

R & D Technical Summary W5-031/TS

Failure on-demand of Flood Defence Scheme Components

Background to R & D project

This project is a key to understanding risk and reliability associated with components of the flood defence system such as gates, culverts, flaps, and pumping systems. In the past there have been failures of these components but there has been no collection of data and analysis of frequency and effects. The intention is to provide a framework and data for design, appraisal and management of flood defence systems on the reliability of components. More specifically the project aims were to:

- Obtain data on failure of components and reasons for failure.
- Analyse the reasons for failure.
- Produce estimates of failures and their impacts on the needs of flood defence, navigation and flood warning.
- Develop methods for appraising the importance of particular components relative to the needs for flood defence, navigation and flood warning, and for further research on performance and reliability of flood and coastal defence structures.
- Produce guidance notes on the selection of alternative components for design and flood warning purposes and procedures for operational purposes.

Results of R & D project

A first pilot database system has been developed and a set of preliminary results was generated. The failure estimates produced from the database at this stage are calculated by averaging across the entries relevant to a chosen system or component. They are higher than might be expected because they currently do not account for similar components that are in operation that have not failed. Corrections for this will be undertaken in the next phase of work.

To date, it is estimated that between 12 % and 15 % of failure incidents that have occurred over the past 10 years have been captured. This suggests that there is potential for increasing the size of the data set by at least six times. Together with other methods of ‘adding value’ to the data, this indicates that potentially there should be enough data to formulate reasonable estimates of component failure rates. As well as capturing numeric data for calculating failure rates, other general knowledge of the causes and potential severity of incidence have been captured. This knowledge base offers an invaluable resource aid in the development of best practice in the future.

The main issues requiring additional attention are:

- consolidation and further data gathering;
- data checks for spurious or anomalous entries;
- additional analysis to add value to the data;
- recording of future failures;
- further development of the database.

R&D Outputs and their Use

The principal output is the R & D Technical Report. This will be used to define the reliability of flood defence components and to inform future collection of data on component reliability. It also provides an initial 'default' data for reliability of some types of component. This is a fundamental element of recent models of risk, which seek to understand the performance of whole systems including static flood defences as well as mechanical and electrical operated systems.

It is proposed to carry this work forward as a key part of the PAMS (Performance Based Asset Management System) project currently being developed, since this will be the main operational tool for managing and assessing risks at the level of components and structures.

This R & D Technical Summary relates to R & D Project Failure on-demand of Flood Defence Scheme Components No. W5-031 and the following R & D outputs:

- **R & D Technical Report W5-031/TR - *Interim Report on Failure on-demand of Flood Defence Scheme Components – Phase 1 Data Gathering and Pilot Database Development.*** April 2003

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