

4 Planning, design and management of restoration works

As explained in *Section 1*, the techniques in the Manual might be used in works ranging in size from small-scale interventions using local labour and equipment to large civil engineering projects. Some projects will have additional objectives such as flood risk management and amenity in addition to river restoration. Whatever the scale or type of restoration works, there is a necessary sequence of activities which might include feasibility assessments, outline design, detailed design, implementation, post project monitoring and assessment and maintenance.

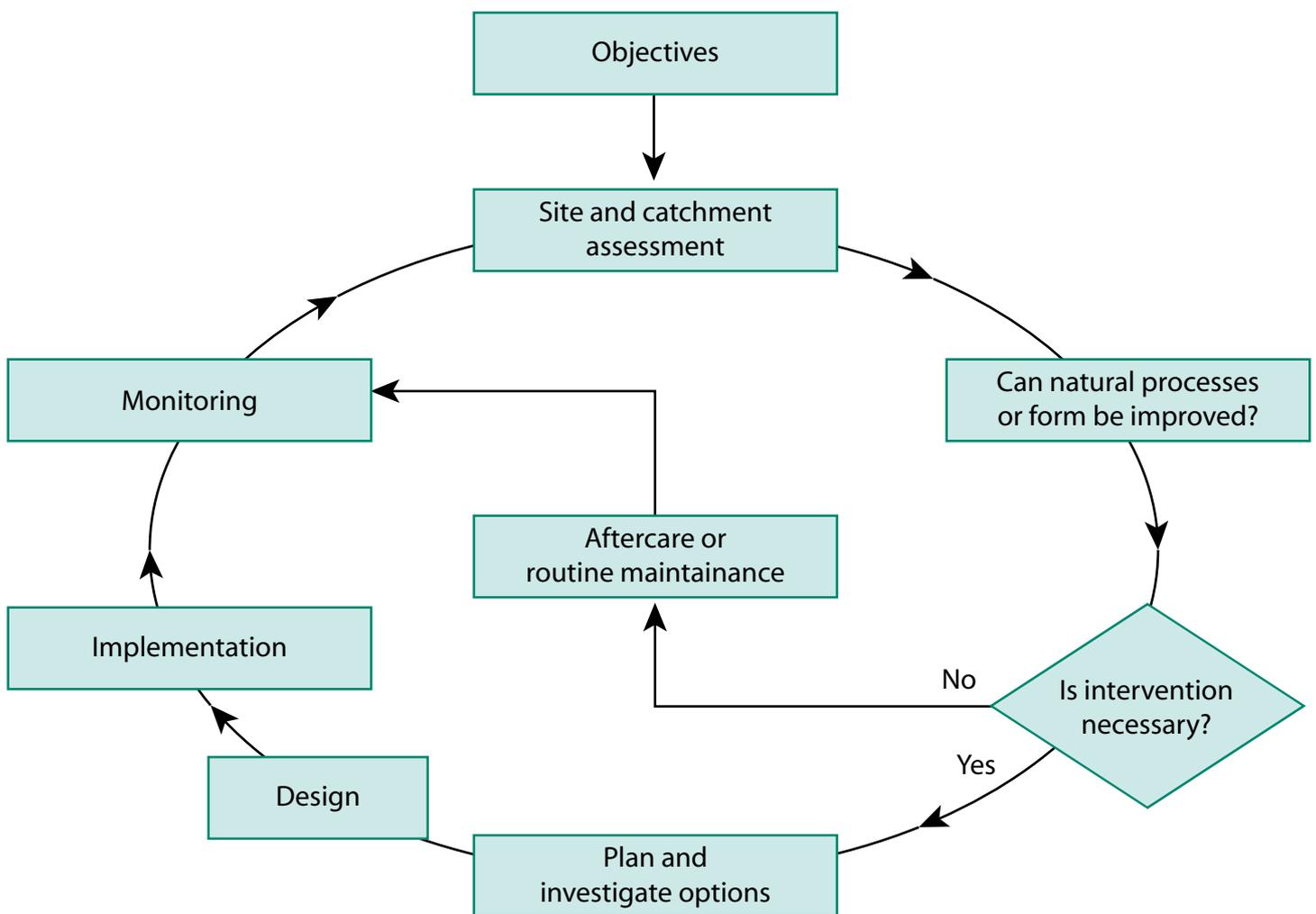


Figure 1 shows a generic ‘management cycle for river restoration works’ in which some form of restoration is implemented at a river site. The activities of the management cycle apply to both the river environment (e.g. ecological processes) and to the physical works involved with the technique (e.g. designing a bed control structure). Adapted from [EA Fluvial Design Guide](#).





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

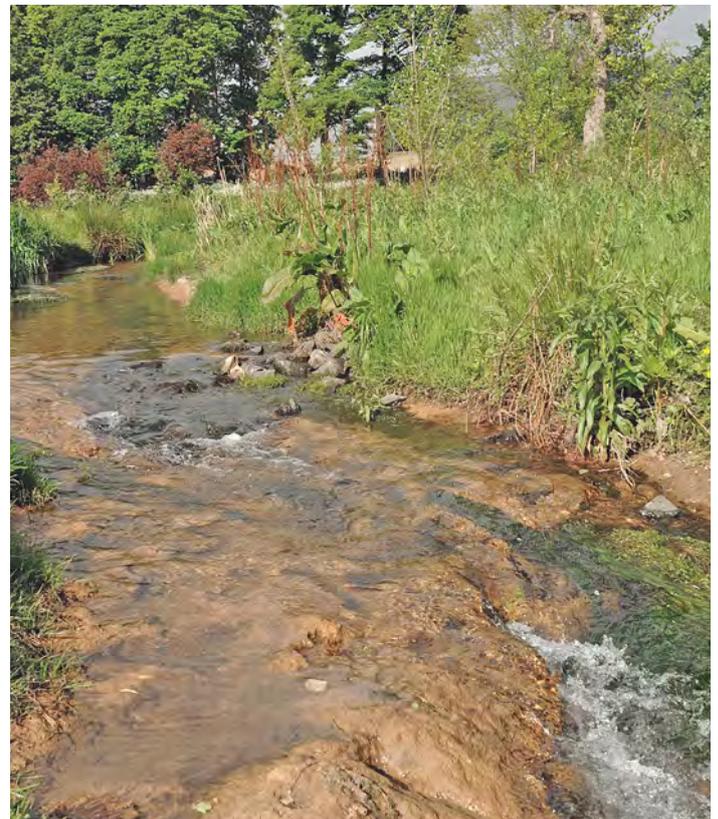
- The starting point for considering the use of any river restoration technique is to develop clear objectives bearing in mind, among other factors, the assessment of the existing site and relevant attributes of the catchment.
- The initial assessment of the works site will build on past assessment, 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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