



RESTORING MEANDERS TO STRAIGHTENED RIVERS

I.7 Reconnecting remnant meanders

RIVER LITTLE OUSE

LOCATION - Thetford, Norfolk TL 870812 – TL 874816

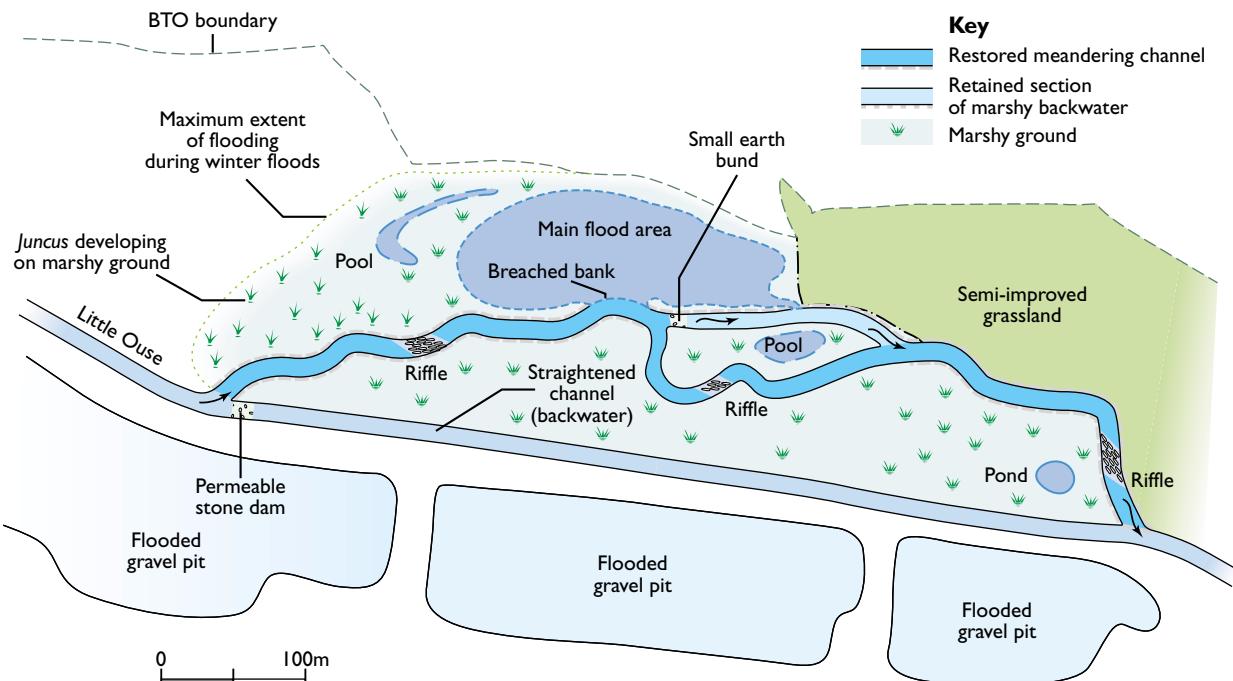
DATE OF CONSTRUCTION - 1994

LENGTH - 900m

COST - £15,000

Figure I.7.1

PLAN OF MEANDERS



DESCRIPTION

The Little Ouse is a low gradient river draining an area of mixed land use (forestry, dry grassland and arable). Sand and gravel extraction has taken place as part of a 30 year programme within the valley. This had lead to 900m of the river being bypassed by a new canalised channel.

In 1991, the site and adjacent land was purchased by the British Trust for Ornithology (BTO) to create a wetland bird reserve. BTO approached the Environment Agency to assist with restoring flows to the meandering course. The grassland on either side of the old course was beginning to dry out due to the lower water levels within the new channel, and resultant lack of connectivity between river and floodplain.



Canalised course of the Little Ouse

The new canalised course was straight, trapezoidal, c.6m wide and 1-2m deep, with 3m dry, steep banks dominated by tall ruderals and grass. In-stream habitat was poor, macrophytes were confined mainly to the shallow margins, and the substrate was dominated by sand with some silt and gravel.

The old meandering channel remained as a damp depression, merely infilled at each end during the excavation of the new cut. By restoring flows to the old channel 900m of diverse river habitat incorporating deep pools, runs and riffles would be regained, in contrast to the uniform, slack and deep water of the canalised section. Additionally, the landowner was keen to see the land adjacent to the meanders flood, restoring the lost hydrological connection between river and floodplain.

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Looking downstream along the old meanders

The marshy habitat that the isolated meanders provided would be lost through reconnection, so it was decided to retain and bypass a short 120m section of the old course. This would provide a refuge for plants and animals and a source for colonisation of the proposed wetland reserve.

