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Discussion: Detailing of flood-detention reservoirs for resilience

Paul Perry BSc (Hons), CEng, MICE, MIStructE, MHKIE
Associate Director, Hewson Consulting Engineers, Guildford, UK
(paul.perry@hewson-consulting.com)

Contribution by Paul Perry

I congratulate the authors on an interesting paper, however, having been involved in a number of hydraulic, dam and maritime structures in the course of my career so far, I would suggest that future structural engineering assessment of flood-detention reservoirs would be improved if:

- Standard drawing list was promulgated such that individual sections of drawings for: ground investigation, advanced works, general arrangement plans and sections, concrete detailing, secondary detailing, envisaged construction method, temporary works left in the ground and third-party detailing, were adopted.
- Design criteria were available at the time of each inspection, rather like an approval in principle for a bridge.
- Structural assessment was followed in accordance with the appraisal of existing structures (IStructE, 2010), which as it states in chapter 1 applies to all structures even if it refers to buildings.

Adopting this 'golden thread' of information (Martin and Phillips, 2021) would assist in future inspection, alteration and adaption and assist in future resilience for flood-retention reservoir structures. This would also assist to assure performance of these structures and I would suggest these are relevant emerging issues that ought to be considered, as well as those stated in the paper.

Author's reply

The authors thank Mr Perry for his contribution.

The authors note the suggestion for a standard drawing list to standardise the approach to various subject areas listed and agree that in principle it is a good idea. The Environment Agency has tried to develop standard drawing details through collaboration with the framework consultants at the time, which covered flood-risk management works and not just reservoirs. However, it has often not been applied in practice, for reasons including the fact that different consultants, and even different offices within one consultant, have different preferences. Also, climatic conditions and site usage vary between sites (e.g. Northumberland against London). However, we will raise this with the Environment Agency as the main organisation promoting new reservoirs, and noting that it would also benefit lead local flood authorities and developers, as they also promote flood-detention reservoirs.

In terms of design criteria this should already be available both in the Health and Safety file under CDM, and also through the requirement of section 7(6) of the Reservoirs Act, which requires a 'Certificate of efficient execution', to include *'drawings and descriptions giving full information of the works actually constructed'*. Although it does not specially require 'design criteria' these are normally included in the designer's design report, which is normally annexed to the certificate.

We note the suggestion to use IStructE guidance on appraisal of existing structures, and note that the British Dam Society (BDS) includes a list of the guidance relating to operation and periodic safety inspection of dams at https://britishdams.org/reservoir-safety/res-safety-resources/. These are continually reviewed and updated. There is also an Institution of Civil Engineers committee which was established in 2001, meets four times a year, and reviews the need for research or guidance to improve reservoir safety, the Reservoir safety research advisory group (ReSRAG) of which one of the authors was a previous chair, and another is a current member. We will suggest that BDS add the IStructE guidance to the list of guides on the BDS website, as this is likely to be particularly useful when considering appurtenant structures at a dam.

We agree that flood-detention reservoirs are now one of the main types of new reservoirs constructed in the United Kingdom, and compared to other UK reservoirs are relatively young, so there are emerging issues in terms of design, operation and maintenance. We agree that the points raised are part of improving good practice, which is why the authors produced the paper under discussion.

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