

## **R & D Technical Summary W5B-028/TS**

# **Risk evaluation of Agency flood storage reservoirs**

### **Background to R & D project**

This Agency R & D project was a pilot study into the use of the CIRIA methodology on flood storage reservoirs (FSRs). It involved the application of the CIRIA methodology to five contrasting FSRs.

CIRIA Report C542: 'Risk Management for UK Reservoirs' was published in 2000 following a study partly funded by the Environment Agency. It involved the development of a risk assessment methodology to enable reservoir owners to rank their sites in terms of risk and hazard, and assist with the prioritisation of any works required. The CIRIA study concentrated on reservoirs that were full of water much of the time, which is not the case with most of the Agency's flood storage reservoirs, which normally only impound water during floods.

The principal objectives of the present study were:

- to evaluate the application of the CIRIA methodology to FSRs;
- to determine any modifications needed to the methodology before it is used on all the Agency's reservoirs which come within the ambit of the Reservoirs Act 1975; and
- to advise on further research required to develop the methodology for such use.

The study also considered the identification of risk mitigation measures in the unlikely event of failure of a flood storage reservoir.

### **Results of R & D project**

The study adapted and applied the method to five FSRs. Potential benefits of applying the method include: prioritisation of safety works, maintenance and monitoring, identification of possible failure modes; preparation of emergency plans and ensuring good practice maintenance regimes are implemented.

It was concluded that the CIRIA methodology was valid and there were benefits in using it for flood storage reservoirs. But some specific issues were identified. A particular problem arose in the difficulty in identifying the impact of dam failure on an already flooded valley, and further research into this issue is recommended. The 'Location Cause Indicator (LCI)' diagrams in the CIRIA methodology were not wholly applicable to flood storage reservoirs and a more appropriate LCI diagram for flood storage reservoirs has been developed during the study. The study demonstrated that risk assessments are best undertaken by personnel well acquainted with the reservoir and its environment. Operation and maintenance were identified as key issues in ensuring that flood storage reservoirs function properly when required. A brief comparison was also made with risks at impounding reservoirs and from other hazards such as nuclear and offshore and industrial plant.

Additional research is recommended into the impact of dam failure on a flooded valley and also that risk assessments should be undertaken on all the Agency's flood storage reservoirs in dam categories A and B (i.e. those where lives are considered to be at risk). In order to ensure consistency, all the risk assessments should be reviewed by a single experienced reservoir panel engineer.

A separate, brief study was carried out into the possible use of the CIRIA methodology for linear flood and coastal defence structures. That investigation is being used internally by the Agency in its

development of risk assessment tools and is reported in an internal Technical Report.

## **R & D Outputs and their Use**

The principal output is the R & D Technical Report W5B-028/TR1. This reports on the use of the CIRIA method for Agency flood storage reservoirs. It includes the results of an initial trial application to five reservoirs, a review of relative risks, a review of the CIRIA methodology, and recommendations for development and application of the methodology for flood storage reservoirs.

One issue which needs further investigation is that the standard methodology may lead to an overestimate of the risk of flood storage reservoir failure, since a valley downstream may already be flooded at times when a storage reservoir failure is most likely. This will require a further study to enable a realistic assessment of the impacts of reservoir failure under those conditions.

It is recommended that the methodology be applied on 1 or 2 FSRs in each region under worst case conditions and information collected to identify if further refinement of the methodology is required.

An internal Technical Report W5B-028/TR2 has been prepared to advise the Agency on the applicability of the CIRIA approach to linear river and coastal defences. This is being used to guide the development of risk assessment tools in the Agency.

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This R & D Technical Summary relates to R&D Project W5B-028 and the following R&D outputs:

- **R & D Technical Report W5B-028/TR1** Evaluation of risks associated with environment agency flood storage reservoirs. Published September 2003.  
Publication Internal Status: Released internally. External Status: Released to Public Domain.
- **R & D Technical Report W5B-028/TR2** Evaluation of risks associated with environment agency flood storage reservoirs - application of CIRIA Report C542 to linear defences. Published September 2003  
Publication Internal Status: Available internally. External Status: Web-based dissemination

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The output W5B-028/TR1 can be obtained from the Environment Agency's National Customer Contact Centre by emailing [enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk) or by telephoning 08708 506506.

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