

River sediments and habitats and the impact of maintenance operations and capital works: Stage 1

Technical Summary: FD1920

Joint Defra / EA Flood and Coastal Erosion Risk Management R&D programme

Background to R&D project

Historically, channel maintenance has been carried out with the objective of maintaining river channel conveyance and providing land drainage. In selecting methods of channel maintenance sometimes little regard has been paid to the impact that removal of vegetation or sediments may have on habitats and the whole sediment dynamics of the river at the reach and catchment scales. However, by understanding the interactions between sediments, habitats and conveyance it should be possible to develop methods and advice on best practice for carrying out maintenance that is effective, minimises the adverse impacts on the environment and potentially brings environmental benefits. This report describes Stage 1 of a project to improve the understanding of these interactions, which includes the following objectives to:

1. Quantify the impacts, benefits and influences of management and maintenance on sediment and habitat features.
2. Establish if, when and how sediment processes become self-regulatory, negating the need for further maintenance or management, where appropriate.
3. Determine the critical time at which intervention is required to manage geomorphically created sediment habitats in restored rivers for conveyance purposes.
4. Test and validate new approaches to maintenance and channel design.
5. Provide guidance on appropriate management (including no management scenarios).
6. Supply the experimental basis for adaptive management of flood control and restored channels.
7. Develop improved links between RHS outputs and flood defence management, with the former providing a guide to when modifications to management would be desirable, and then as a monitoring tool to show benefits accrued.

The primary objective of this first stage is to identify the requirements for field trials, identify suitable locations, data collection requirements and protocols for data quality, checking and storage.

Results of R&D project

The results of this Stage 1 phase specify Stage 2 of the project. It is recommended that this consist of a programme of study based on new field data that would be collected, and analysis of existing data. A list of field sites has been compiled and the issues that can be addressed at each site identified. The data that need to be collected can be classified under the following categories: historic data; hydrological data; maintenance regime and forward planning data; morphology and sediment data; habitat data; biotic data.



In addition it is recommended that data from the RHS database are analysed to provide supplementary information relating to river types and maintenance works that are not covered by the field sites.

The risks associated with Stage 2 have also been considered and methods to manage them are suggested. The primary risks are associated with the flow conditions that may be experienced during the period of the field investigations. These flow conditions will be monitored during the period of the field work and this information will be used in interpreting the data that are collected.

An estimate of the potential benefits of Stage 2 has been prepared and compared with the likely costs. These indicate that the payback period for Stage 2 is less than a year and that the benefit/cost ratio exceeds 10 if the discounted benefits are calculated over a 20 year period with a discount rate of 5%.

R&D Outputs and their Use

The results of this first stage will be used to develop Stage 2 of the project, in which it is intended that field trials and demonstrations be carried out. These results will then be interpreted to provide information on the self-regulatory nature of conveyance response, effective river management and new approaches to sustainable maintenance and channel design, including adaptive management for flood defence.

The benefits to Defra/Environment Agency (EA) of the overall project are that it should be possible to deliver present Standards of Service in terms of flood defence and land drainage while reducing adverse impacts on channel eco-systems and preferably bringing about habitat rehabilitation through natural processes.

Under the new EC Water Framework Directive (WFD) there is a requirement to put in place programmes of measures by 2016 to achieve 'good ecological status' for all water bodies, with the exception of 'heavily modified water bodies'. There is also a requirement for no degradation. It is imperative that if these responsibilities are to be met, there needs to be far greater understanding of the effects of maintenance on sediments and habitats, and ultimately the biology that the habitats support. Through greater understanding of the inter-linked processes, flood defence management could, in the future, hold the key to achieving sustainable river rehabilitation through improved management practices that encourage natural processes to sustain both habitats and conveyance.

This R&D Technical Summary relates to R&D Project FD1920 and the following R&D output:

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