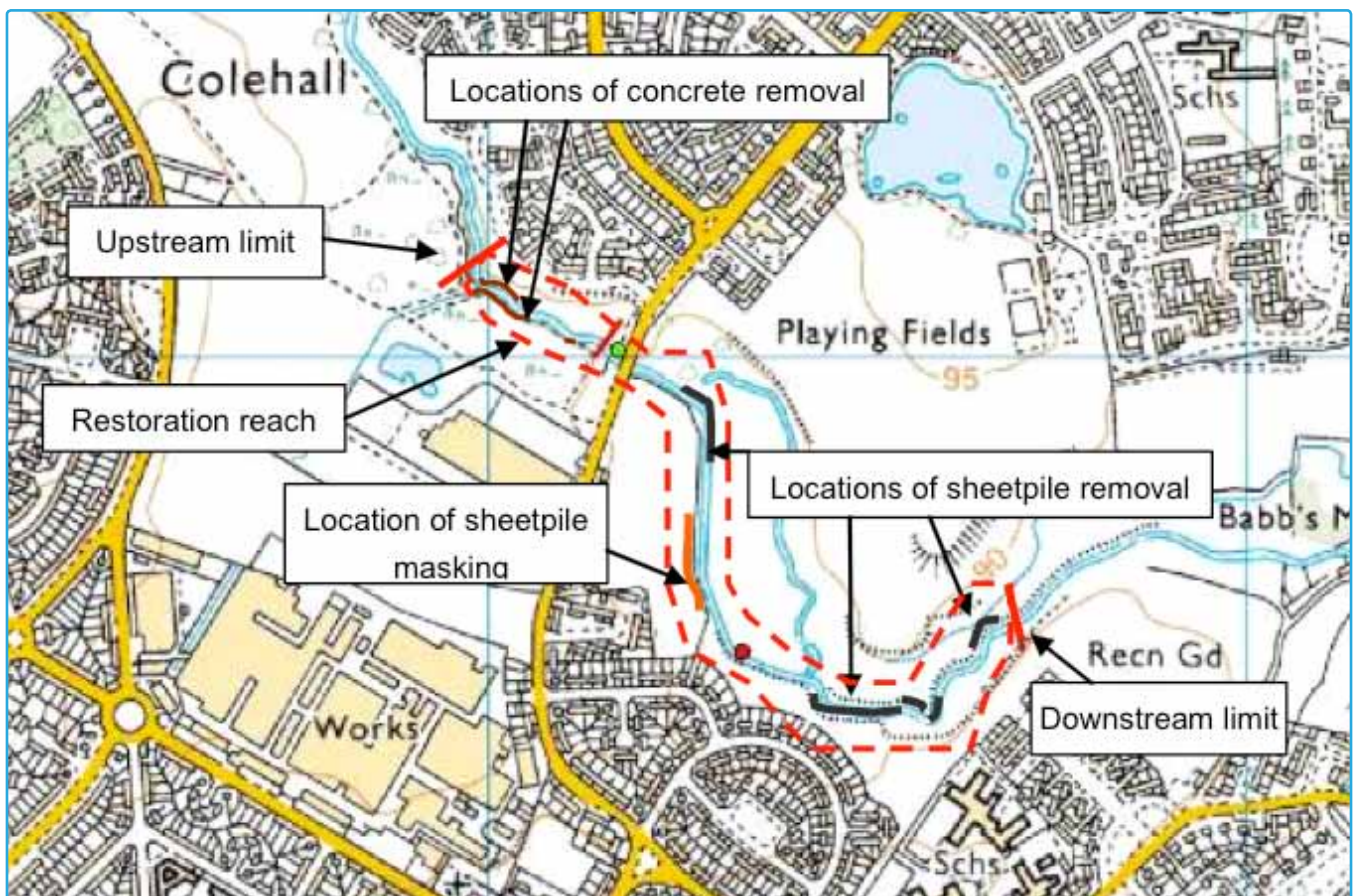
The River Cole rises in Red Hill to the south of Birmingham. The river flows through arable fields in the upper reaches and urbanised areas in the mid to lower reaches, before discharging into the River Tame at Blyth End. Prior to restoration, this reach was heavily modified with concrete banks upstream of Lea Ford Road bridge and sheet piled reinforced banks downstream of the bridge.

