

# science summary



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## **EurOtop - Wave overtopping of sea defences and related structure: Assessment manual**

Science Summary SC050059/SS

A new manual commissioned by the Environment Agency offers up-to-date guidance on assessing the overtopping performance of seawalls and dikes, drawn from European experiences and expertise.

The manual, based on research for the Department of Environment, Food and Rural Affairs and the Environment Agency, carried out by HR Wallingford, outlines techniques for predicting the mean overtopping discharge and consequent flood volumes and drainage requirements for a range of seawall types. Holland and Germany have carried out extensive research into overtopping at embankments and dikes, and the recent European research project CLASH has expanded our understanding of overtopping.

EurOtop draws on advice developed for equivalent guides in the Netherlands and Germany, and incorporates the latest techniques and data from European and UK research on wave overtopping predictions. It covers many types of sea and shoreline defence structures, provides details on overtopping responses, and includes a wide choice of how to calculate those responses. It is supported by a web-based calculation tool that guides the user through a series of steps to predict overtopping, as described in the manual.

EurOtop can help an engineer to analyse the overtopping performance of any type of sea defence or related shoreline structure in Europe. The methods described can be used for current performance assessments and for longer-term design calculations. The manual defines different types of structure, provides definitions for each of the parameters, and gives some guidance on how the results should be interpreted. It discusses waves and water levels in the context of overtopping, and wave overtopping processes. The manual covers the different methods available for predicting or assessing overtopping discharges, such as empirical methods, physical modelling and numerical techniques.

A chapter on embankments and dikes discusses empirical wave overtopping methods for coastal dikes and embankment seawalls. This expands upon the techniques described in previous manuals for simplified embankment structures and explains how to assess overtopping discharges on compound embankment structures.

Rubble mound and armoured slopes are discussed separately and new coefficients for a wide range of armour types are given. A final chapter describing the empirical methods concentrates on vertical, steeply battered and compound vertical structures. Considerable research on vertical structures has been completed since previous manuals were published, and several new techniques are included.

Each of the empirical methods describes how deterministic and probabilistic overtopping assessments can be made, and the degree of any uncertainty that should be considered. Methods are described to adjust predictions to allow for any scaling or wind effects. The manual can be downloaded from <http://www.overtopping-manual.com/>

Accessible from the website, an online calculation tool guides the user through a series of steps to establish empirical overtopping predictions for embankments and dikes, rubble mound structures and vertical structures. By clicking on graphical representations of structure types and structural features, and by adding the dimensions of the geometric and hydraulic parameters, a range of outputs are calculated and displayed online.

A tool developed from a Dutch overtopping manual is also available for online calculations. The CLASH Neural Network calculation tool can be downloaded and can be used for structures of an unusual geometry. The calculation tool can be found at [http://www.overtopping-manual.com/calculation\\_tool.html](http://www.overtopping-manual.com/calculation_tool.html).

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