DESIGN

Assessment and design of the restoration scheme was kept simple and carried out 'by eye', since the old channel was still intact as a reedy, damp depression meandering through the valley bottom.

The old course was reopened by excavating the 'plug' material from the upstream and downstream ends of the meanders. Some tree work and minor regrading was carried out along the remaining length of the original course where necessary. The very small amount of spoil was spread within the immediate reach of the excavator. The restored Little Ouse now has an average channel depth and width of 1m and 8m, respectively.

Using a 50 foot reach dragline, a boulder and stone structure was placed into the river at the upstream

end of the canalised reach (permeable stone dam on figure 1.7.1), to raise the river level by 0.6m. This would ensure that approximately 90% of flow would be routed through the re-opened course.

The structure, 6m wide by 10m long by 2m high, was constructed using 1.5 by 1m prefabricated concrete blocks below a 0.75m depth of boulder sized limestone, surfaced with 0.25m of cobble sized limestone. The 'weir' was designed to be permeable to provide a sweetening flow to the canalised channel. Flows, where levels exceed the 2m crest, will overtop and discharge through the retained canalised 'flood relief' backwater channel.

In the middle of the meandering reach a marshy backwater section was isolated with a bund at the upstream end to protect the habitat from high velocity flood flows.



Sluice, bund and upstream flooding area



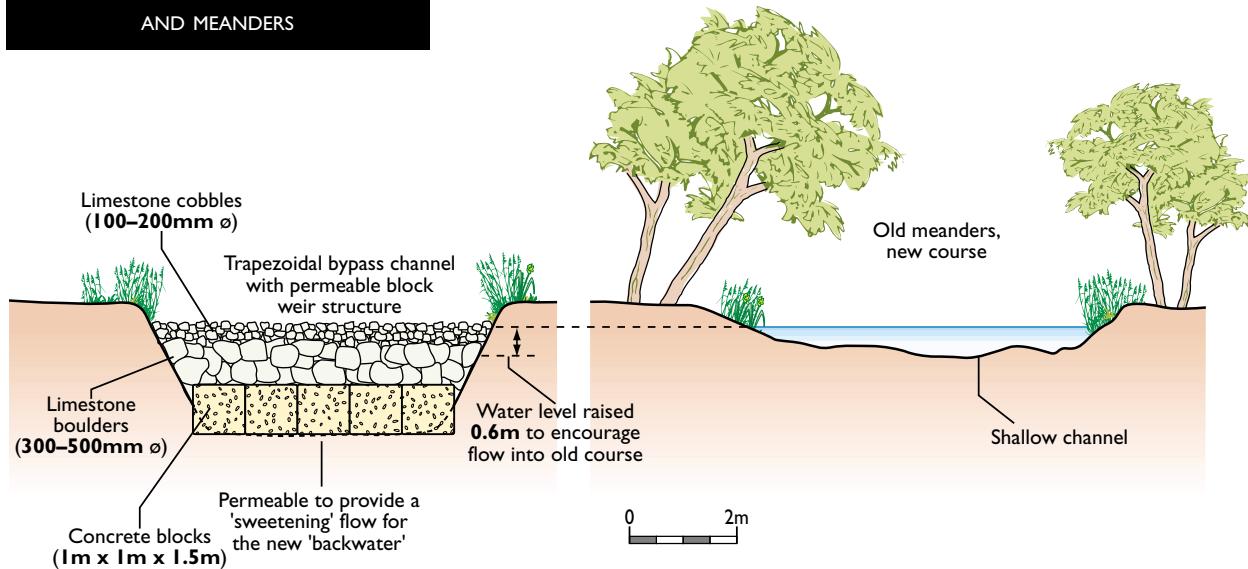
The meanders needed to be 'unplugged' at both ends



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Figure 1.7.2

SECTION THROUGH STONE DAM AND MEANDERS



SUBSEQUENT PERFORMANCE 1994 – 2000

Surveys show that the meandering channel is sustaining a diverse aquatic invertebrate community, with stonefly, mayfly and snail species which are not present in the canalised section. Fish species such as chub and dace, also not found in the straight section, are using the reconnected reach as spawning and nursery habitat.

The re-establishment of marshland plants on this site has taken longer than originally anticipated. This may be due to a combination of factors, including an inadequate seed-bank, build-up of silt deposits, and prolonged inundation. However, wildfowl and waders have not been slow to use the greater areas of shallow standing water, including nesting pairs of lapwing.



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The restored Little Ouse

Sections of fencing have been erected along the meanders to restrict grazing and poaching by cattle, and to allow marginal plant establishment.

Some scour around the weir was discovered, due to overtopping in high flows. The length of the dam and a section immediately upstream has since been revetted to minimise further scour.

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Flooding along meanders,
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