6

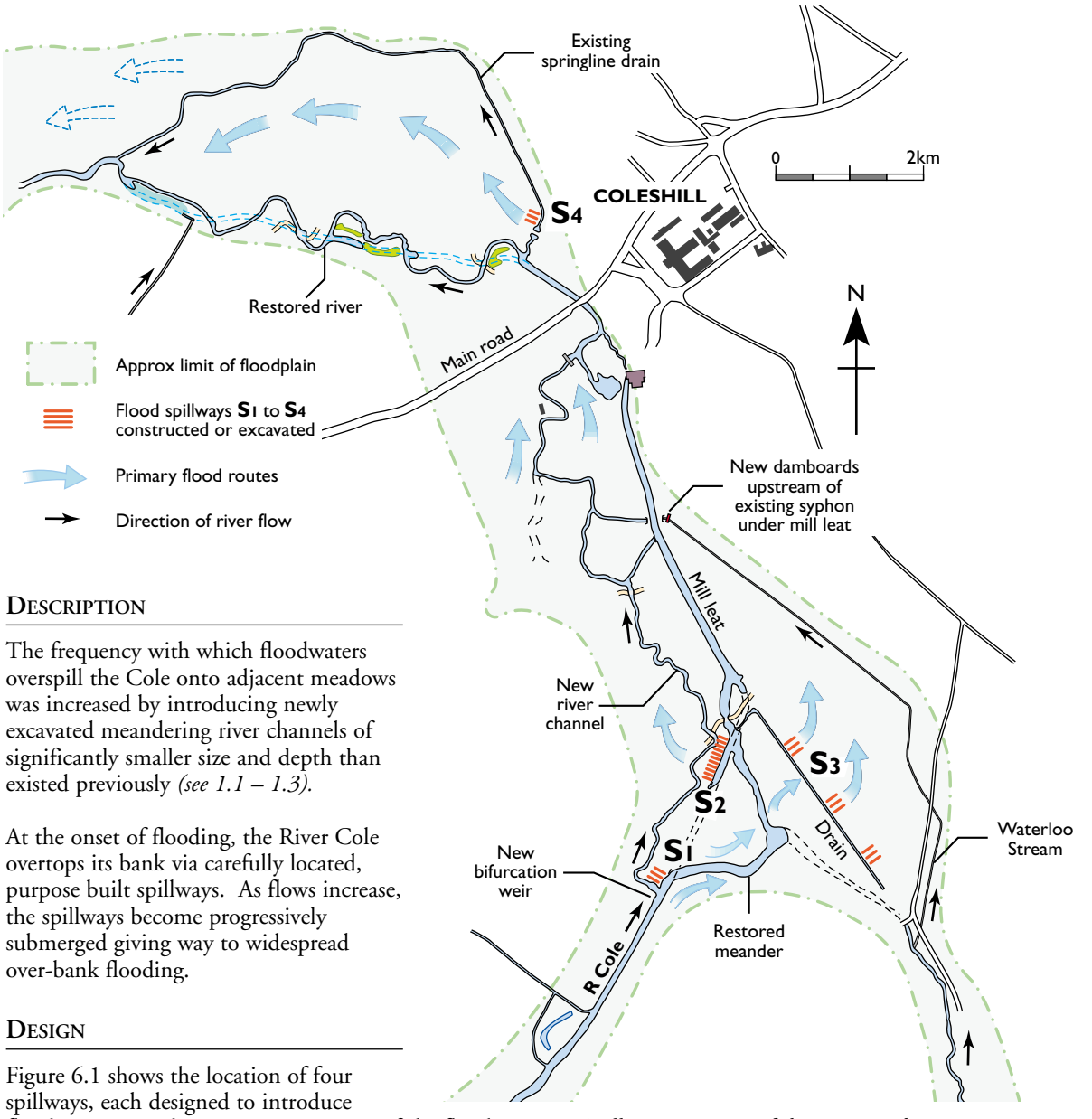
MANAGING OVERLAND FLOODWATERS

6.1 Floodplain spillways

RIVER COLE

LOCATION – Coleshill, Oxon/Wilts border, SU 234935
DATE OF CONSTRUCTION – Autumn 1995
FLOODPLAIN AREA – 50ha.
COST – Approx. £28/metre for 100m of spillway

Figure 6.1
PLAN OF FLOOD ROUTING



DESCRIPTION

The frequency with which floodwaters overspill the Cole onto adjacent meadows was increased by introducing newly excavated meandering river channels of significantly smaller size and depth than existed previously *(see 1.1 – 1.3)*.

