

Flooding of polder areas that are dominated by greenhouse industry

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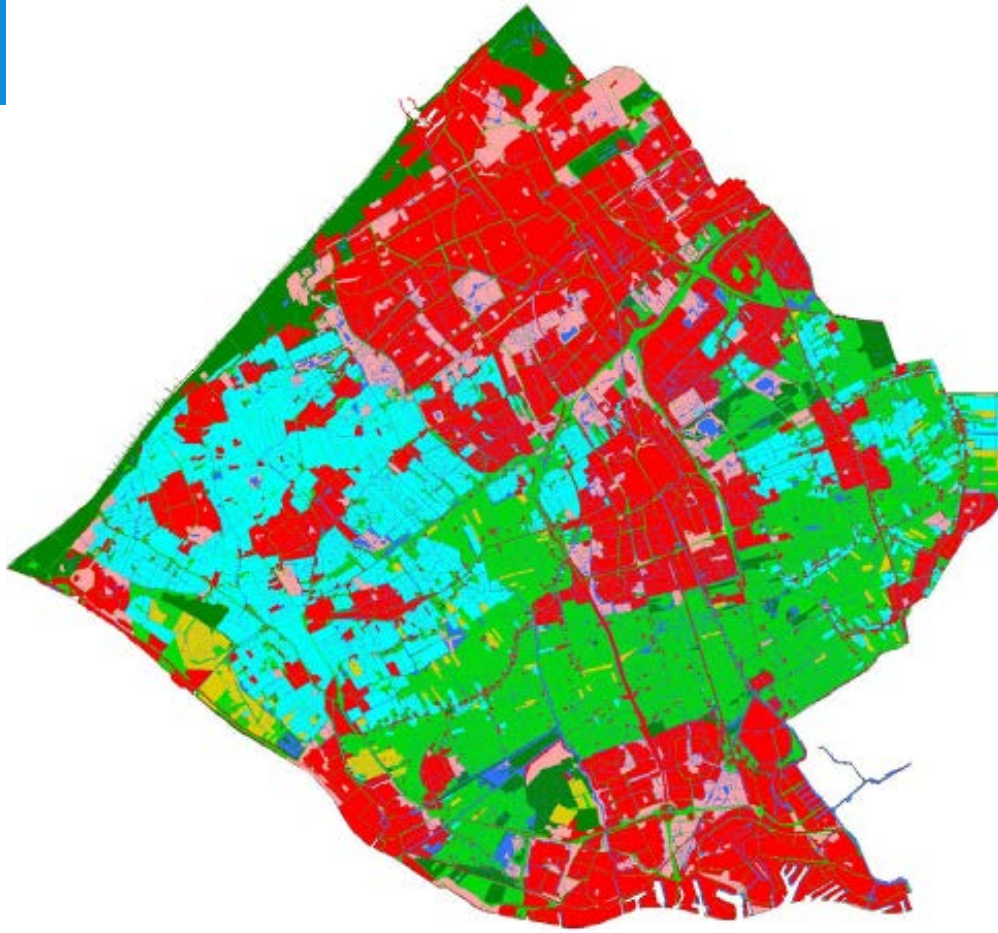
05-09-2012



