



# Introduction

## 1 The Manual of River Restoration Techniques

Welcome to the third edition of the Manual of River Restoration Techniques (the Manual) produced by the River Restoration Centre (RRC) based in the UK. This update has been funded by the Environment Agency (EA), Scottish Natural Heritage (SNH), Scottish Environmental Protection Agency (SEPA), the Rivers Agency (RA), Natural England and the EU-LIFE+ Information and Communications project RESTORE. The overall aim of the Manual is to promote good practice in river restoration and management so as to support a healthy river ecosystem and, wherever possible, work with natural processes. The updated Manual contains 64 technique examples from 35 different project sites across the UK illustrating a wide range of approaches for different types of river.

Each example describes (a) how a particular objective of river restoration or management has been planned and developed by using a particular technique, (b) what the completed works comprise, and (c) how the technique performed and how it has subsequently evolved.

The work to update the Manual was carried out by RRC in 2012/13 with significant assistance from practitioners associated with the different sites. Seventeen new technique examples from different project sites have been added to the 47 existing examples described in the second edition (RRC, 2002). The new technique examples have deliberately been written in a more technical, but equally accessible, style to the existing entries. Examples range from civil engineering work on large projects to small-scale interventions using local labour and equipment.

The existing examples were updated wherever possible in the light of the performance of the techniques and the evolution of the site concerned. In both the existing and new technique examples, technique costs are based on the information provided at the time of the project completion. No inflation has been factored in. Additional information comprises a 2013 update page and a box which includes WFD, environmental designation status and monitoring information. Overall however, whilst the existing techniques have been converted to the new Manual style, with the exception of some very minor changes and, the addition of both common and the accompanying Latin terms for species, they have not been reworded.

In this new electronic version of the Manual, each section of this Introduction can be selected individually. There is an [Interactive map](#) of all sites. Furthermore technique examples can be viewed by River name, Site Designation, Technique and WFD mitigation measure ([here](#)). Techniques can be searched for using a simple table format to allow for easier navigation on mobile devices.

Whilst this Manual provides a stand-alone document it is recommended that it should, where necessary, be used in conjunction with other valuable information that is available from a range of sources. As such the RRC has compiled a [reference list](#) of supporting documentation, guidance and tools which is linked to this Manual. Additionally, where specific information is available that relates to a technique example, this can also be accessed directly from the specific study.



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**Critically, the Manual is not a design manual: the techniques cannot be transferred to another site without due consideration and appropriate design (see Section 4).**



Key points related to carrying out restoration works are given below:

- The starting point for considering the use of any river restoration technique is to develop clear objectives bearing in mind, among other factors, the assessment of the existing site and relevant attributes of the catchment.
- The initial assessment of the works site will build on past assessment, survey or monitoring activities to decide the degree of restoration that can be achieved.
- Detailed assessment is likely to require further specific studies to plan and investigate options once the decision to make an intervention is made. 'Plan and investigate' may cover environmental studies, feasibility assessments, engineering studies (e.g. foundation investigation, hydraulic loads, etc.) and socio-economic studies. The term 'intervention' is used to describe an action that changes the physical state of the river).
- Some design activities must always be carried out to establish the composition, size and location of the physical works and to specify appropriate aspects of implementation and maintenance. The extent and the output of this design work will depend on the nature and scale of the physical works and how they are to be implemented and maintained.
- In all cases, the design and implementation must be fit-for-purpose and include multiple design phases depending on the project complexity. Large civil engineering projects need to involve appropriately qualified engineers and specialist contractors. This is particularly important where the elements

of the works are subject to significant loading or public safety is involved (e.g. CDM regulations). At the other end of the spectrum, some river restoration works will necessarily be low-cost and carried out with volunteer labour and simple equipment, but still to a predetermined design.

- When the works are completed, an appropriate monitoring and maintenance cycle should be established to appraise success and the requirement for any adaptive management. The [RRC's River Restoration Monitoring Guidance](#) can assist in determining the appropriate level and type of monitoring.
- Where restoration techniques involve establishing vegetation (e.g. bankside willows or marginal reeds), aftercare should be available until the plants are well-established, or allowance for the lag-time associated with natural colonisation must be made explicit.

The process of monitoring the state of the site following the restoration works should lead to (a) confirming that the objectives have been achieved and there is no need for further intervention, and (b) a simple on-going cycle of monitoring and maintenance. Often, however, some further small intervention may be needed to 'fine tune' the state of the site if the environmental objectives are not being achieved. This process of making successive interventions to optimise or modify the restoration works is referred to as 'adaptive management'.

For further guidance on river engineering works, see the Environment Agency's [Fluvial Design Guide](#).



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