

Fluvial Freeboard Guidance Note

Scope - the Guidance Note covers Freeboard for flood defences subject to fluvial conditions. It does not provide guidance for tidal and coastal situations, reservoirs or dam freeboard.

It considers the various methods and 'rules of thumb' which have been used historically for calculating Freeboard and suggests a more rational approach – one in which site specific conditions are actively taken into account as well as uncertainty.

The method can be used in the design of new flood defences and can also be used to assess the Standard of Protection of existing flood defences.

Freeboard is defined as an allowance to take account of:

- Physical processes that affect the defence level, that have not been allowed for in the design water level
- Adverse uncertainty in the prediction of physical processes that affect the defence level.

The inclusion of an allowance for uncertainty provides a *safety margin* that ensures that the defence will perform with a high degree of certainty to the required standard of protection.

The inclusion of Freeboard in the design of schemes has sometimes created difficulty in the economic appraisal. The Guidance Note clarifies how this should be dealt with and how Freeboard relates to the 'Standard of Protection' and the 'Threshold of Flooding'.

The procedure for calculating Freeboard is presented as a four stage approach, viz:

- Stage 1 - The Physical Processes that affect the defence performance are determined.
- Stage 2 - The uncertainty in the design water level and physical processes is calculated
- Stage 3 - The magnitude of the uncertainty is assessed and reduced if necessary
- Stage 4 - A review of how the flood defences will perform is done to finalise the freeboard.

The importance of Stage 4 is emphasised because the assessment of Freeboard is complex and not all elements of Freeboard can be readily quantified. The proposed method is therefore not intended to be a 'Black Box' approach, in which the data is processed blindly and an answer is churned out. The user is encouraged to apply common sense to ensure that the answers obtained are of the right order.

This Guidance Note has been written to assist Flood Defence Engineers responsible for the design and economic appraisal of fluvial flood defences.

Brief overview of the Contents of the Guidance Note

Chapter 1 - Introduction and definition of Freeboard.

Chapter 2 - The rationale for Freeboard, Standard of Protection and Economic Appraisal

Chapter 3 - The Freeboard Procedure - A step by step approach to applying Freeboard

Chapter 4 - The Physical Components of Freeboard identified and Quantified

Chapter 5 - The Uncertainty Component of Freeboard – Quick Method of Determination

Chapter 6 - The Uncertainty Component of Freeboard – Detailed Method of Determination

The Outputs from project W5-042 are:

R&D Technical Report W187: Fluvial Freeboard Guidance Note

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External Status: Released to Public Domain

R&D Project Record W5/042/1: Fluvial Freeboard: Background Information

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