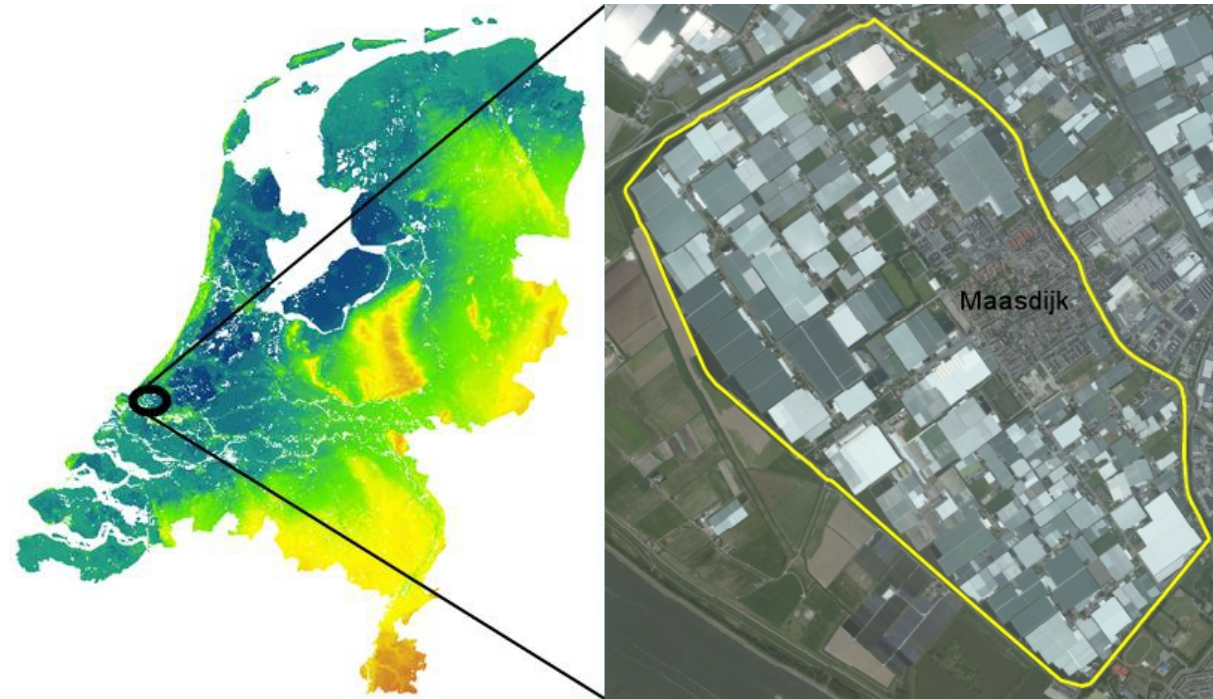
Nelen & Schuurmans



Introduction



Methods

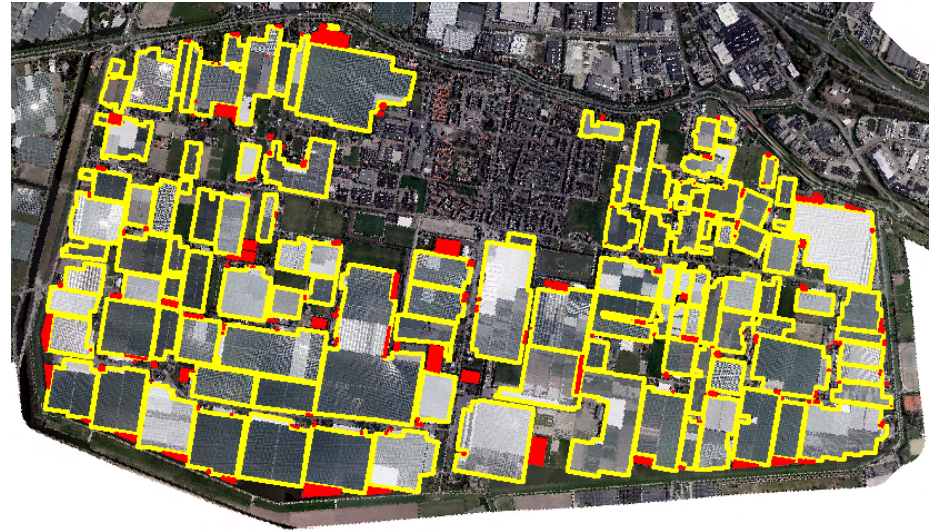


- Hydrodynamic model in Sobek
 - High level of detail
- Integrated approach
 - Cooperation between involved parties



