



# Enhancing Straightened River Channels

## 3.7 Replacing a concrete drain with a 'natural' channel

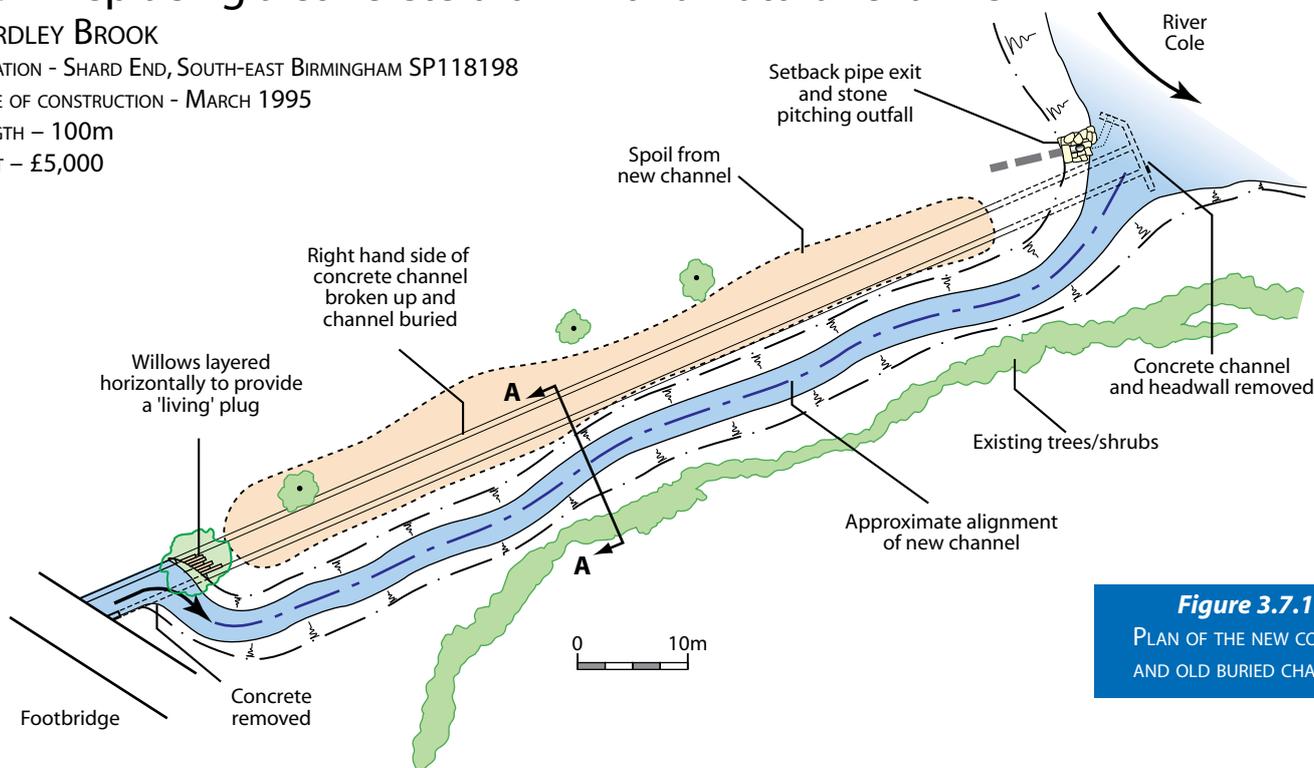
### YARDLEY BROOK

LOCATION - SHARD END, SOUTH-EAST BIRMINGHAM SP118198

DATE OF CONSTRUCTION - MARCH 1995

LENGTH - 100m

COST - £5,000



**Figure 3.7.1**  
PLAN OF THE NEW COURSE  
AND OLD BURIED CHANNEL

### Description

Yardley Brook rises in south-east Birmingham and emerges from a culvert onto the floodplain of the River Cole in a concrete channel. The catchment is highly urbanised, with over 150,000 people living within 2km of the river. Urban run-off thus causes periodic poor water quality and significant litter. The brook itself is contained within an area of made-up ground which has been retained as public open space.

Originally a sewage outfall, the brook no longer needed to be contained in a concrete straight-jacket due to closure of the sewage works upstream in the late 1960s. The brook is located within the Project Kingfisher area; a collaboration between local and statutory authorities and volunteer groups to achieve a substantial improvement in the wildlife quality of an 11km section of the Cole and adjacent land in Solihull and Birmingham.



