



R&D Technical Summary W5A-069/TS/1

Engineering materials in flood and coastal defence – Review of current knowledge

Background to R&D project

The cost and performance of materials obviously plays a key role in achieving sustainable flood and coastal defences. In order to achieve effective overall management of defence assets, which includes optimizing performance, asset life and ‘whole life’ costs, it is necessary to have a knowledge of materials properties and to have appropriate standards, sourcing etc. Looking into all this, it became clear that the selection and use of materials needed to be addressed within the Engineering Theme programme as a subject in its own right. The objectives of this project were therefore (a) to provide a broad overview of current knowledge on materials to flood and coastal defence practitioners, and (b) to identify gaps in current knowledge or availability of information that warrants future research.

Quite separately from the review, two other work packages on materials have been funded under this R&D Project – (a) a framework for prediction of performance of rock armour blocks in coastal defence structures, and acceptance criteria for test results, and (b) provision of guidance to industry on the sustainable use of timber in coastal and fluvial construction.

Results of R&D project

Materials have been categorised as:

- Conventional, inert materials (‘Primary materials’) – rock, masonry, steel, aggregates, concrete, asphalt, geotextiles and plastics
- Natural materials – timber, willow, faggots, grass
- Reclaimed/recycled materials (‘Secondary materials’) – including construction/demolition waste, railway ballast, by-products from china clay production, slate and colliery waste, material from maintenance dredging, spent foundry sand, scrap tyres, incinerator waste.

Materials have been considered in the context of the overall structure or system in which they are used. In some cases, they form composite materials in combination with other materials.

With most materials, current good practice was found to have been recorded in some form of guidance document or paper that either already exist or are in the process of being prepared. In some cases, existing guidance was found to be outdated and in need of being rewritten to reflect better the current context and issues related to the particular material. For example, this is now being done through CIRIA for the Rock Manual.

R&D Outputs and their Use

Materials are considered in terms of (a) physical issues – strength, weight, durability etc; (b) economic issues – availability, whole life cost, adaptability (including buildability, maintainability, replaceability); and (c) environmental and social issues (compatibility with existing structures and natural features, social acceptance, ecological impact, and sustainability of use). Key references are given for each area and material type. This forms a useful set of references for the practitioner.

Future research needs are summarized. Two key reference manuals are proposed on concrete and masonry. Other related work is proposed on pilot projects, particularly on recycled materials as these will not be fully utilised unless improved standards and performance data are made available. The proposed research in this document will be considered with other potential funders in establishing the Joint Flood and Coastal Defence R&D Programme for 2005/06.

This R&D Technical Summary relates to R&D Project W5A-069 and the following R&D outputs:

- **R&D Technical Report W5A-069/TR1 - *Engineering materials in flood and coastal defence – Review of current knowledge*** June 2004

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The above outputs are available on the Defra / Environment Agency webpages for the Joint Flood and Coastal Erosion Risk Management R&D Programme. These are currently at www.environment-agency.gov.uk/floodresearch, and will be incorporated into the new Defra-hosted webpages at www.defra.gov.uk/enviro/fcd/research (use the search tool located on the project information and publications page).

Copies of the Technical report are held at the EA Information Centre. They can be purchased from the EA National Customer Contact Centre by emailing enquiries@environment-agency.gov.uk or by telephoning 08708 506506.

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