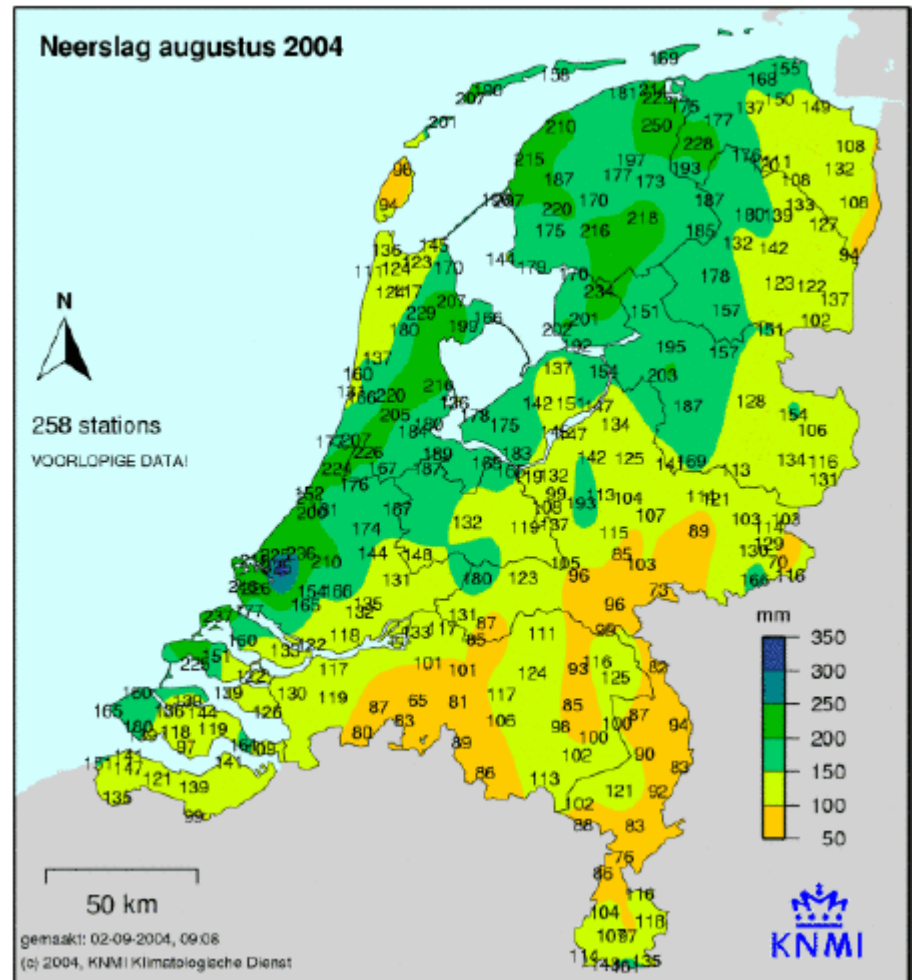
Hydrodynamic model

- Rainfall runoff
 - Rural area
 - Pervious
 - Impervious
 - Greenhouse
- Sewer flow
 - Urban area
- Channel flow
- Overland flow



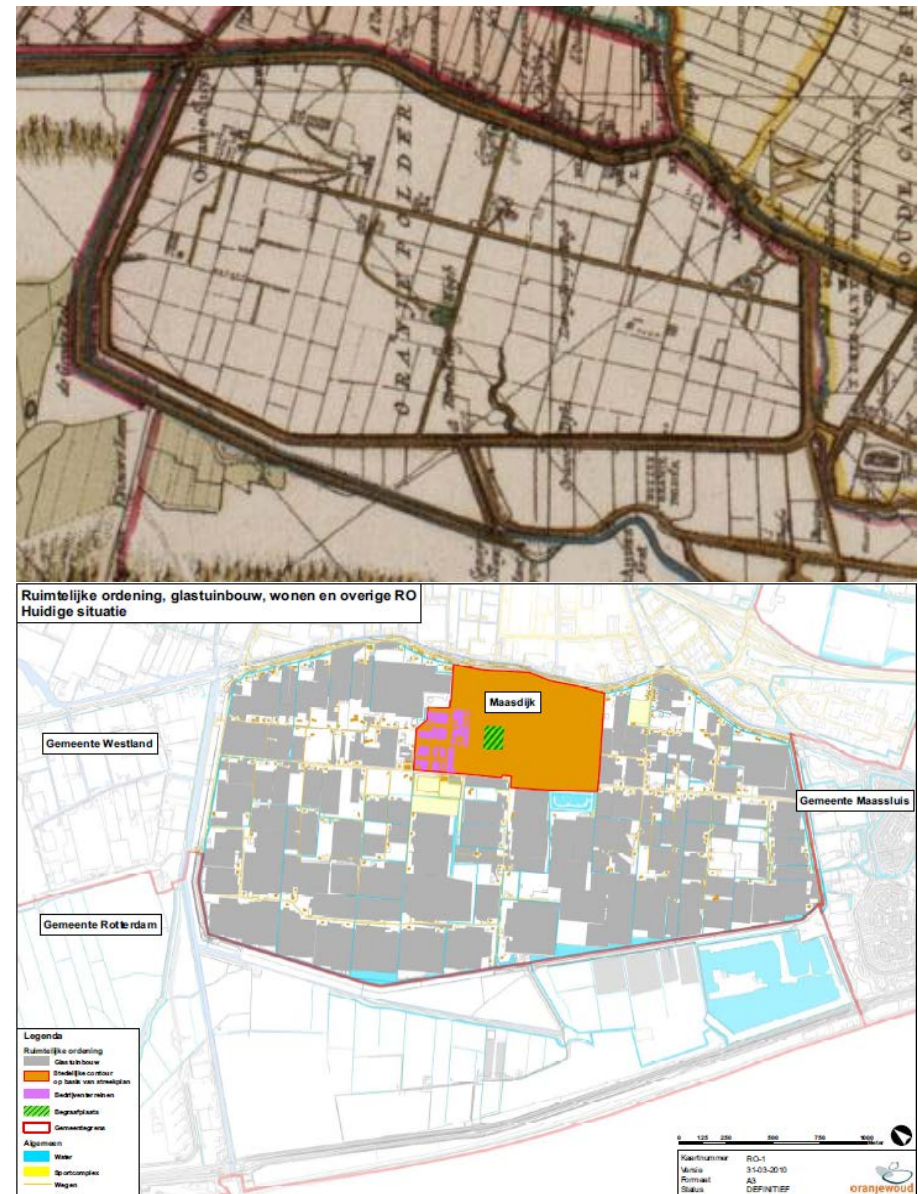
Simulation

- Rainfall August 2004
 - 325 mm
 - 4 large events (>40 mm)
- 45 qualitative reports
 - Dates
 - Locations
 - Water depth



Case study

- Area of 490 ha
- Village Maasdijk
- Over 70% covered by greenhouses
- 3.9% open water



Oranjewoud (2010) *Brede Verkenning Oranjepolder*, Gemeente Westland en Hoogheemraadschap van Delfland.



