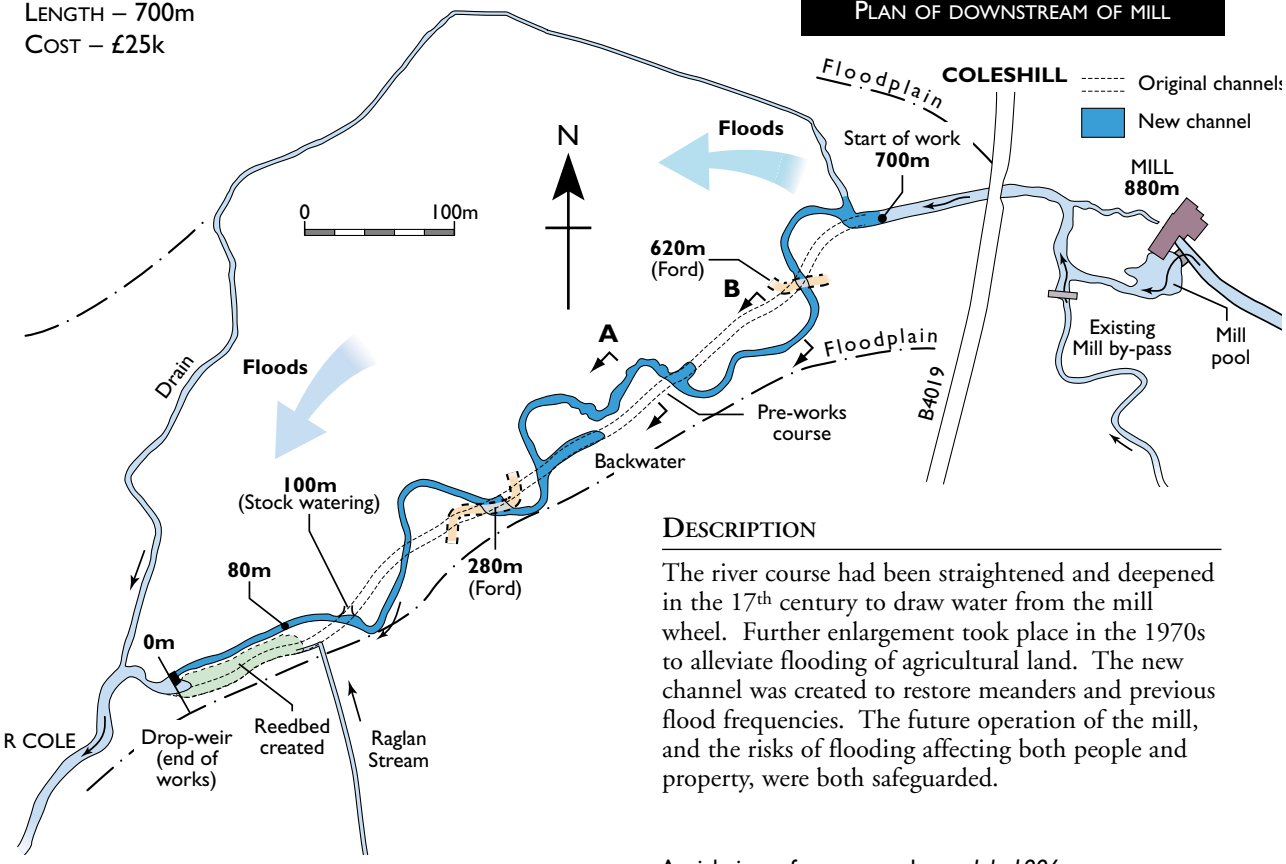
RESTORING MEANDERS TO STRAIGHTENED RIVERS

1.2 New channel meandering either side of existing

RIVER COLE

LOCATION - Coleshill, (Oxon/Wilts border) SU 234935
DATE OF CONSTRUCTION - Autumn 1995
LENGTH – 700m
COST – £25k

