

Hydrological and hydraulic Study of the Beggelbeek Catchment



Financed by: Province of Antwerp

Client: Province of Antwerp

Date: 1999 – 2001

Budget: € 115 000

Location: Lier, Province of Antwerp, Belgium

Assignment:

The floods of September 1998 in the Province of Antwerp (B) caused severe inundation damages in several towns and villages. The Provincial Water Authorities concluded to tackle the flooding problems on the basis of detailed hydrological and hydraulic studies of the concerned river catchments. Soresma-haecon was awarded the hydrological/hydraulic study of the Beggelbeek.

Technical Description:

The project is a typical example of a stream catchment study in a lowland such as Flanders. First a detailed inventory of the different elements of the actual surface water system including sewage, outlets, ditches, streams, culverts, weirs, ... was made.

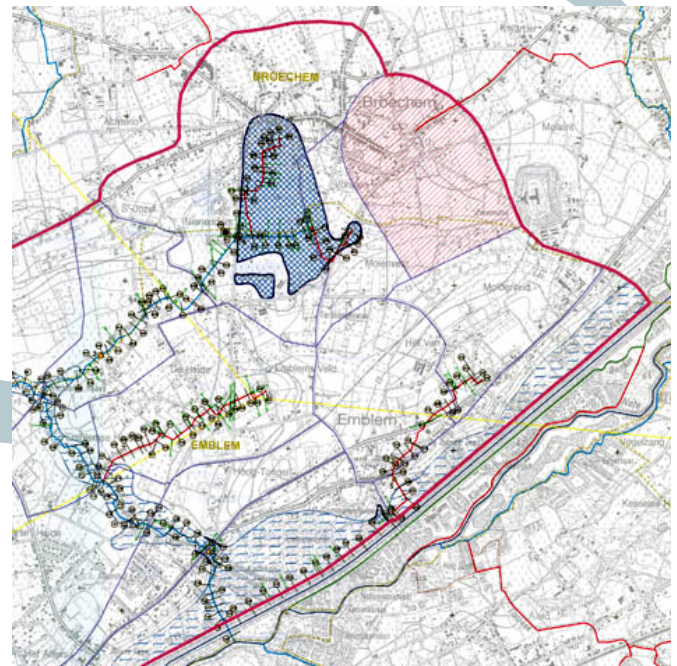
The river sections, hydraulic structures and flooding areas were topographically surveyed for input in the 1D mathematical hydraulic modelling system ISIS.

Rainfall and discharge measurements were carried out in the field during an intensive measuring campaign and the hydrological response of the catchment area was defined.

Hydrological models in PDM were calibrated and simulation yielded inflow hydrographs for statistically designed extreme events of rainfall and discharge.



Flooding in Broechem (Lier)



Catchment area with indication of flooded areas

Scope of Services:

- Analysis of actual water problems (river catchment inventory)
- (Numerical) hydrological and hydraulic study
- Study of mitigating measures
- Integrated water management



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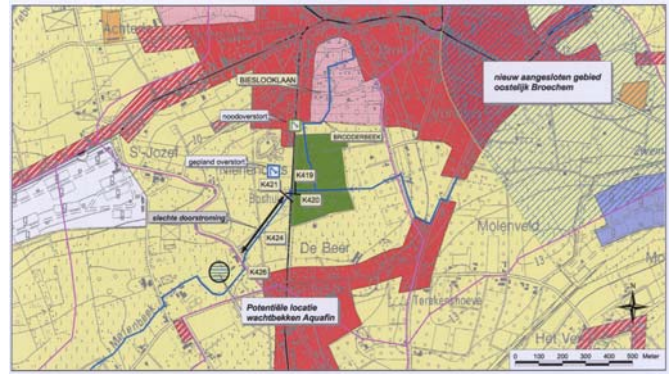
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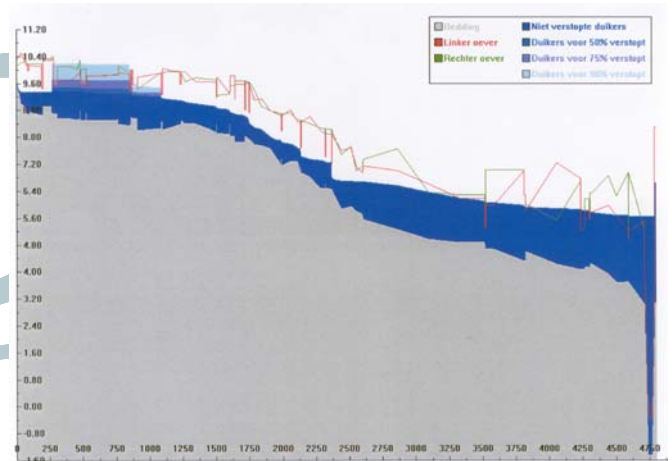
The hydraulic ISIS-model of the Beggelbeek includes special features such as the tidal influence downstream boundary conditions of the Nete river, rules for abstraction by a pump, a drainage network to model storage in ditches in a wetland area, flow in winterbed sections with variable bed roughness, etc ...

The numerical model of the actual hydraulic behaviour of the water system allowed for the identification of specific problems related to extreme low current velocity (causing mud deposition), section decrease and increase, frequent local flooding of the river valley (undesired because of poor water quality), obstruction of culverts causing upstream flow obstructions.

Again, based on a calibrated and validated model of the actual state, a thorough scenario analysis with the numerical tools reveals some interesting water management measures. Proposed solutions, as an introduction to integrated flood management, include an adapted maintenance programme for the Beggelbeek river.



General spatial layout river catchment



Numerical ISIS simulations (effect of removing trash screens at culverts)