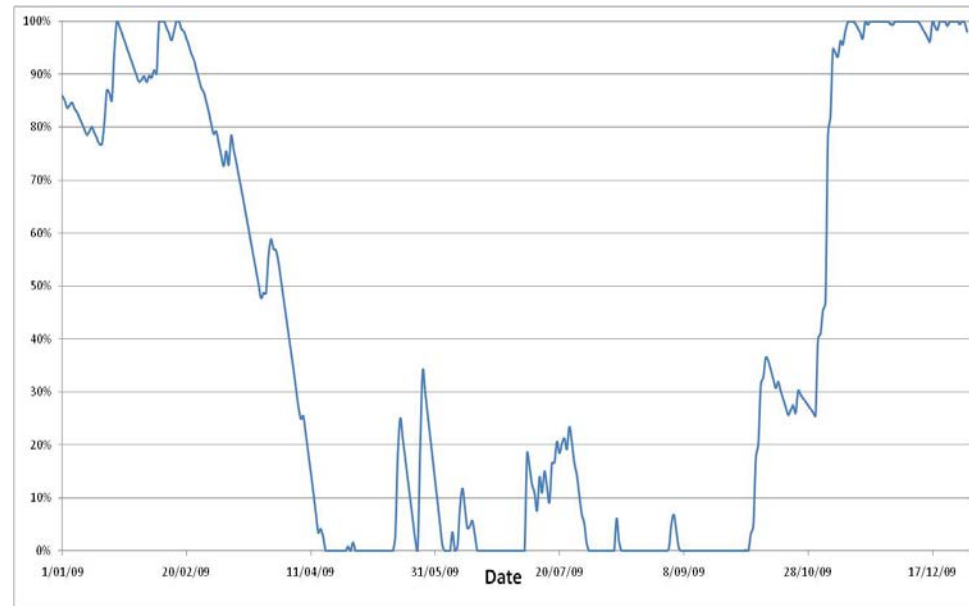
Integrated approach

- Waterboard: Open water
- Municipality: Sewer system
- Horticulturists: Greenhouses