Figure 1.2.1
PLAN OF DOWNSTREAM OF MILL

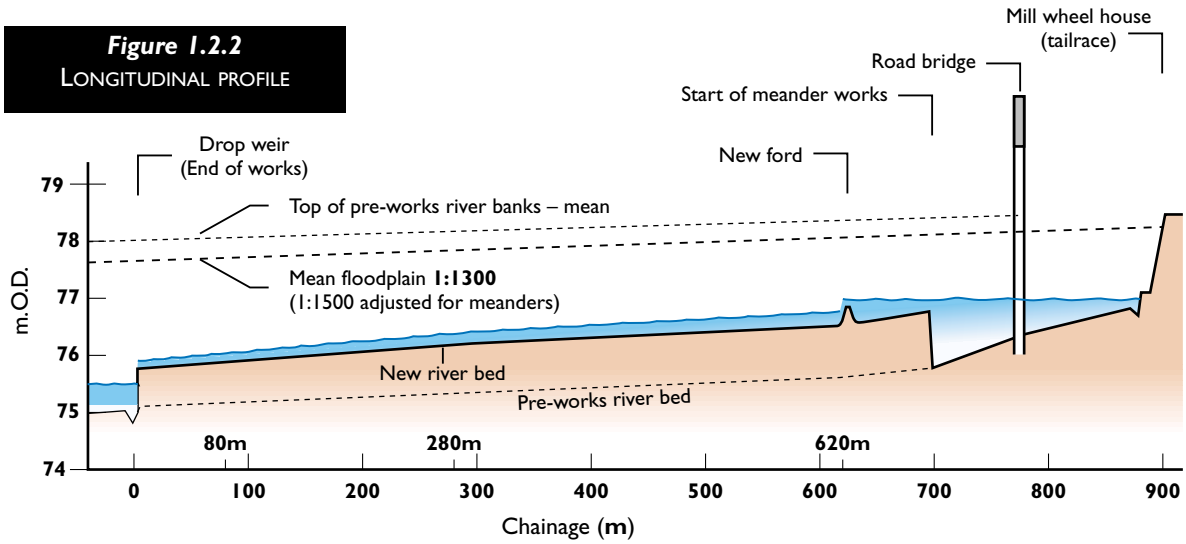


DESCRIPTION

The river course had been straightened and deepened in the 17th century to draw water from the mill wheel. Further enlargement took place in the 1970s to alleviate flooding of agricultural land. The new channel was created to restore meanders and previous flood frequencies. The future operation of the mill, and the risks of flooding affecting both people and property, were both safeguarded.

Aerial view of new meanders – *July 1996*
Photo: Environment Agency

Figure 1.2.2
LONGITUDINAL PROFILE



DESIGN

Longitudinal profile (fig. 1.2.2)
The elevation of the new river bed was raised by up to 1.0m, the maximum possible that still enabled water to flow freely from the old mill wheel tailrace. The bed gradient would ideally have paralleled that of the mean floodplain gradient (1:1300 straight; 1:1500 meandered) but was steepened to reduce the height of the drop structure needed at the down-stream end of the reach. The actual bed gradients constructed are: chainage 0-280m at 1:740; 280-620m at 1:1000; 620-700m at 1:460; these equate to a mean of 1:700.

The raised bed enabled impoundment of water upstream of the works, restoring historic levels in the mill pool and the mill by-pass. A stone ford was built at ch. 620m to safeguard water levels against any downward scour of the new bed.

Channel before works – *1994*

New channel flowing into existing channel during construction – *September 1995*

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Meanders during construction – *1995*

Alignment of channel (fig. 1.2.1)
Practical influences on the meander layout were the desire to retain several mature willows on the new river banks, and to maintain a sensible balance of land areas lost/gained either side of the old straight course. A geomorphological audit of the river, including a study of meander form evident in the downstream reach, finalised the layout. The relatively straight reach between ch. 0 and 80m avoided disturbing a fritillary meadow alongside and facilitated a riverside reedbed downstream of the Raglan Stream junction *(see Part 9)*. At ch. 280m the meander deliberately cut into rising ground just off the floodplain to provide a local cliff face c. 2.5m high.

Cross-section (figs. 1.2.3 – 1.2.4)
Section A shows a normal flow channel 2.6m wide by 0.8m deep. The geomorphological audit of the Cole indicates this to be the ideal size of channel. Because actual channel depths were greater than 0.8m, the upper banks were graded back at shallow profiles.

Section B shows a compatible asymmetrical section introduced at each bend. The deepest bed level is below the mean bed gradient to ensure that pools are sustained.

Land profiles between meanders
These were all lowered by c. 0.4m to levels that approximated to the mean floodplain levels (*fig. 1.2.2).*

Figure 1.2.3
SECTION A THROUGH SYMMETRICAL CHANNEL

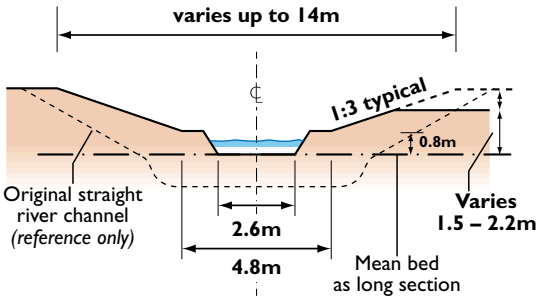
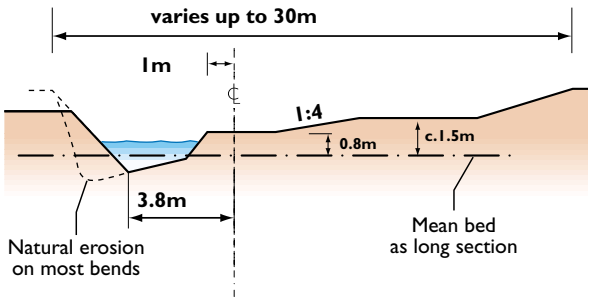


Figure 1.2.4
SECTION B THROUGH ASYMMETRICAL CHANNEL



This necessitated the removal of spoil deposited on the old river banks from the 1970s deepening works. The conveyance of flood flows across the meanders

proved to be important in achieving the necessary hydraulic safeguards during 1 in 100 year flood conditions.

The old straight channel located within these areas was largely backfilled, although not completely (*see Parts 2 and 8* for details of backwaters, fords, stock watering points, etc that were incorporated).

SUBSEQUENT PERFORMANCE 1995/8

Spates of floodwater immediately following completion of the new channel led to rapid and extensive reshaping of the channel. Cliffs were eroded, pools were scoured and gravel riffles and sandy shoals deposited, all creating desirable natural features within the reach. Excess sediments built up immediately downstream of the works, helping to restore a further reach of the original over-deep channel. Since these initial adjustments, subsequent spates have satisfactorily sustained the regime described but at a much lower rate of change. Intervention has been limited to further flattening of the profile of the inside of the south side bend at ch. 280m. The river is largely unvegetated after two summers, although marginal vegetation is becoming established. A wide range of soil types are exposed in the channel and these account for the diversity of features that are now evident.

Diverse new channel – Two years after construction. – *March 1997*

Natural cliff formation post works – *March 1997*