Yardley Brook entering the River Cole before works

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The brook was constrained in a concrete sleeve, offering no possibility for small-scale in-channel enhancement. Rehabilitation required removal of the brook from its 100m long concrete surround. Complete relocation, rather than removing the concrete, was the cheaper option.

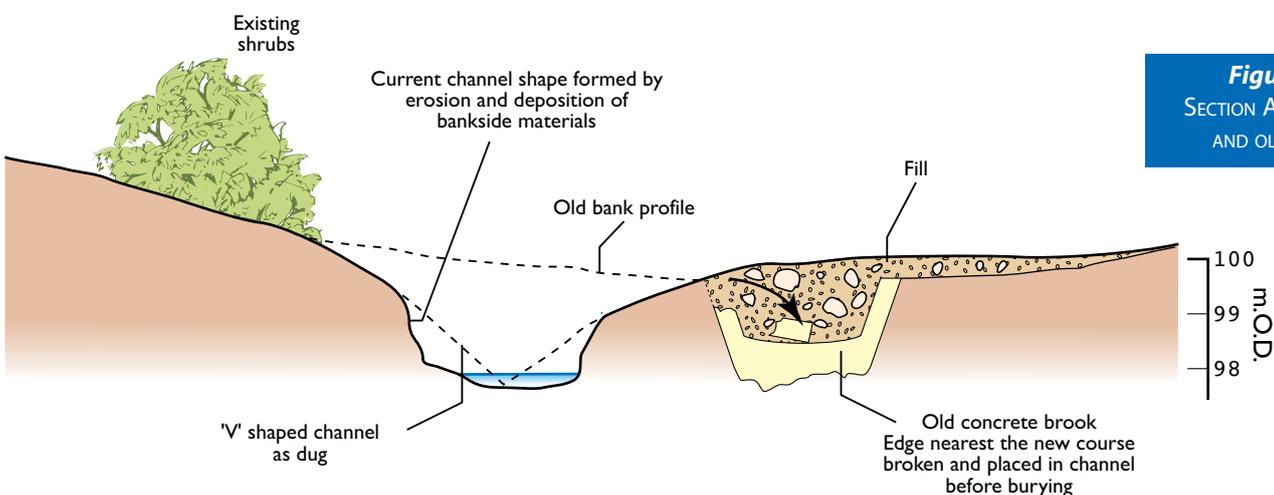
### Design

The lip of the concrete channel was broken up using an excavator, to ensure that once buried the remnant channel would not protrude above ground level. The broken concrete was pushed into the barely flowing channel.

Figure 3.7.1 shows the 100m sinuous channel that was excavated alongside the brook. The new course was excavated at a greater depth than the concrete channel bed. Previously the bed of the River Cole had been approximately 0.7m below the concrete outfall, as a result of deepening of the Cole over the lifetime of the concrete brook. A simple 'V' shaped channel was dug with sloping earth banks as it was decided that the brook could sufficiently shape itself. Over-specifying the design would not be cost-effective.



Concrete channel being broken up



**Figure 3.7.2**  
SECTION A THROUGH NEW AND OLD CHANNELS

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## Enhancing Straightened River Channels

The 'new' brook being excavated adjacent to the old channel. Spoil stockpiled



All spoil was stock-piled between the new and the old channel, and where this became too narrow, on the opposite bank of the old channel. This maintained the flow through the old drain and allowed all work to be carried out in the dry. Once completed, flow was diverted through the new course, and the old channel was filled using the spoil from the new.

At the upstream end of the 'new' brook the old course was blocked with rubble then plugged with live willows (*Salix spp.*) laid in during the in-filling process to form a growing plug.

The new confluence with the River Cole is on the site of the old outfall structure. The large (9m by 2m) concrete eyesore

was removed and the mouth reformed to a more natural appearance. A number of large concrete blocks, remnants of failed bank protection works, were also removed. This concrete was broken up and buried nearby.

A drainage pipe that exited at the old outfall structure was given a new stone pitched headwall which is now well hidden by growth and difficult to discern.

The works took two weeks, one of which accounted for concrete removal and breaking-up. The end result is an apparently natural 2-3m wide channel.