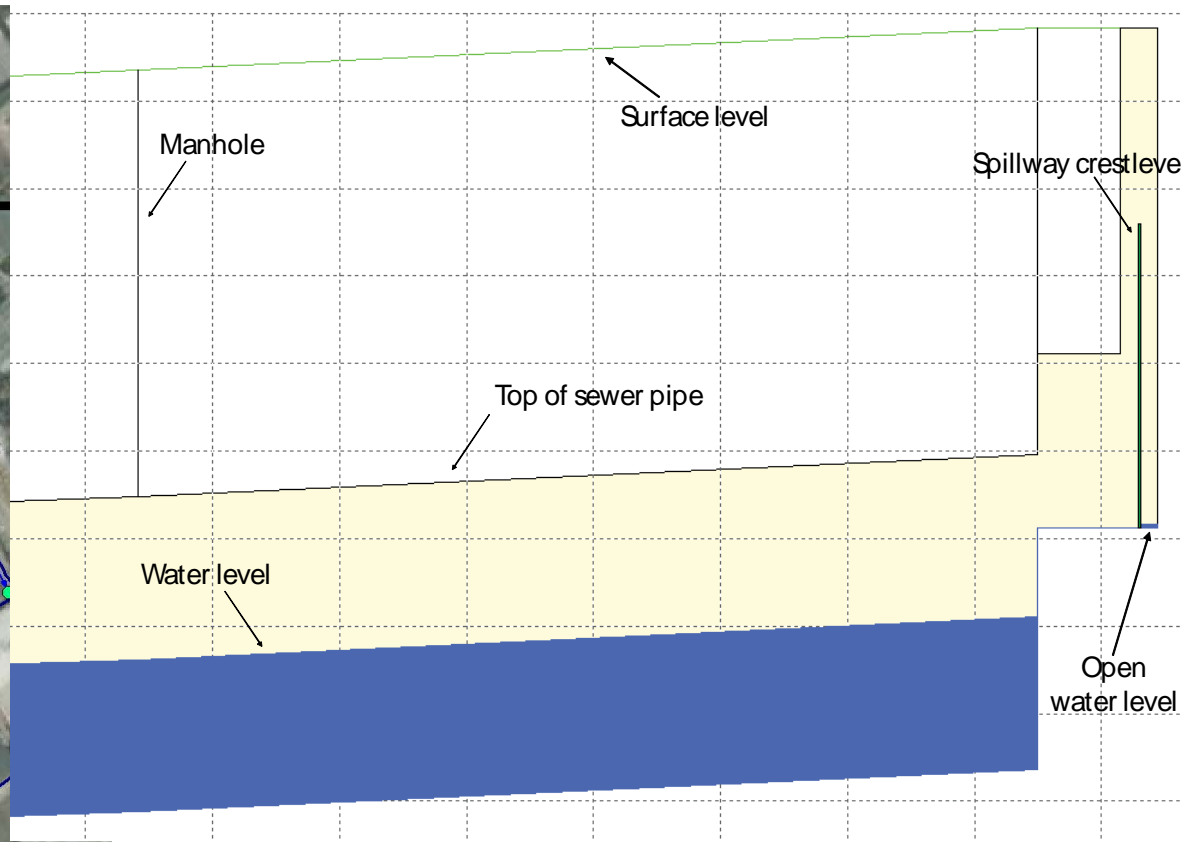


Greenhouses

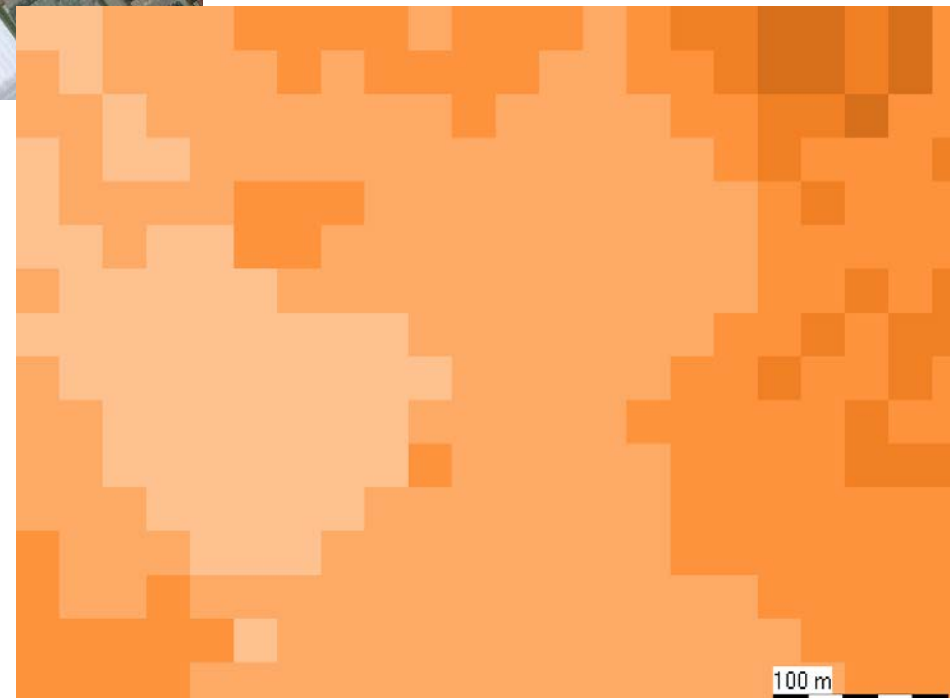
- Water storage
- Water level fluctuation
 - Measured
 - Validated

