

# Scoping the Risk Assessment Process for Small Reservoirs

Technical Summary: FD2640

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

### Background to R&D project

The aim of this project is to scope methodologies that will allow an assessment to be made of the risk posed by raised reservoirs with a capacity of less than 10,000m<sup>3</sup>. The methodology will be used for two different purposes.

The first is to inform decisions arising from the Flood and Water Management Act. The Act enables reservoirs of 10,000m<sup>3</sup> or larger to be brought within reservoir safety legislation (the Reservoirs Act 1975 currently only covers reservoirs with a capacity greater than 25,000m<sup>3</sup>). This project has scoped risk-based methodologies to provide an evidence base for this minimum reservoir volume. This is because the Act contains powers for the 10,000 m<sup>3</sup> figure to be adjusted upwards or downwards according to evidence. Evidence as to whether it needs to be adjusted upwards would be derived from the registration and risk-assessment process. However, the Act provides no process by which evidence can be gathered as to whether the figure is too high. For the purpose of determining the appropriate minimum reservoir volume to be included within reservoir safety legislation only the risk to life due to an unplanned escape of water will be considered.

The second use of the outputs is to develop a methodology to satisfy the Environment Agency's obligations with regards to reservoirs under the Flood Risk Regulations 2009. This legislation requires the Environment Agency to determine in relation to each river basin district whether, in its opinion, there is a significant flood risk from the sea, main rivers and reservoirs. For those areas identified as flood risk areas a flood hazard map and flood risk map must then be produced. For reservoirs this process has been started with the National Reservoir Inundation Mapping project (NRIM) which has carried out reservoir inundation mapping for all reservoirs registered under the Reservoirs Act 1975. However, the Environment Agency must assess the flood risk posed by all reservoirs, including those with a capacity of less than 25,000m<sup>3</sup>.

### Results of R&D project

An assessment of the available data sources has shown that individual reservoir parameters (such as dam height and storage volume) are likely to be both costly and time consuming to acquire, and may be of questionable accuracy. In contrast reservoir locations, ground topography and details of flooding receptors are relatively easy to obtain and are generally of a good quality.

Three methodologies that will allow an assessment to be made of the risk posed by small raised reservoirs have been scoped. These have differing levels of accuracy and anticipated costs:



- High Level Screening – generalised qualitative analysis requiring little input data and producing a comparative consequence score for each reservoir location
- Intermediate – risk assessment based on detailed modelling but with assumptions made regarding reservoir details. 2D modelling carried out for each reservoir location using a set of dam breach hydrographs representing a range of potential reservoir volumes
- Detailed – risk assessment based on detailed 2D modelling and using individual reservoir details to produce a specific breach hydrograph for each location

## R&D Outputs and their Use

Following testing of the methodologies on a small case study sample the following recommendations have been made:

- The High Level Screening method has been found to be significantly more time-consuming and subjective than anticipated. It delivers outputs that are considerably less useful than the other proposed methodologies, but may be more costly to implement. It is therefore recommended that this methodology is not developed further.
- The Intermediate method uses simple inputs and produces results that can be used to provide an evidence base for the lower limit on reservoir volume for the Flood and Water Management Act. This method cannot produce individual risk assessments for each reservoir as it uses generic breach hydrographs. However, it provides a detailed assessment of the level of risk of each reservoir location
- It is likely to be both time-consuming and costly to obtain the individual reservoir details necessary to carry out the Detailed method. The information cannot be obtained with sufficient accuracy from a desk study so it would be necessary to conduct site visits, or request this information from reservoir undertakers. It is therefore recommended that this methodology is not used on all reservoirs. However, it may be possible to use the results from the Intermediate method to target detailed risk assessments on only those reservoir locations shown to potentially pose significant risk.

This R&D Technical Summary relates to R&D Project FD2640 and the following R&D output:

**R&D Technical Report FD2640/TR1 – Scoping the Risk Assessment Process for Small Reservoirs.** Published May 2010.

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The above outputs may be downloaded from the Defra/EA Joint R&D FCERM Programme website

<http://evidence.environment-agency.gov.uk/FCERM/>

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