Live willow plug

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After – the new 'natural' Brook

### Subsequent performance 1995 – 2001

Immediately following the diversion to the new channel a dramatic change in the habitat quality of the brook was achieved in terms of landscape, visual amenity and ecology.

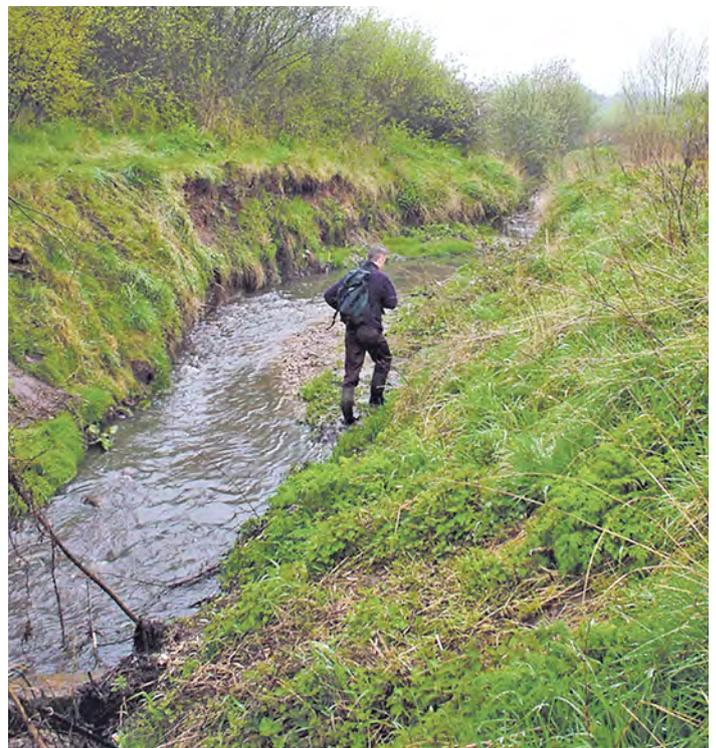
After completion winter flows quickly began to 'develop' the kinds of natural channel features one would associate with a small brook. The 'V' shape quickly transformed through erosion of the loose fill material into a much more 'natural' channel 2-3m wide. This process has continued as the site matures.

The live willow plug has grown to secure the breakout point of the new brook. This area now blends in well with the general appearance of the brook and its self-set bankside trees and shrubs.

Six years on, Yardley Brook has developed 'natural' channel features in contrast to the concrete channel previously in place. The brook still suffers from periodic poor water quality due to the dense urban population that surrounds it.

The work was deemed so successful that a further concrete length of the main River Cole was removed in 1996-1997. This type of 'demonstration' site gives added confidence to others and reduces potential risks through valuable experience.

Original Information Provider:  
Andrew Crawford



Six years on. Earth cliffs, gravel shoals and a diverse flow regime – April 2001





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## 3.7 Yardley Brook 2013 Update

Following works a more natural bed profile has been created and natural processes are now able to take place. The more natural channel has created flow variability with areas of fast flowing water and slack water at the margins, where emergent vegetation is now growing. There are still major water quality issues, as a result of misconnections, which may be investigated in the future.

The project would have benefited from following the original plan, i.e. make a shallow V shaped cross section with the excavated material placed away from the bank. Instead the soil was piled up next to the channel making a much steeper V shaped channel. Erosion has removed much of the material which has contributed to raising the bed of the River Cole, at the mouth of the brook, by some 0.4m. In addition, as a result of the new channel having too steep a gradient in some places, a nick point started to move upstream exposing a sewer pipe. To remediate this, a layer of large gravel stones was laid on top to act as a check weir to prevent further erosion.

The live willow plug at the upstream end of the brook has continued to be very successful as a bioengineered bank stabilisation method.

Following this project similar work has been carried out on the main River Cole. Concrete was broken up, and where possible, removed from the channel immediately downstream of the confluence with Yardley Brook.



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Erosion exposing sewer pipe as nickpoint moves upstream

<b>Yardley Brook</b>	Medium energy, clay
<b>WFD Mitigation measure</b>	
<b>Waterbody ID</b>	GB104028042502
<b>Designation</b>	None
<b>Project specific monitoring</b>	None



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Yardley Brook flowing into Cole



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Yardley Brook flowing into the Cole. Riparian trees and vegetation have now grown up to stabilise the banks – February 2013

### Contacts

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