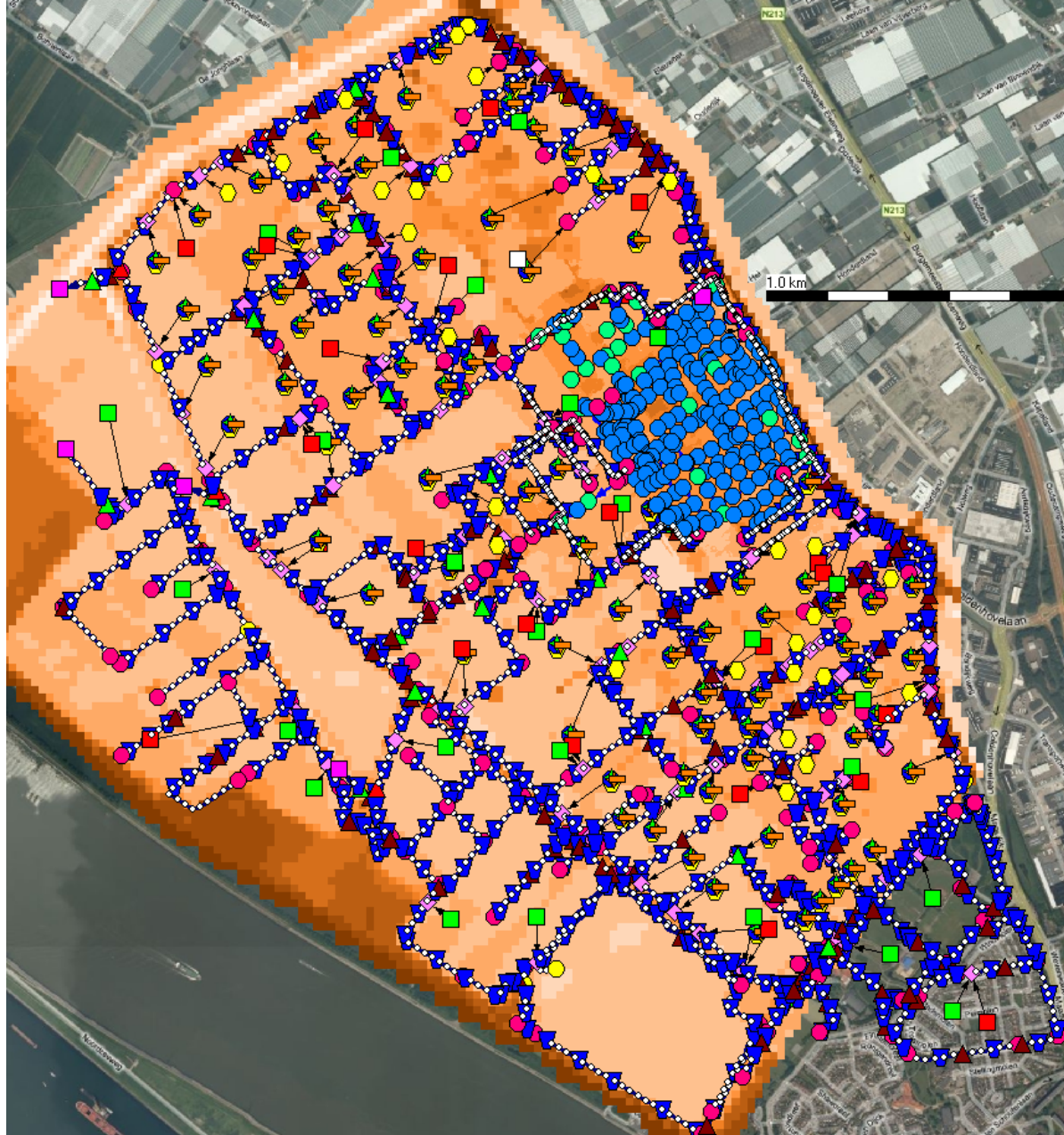


Sewer system – open water system



Overland flow





