Improving the overtopping resistance of existing flood detention reservoirs

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SYNOPSIS Recent Reservoirs Act inspections identified a number of concerns with the ability of several flood detention reservoir embankments to accommodate overtopping flows during extreme flood events without significant risk of failure. The issues identified arose from a number of sources, including changes during construction to accommodate adjacent landowners’ concerns; construction outwith required tolerances and improved understanding of risk. Lessons learned from these will be summarised to provide guidance for investigations to be considered during future inspections.

While the works required in the interests of safety identified were in principal straightforward – raising embankments to prevent overtopping, lowering embankments to create spillways, installing crest beams, and using different types of reinforced grass e.g. Ankalok blocks, Salix Vmax and Enkamat – the application of these presented several challenges to the designs, including:

- Causing an increase in flood risk downstream of the reservoir over a range of intermediate frequency flood events, through lowering an auxiliary spillway to prevent the main embankment overtopping in an extreme event.
- Balancing environmental concerns and cost with different erosion protection systems, embankment slope and resulting landtake.
- Controlling a short term potential increase in risk of failure while a new protection system, to achieve greater long term security, is established.

During the construction stage several difficulties were encountered in achieving a satisfactory interface with the existing erosion protection, contractor self-supervision and maintenance once the contractor had
completed the initial construction. The paper concludes with lessons learned for the benefit of future projects.