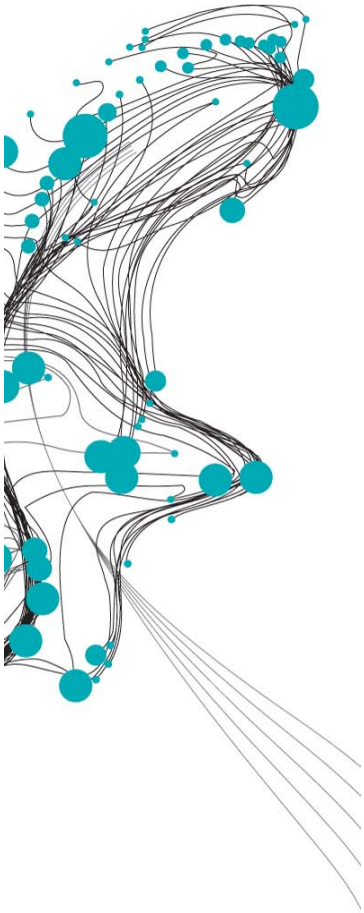
Spatial Planning & Flood Risk

Development of a spatial planning framework for the mitigation of flood risks



Due to significant housing shortages in the Netherlands, large scale housing projects are planned across the country. Most of those new houses are planned in areas that are at risk of flooding. The arrival of new inhabitants and new spatial structures increases the severity of flood events, leading to extra flood risk. This in turn also influences the strictness of flood safety standards in dike ring sections where the flood safety standard was derived from the SCBA (social cost benefit analysis) flood risk criterion. The SCBA flood safety standard is based on an economic optimum between expected flood damage and the expected costs for flood defense improvement. Thus, the construction of new spatial structures is of direct influence on the strictness of flood safety standards and the total flood risk. This study aims to research whether it is possible to develop and test an effective spatial planning framework. The aim of this spatial planning framework is to consider flood risk in a certain area and adjust the current spatial planning, to minimize increases in flood risk associated with new spatial developments.

Three dike ring areas were used as case study. For all three case studies, the impact of new spatial developments planned for the period 2021-2030 on the flood damage and flood risk was computed with the SSM2017 flood damage and casualty model. The results showed that following the official spatial planning leads to a significant increase in flood risk for all case studies, with for example an 97% increase in flood risk for case study 1 alone. Next was the development of the spatial planning framework. The spatial planning framework considers four damage categories: family homes, apartments, industry, and casualties. The framework defines 11 different flood risk zones, based on the flood characteristics of inundation depth, rise rate and flood probability. The framework was validated with case study 1 and tested with case studies 2 and 3. Application of the framework to all three case studies showed that it is possible to identify areas with few to no flood risk and relocate planned spatial objects to these locations, away from their official planning locations where flood risk is much higher. This yielded significant reductions in flood risk and flood damage for all case studies involved.

Oscar Bakker

Graduation Date:
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Graduation committee:
University of Twente
Dr.ir. M.Booij
Dr.ir. A.Bomers

Affiliation
Ir. R.J.M. Huting
Ir. S.G. Westerhof
Ir. M.C.J. Van den Berg

UNIVERSITY OF TWENTE.