Results August 16

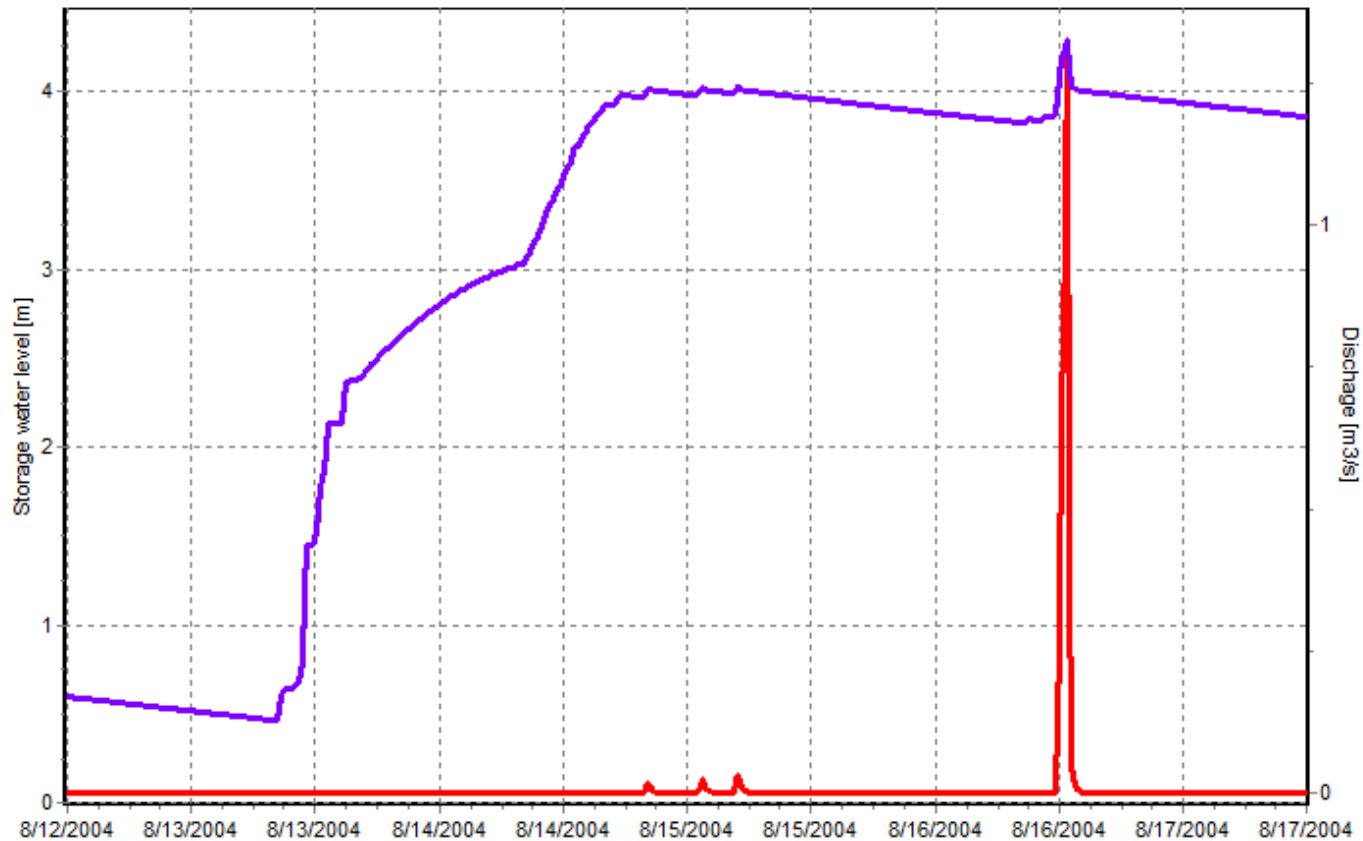
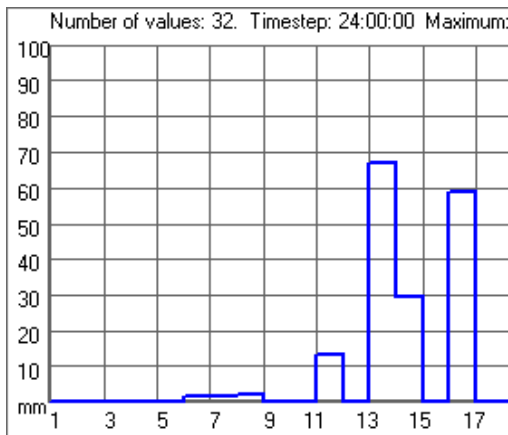