At the onset of flooding, the River Cole overtops its bank via carefully located, purpose built spillways. As flows increase, the spillways become progressively submerged giving way to widespread over-bank flooding.

DESIGN

Figure 6.1 shows the location of four spillways, each designed to introduce floodwaters into discrete compartments of the flood-plain. Upstream of the main road three spillways (S1 to S3) operate with incremental rises in river level and flow. Downstream of the main road a single spillway (S4) introduces water to the right bank meadows. Flood waters pass under the road via the river bridge and two existing flood culverts set at field level.

Spillways upstream of the main road
Spillway S1 is located alongside the bifurcation weir which feeds water into the newly excavated river channel *(see 5.1)*.

The spillway operates early on in a rising flood and is sized such that the new channel fills to bankfull in advance of any overspill elsewhere.

Spillway **S2** . Flood flows indicated by the arrows overtop the spillway, merging with the new channel *(not visible)*

Spillway **S2** begins to operate only after **S1** has filled the new channel with water. Water spilling over **S2** passes directly into the new channel causing it to overflow its banks and initiate field flooding. Scour of the overspill is minimal because this design ensures floodwaters from both **S1** and **S2** merge without excessive turbulence.

The level at which **S2** is set is critical; it is 300mm lower than the floor of the mill further down river, to ensure floodwater is diverted away from the mill. In practice, **S2** replaced an unsightly concrete cascade weir built at the mill to protect it from flooding. The cascade has been boarded off and will be infilled once the performance of **S2** is proven to be satisfactory.

The length and longitudinal profile of **S2** was also critically determined, by hydraulic modelling, to ensure sufficient flow of floodwater down the valley to avoid worsening 1 in 100 year flood levels for isolated properties on the fringes of the floodplain. The crest has a compound profile which is surfaced in stone over the lower part.

Spillway **S3** is a previously existing low embankment alongside a field drain built to prevent water in the leat backing up the drain and overspilling into a large meadow to the east. In 1995, when the main project works were completed, no modifications to this embankment were made. Subsequently, it was verified through observation that floods rarely overtopped the embankment, so in 1998 the crest was lowered at several locations, just sufficient to gain the flood frequency desired. The only escape for floodwaters entering the meadow is via a ditch and syphon pipe under the leat. Water levels build rapidly due to this 'throttle', creating a floodlake. The embankment low spots created are all elevated 100mm higher than the crest level of **S2** so that flooding of compartments arises incrementally giving the farmer time to react if livestock are present.

Spillway downstream of the main road (fig. 8.2.2)
Spillway **S4** is located alongside a spring line drain that discharged to the river. The drain was firstly blocked with soil well back from the river to help keep the meadow damp. The redundant length of drain between the river and the staunch was then modified to carry floodwaters from the river out onto the floodplain. This was neccessary because the land alongside the river is higher than the general field levels, thereby delaying the onset of natural flooding. The drain modifications overcome this problem.

Spillway **S2** in flood

Spillway **S4**. Floodwaters spilling into field gully.

form spillway **S4**. The spillway is located close to a natural gully that meanders down through the floodplain fields and probably marks an ancient river course. The spillway was completed by shallow excavation of the field to extend the gully right up to the bank of the drain.

An access bridge was built over the drain using two 1m diameter pipes, sized to allow reasonable volumes of floodwater to pass through. The top of the crossing was kept up at the prevailing river bank level so that livestock could be evacuated, after flooding commenced via the nearby spillway **S4** (*see 8.2.)*

SUBSEQUENT PERFORMANCE 1995/98

The hydraulic performance has closely matched the predictions of the hydraulic model, which were conservatively judged to avoid excessive summer flooding when hay or livestock are in the fields. Experience of flood levels during the two summers post construction led to the slight lowering of levels at S3, described above, as well as a similar degree of lowering at **S4**.

The stone surfacing of **S1** and **S2** suffered localised scour damage which was rectified by partial reconstruction, taking greater care to ensure the predominant stone size (200mm) was evenly distributed and well compacted into turfy soil that quickly generated root and sward binding. Level pegs were driven near **S2** so that its designed crest could easily be checked for trampling by cattle or erosion by water..