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## Design of rainwater detention basins

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Traditionally in Denmark, rainwater detention basins are designed based on an input box rain with a given return period and a constant outflow from the basin. The water authorities specify the outflow rate in order to avoid erosion in the recipient. Intensity-Duration-Frequency (IDF) curves are used as a prerequisite for the method. Given the design return period, and varying the duration of the box rain, the basin volume that prevents spill from the basin can be determined. By analysing for a series of outflow rates, a basin volume curve for the selected return period can be developed. The current practice is revisited, and a new analytical solution for the duration of the design rain is found.

A constant outflow rate for the basin is, however, not always a realistic assumption, and thus there is a risk for underestimation. An alternative design method has been analysed, assuming that the outflow from the basin takes place corresponding to a linear reservoir with maximum outflow rate equal to the one specified by the water authorities. The method is described in detail, and the results compared with those of the current guidelines.