Project Kingfisher was established in 1985 with the overall aim of caring for the valley of the River Cole, improving it both for people and wildlife. The project created Kingfisher Country Park in July 2004, which consists of an 11 km stretch of the River Cole running from the Coventry Road (A45) at Small Heath as far downstream as the M6 at Chelmsley Wood.

As part of Project Kingfisher, the Shard End reach of the River Cole was restored in two phases:

- Phase 1: In 1994, the sheet piling upstream of Lea Ford Road was removed. A stretch of sheet piling close to residential properties on Fordfield Road had to remain in place so it was instead masked to reduce the visual impact and allow natural habitats to develop in front of it.
- Phase 2: In 1997, the concrete channel downstream of Lea Ford Road was removed. Some banks were re-profiled as part of the bank protection removal process to provide more of a natural “tick-shape” channel cross section, allowing natural erosion and deposition processes to operate in the rehabilitated channel.

The improvements were designed to function naturally without the need for maintenance, resulting in sustainable rehabilitation of the channel for the majority of this reach.



Schematic of the restoration works along the River Cole through Shard End
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Step-by-step

Phase 1: Sheet pile removal (1994)

- Approximately 405 m of sheet piling was removed in discrete lengths from seven different locations (generally on the right bank). The longest continuous length removed was 50 m long and in some cases the banks were reprofiled following removal of the sheet piling.
- A 50 m length of sheet pile was retained and masked with spoil and rocks to form new berms at the bank toe. Willow branches were also planted in the new toe material, and the berms were subsequently colonised by vegetation.

Phase 2: Concrete bank removal (1997)

- Approximately 54 m of concrete bank protection on the left bank and 75 m on the right bank were removed and reprofiled as part of the deculverting project at Yardley Brook which joins the River Cole approximately 200 m upstream of Lea Ford Road bridge.
- In some places, concrete was simply broken up and retained in situ to allow established trees to continue to inhabit the banks.
- A failing outfall was removed from the left bank upstream of the road bridge.



Sheet pile removal works



Concrete bank removal works

Benefits

- The removal of sheet piling and concrete bank protection on the River Cole has allowed the channel to adjust in a natural fashion, changing the flow conditions and resulting in increased morphological diversity and the reinstatement of natural processes. The channel has widened and meanders have migrated by more than a metre (similar changes have occurred in unprotected reaches downstream of the site).
- The removal of hard bank protection has resulted in the creation of new habitat niches due to the more natural banks forms and the creation of an active channel with a plentiful supply of coarse sediment. The renaturalised sediment regime has created a range of depositional features in the channel, including coarse sediments and fine sediments which support a range of different habitats.
- The masked sheet piling is now completely overgrown with willows, providing valuable organic matter and shading to the reach.
- This stretch of the watercourse is now followed in part by the Cole Valley Way Long Distance Path, bringing people in contact with the restored watercourse.



(1) Banks prior to removal of sheet piling; (2) The same banks post-removal

Lessons Learnt

- By allowing the river to adjust naturally, the channel has increased in overall geomorphological diversity with features such as eroding bank cliffs, gravel riffles and shoals, point bars creating a range of different flow types and riparian habitats.
- In active alluvial rivers such as the River Cole, designers should consider allowing natural processes to operate rather than artificially regrading the banks. Ungraded sections have stabilised more effectively as they have been undercut, failed and naturally regraded with a vegetated toe.
- The masking of the sheet piling one location (where it could not be removed has been effective and this is largely due to the planting of willows in front of the structure. This technique could be considered in the future for other locations, although factors such as velocity, bed gradients and channel type need to be taken into account.

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