



Accounting for Residual Uncertainty – an update to the fluvial freeboard guide

The Environment Agency has published a new research report that will help flood risk managers identify and manage the uncertainty in their flood risk assessments and flood defence designs. This new guide is written for all flood risk management authorities, developers, and engineering consultants who work on their behalf. The Environment Agency and Natural Resource Wales are now exploring how to adopt this research in their work.

Flood risk management is inherently uncertain; flooding events are highly random and the relative performance of different options to manage risk is only partially understood. The use of freeboard during the design of a new flood defence, or as an allowance for setting finished floor levels in new development, provides the designer with a degree of confidence that the project will perform as designed.

Why is a new guide needed?

Over the 18 years since the last guide was written we have seen a shift from flood defence to flood risk management. The Environment Agency has also developed and advanced its models, tools and methods.

The new guide takes a step away from simply adding freeboard values to design defence crest levels. Instead the user is encouraged to think about a range of possible management responses. In addition, the methods that have been developed can be applied to all sources of flood risk – expanding the scope of the old guidance which only covered fluvial situations.

What else has changed?

The initial stages of this work involved reviewing how freeboard had been applied in flood risk decisions to date. This review identified that the freeboard allowance was inconsistently applied and with limited justification. In some cases, a freeboard was adopted to account for uncertainties that were already addressed by the appraisal or the design process (for example, through the use of factors of safety).

The new guide addresses these issues and will help you as it:

- provides a structured method for identifying uncertainties across the flooding system
- ensures that any factors of safety used in the design process are not duplicated
- helps users consider all appropriate actions for managing uncertainty across the source pathway and the receptor
- ensures uncertainties are identified, managed and tracked as a project moves from the strategic case through the appraisal process to design and delivery
- provides a hierarchy of methods to ensure the management of uncertainty is proportional to the decision

These fundamental changes are captured in 5 principles which underpin the guide. Figure 1 explains how the residual uncertainty allowance can be identified by considering these principles.

Figure 1: Five principles for managing residual uncertainties



Why should I read the new guide?

You should use this guide when:

- planning for a new development
- appraising and designing a new flood scheme
- assessing the standard of protection of an existing flood defence

The guide show you how to identify and combine uncertainties relevant to your decisions, and enables appropriate management actions to be developed. All methods are illustrated through the use of case study examples.

Further information on the sources of uncertainty and templates to help with their assessment are provided.

How will the new guide help the Environment Agency?

The Environment Agency and Natural Resources Wales are undertaking pilot testing of the new guide to better understand how this research may affect the provision of flood risk management and planning advice as well as during the delivery of flood risk management projects.

Our peer review process

The new guide was developed by the Environment Agency in collaboration with HaskoningDHV and Sayers and Partners. It was reviewed by a Project Advisory Group made up of representatives from the end-user community including:

- risk management authorities
- academia
- engineering suppliers
- the Environment Agency's National Capital Programme Management Services

The guide was also independently peer-reviewed by John Ash, who co-authored the original fluvial freeboard guide.



How can I obtain a copy of the guide?

An electronic copy of the guide is freely available from the GOV.UK website.

This summary relates to information from project SC120014, reported in detail in the following output(s):

Report: SC120014/R

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