

Quantifying the failure probability of a canal levee

Authors: Lendering K.¹, Schweckendieck T.¹, Kok M.^{1,2}

¹Faculty of Civil Engineering and Geosciences, Delft University of Technology, Delft, The Netherlands

²HKV Consultants, Lelystad, The Netherlands

Abstract

Polders in the Netherlands are protected from flooding by flood defence systems along main water bodies such as rivers, lakes or the sea. Inside polders, canal levees provide protection from smaller water bodies. Canal levees are mainly earthen levees along drainage canals that drain excess water from polders to the main water bodies. The water levels in these canals are regulated. During the last decades, probabilistic approaches have been developed to quantify the probability of failure of flood defences along the main water bodies. This paper proposes several extensions to this method to quantify the probability of failure of canal levees. These extensions include a method to account for (i) water-level regulation in canals, (ii) the effect of maintenance dredging on the geohydrological response of the canal levee and (iii) survival of loads in the past. The results of a case study demonstrate that the proposed approach is capable of quantifying the probability of failure of canal levees and is useful for exploring the relative benefit of risk mitigating measures for canal levees.

Keywords: Canal levee; flood risk analysis and management; reliability analysis; quantitative risk analysis

The full article can be requested at the publisher or at HKV consultants (secretariaat@hkv.nl), for personal use only.