Reported inundation

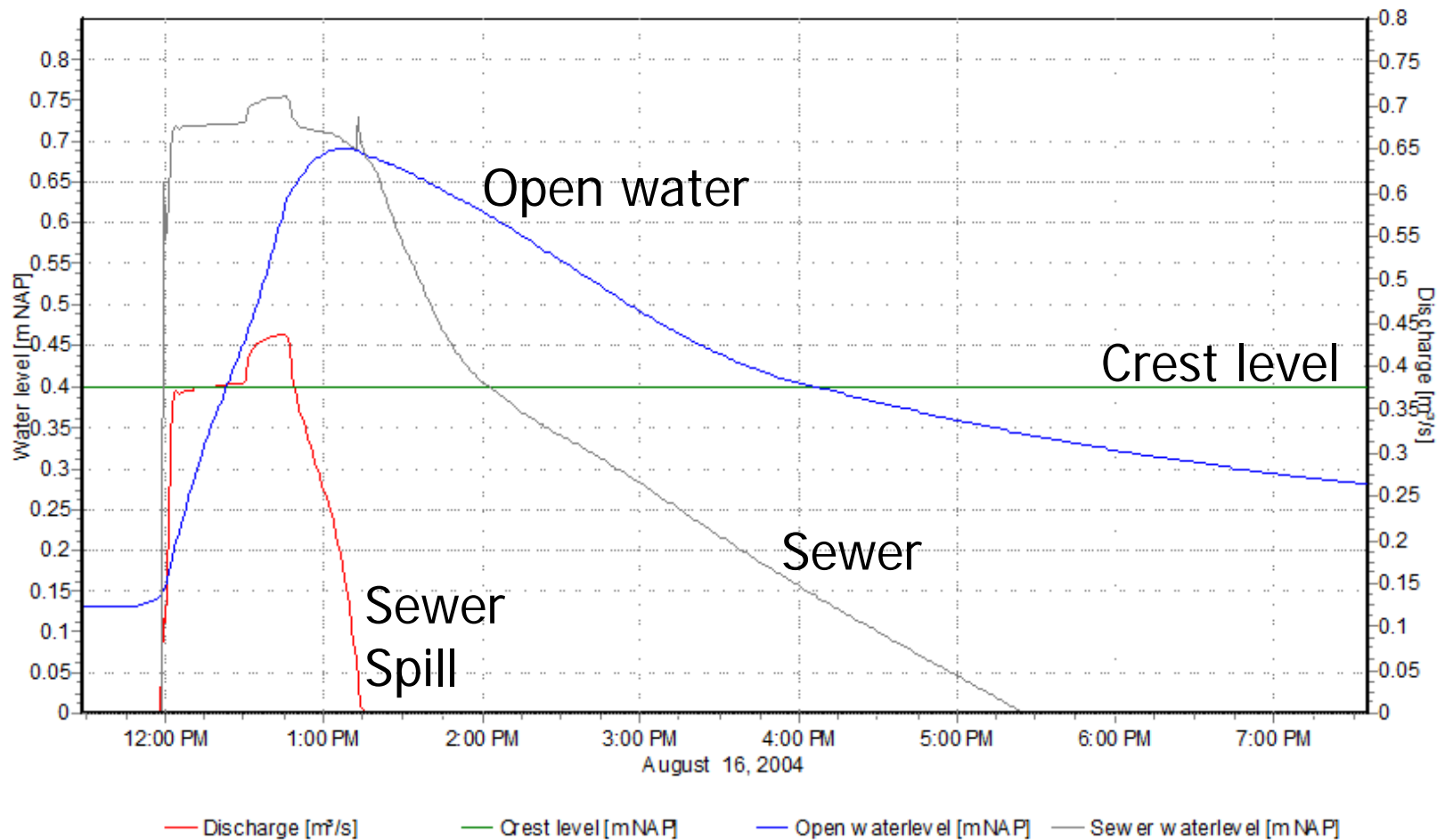
- 10 reports
- 8 confirmed by model



Greenhouse storage

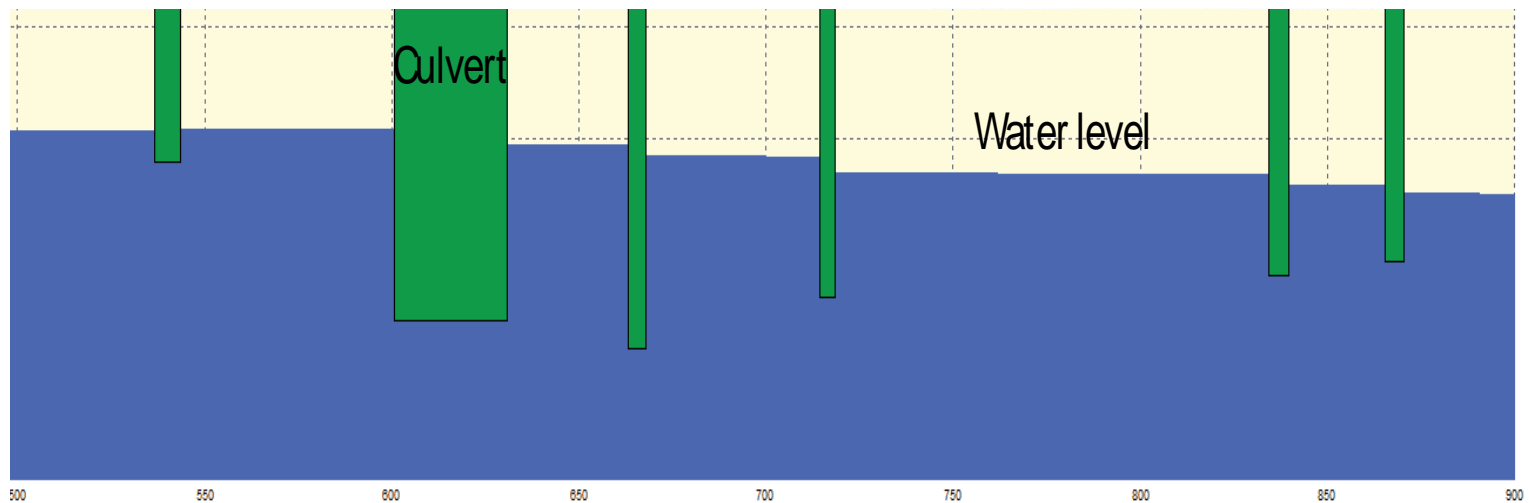


Sewer – open water interaction



Bottle necks

- Head loss
- Many culverts
- Problematic drainage



Measures

- Water storage at greenhouses
- Disconnecting impervious areas from sewer system
- Resizing culverts
- Widening channels



Measures

Water storage at greenhouses

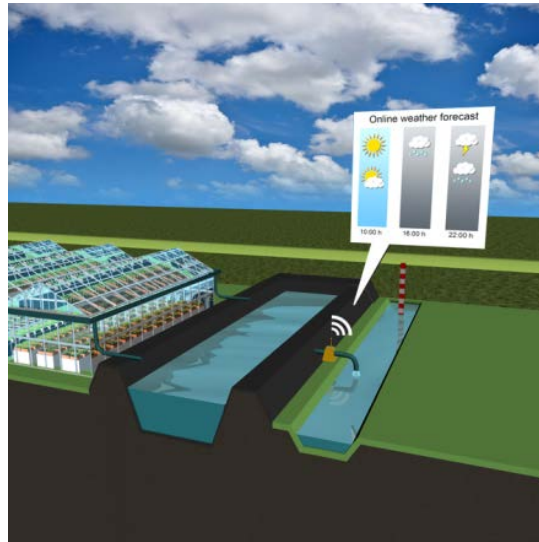


Control NEXT – real time control





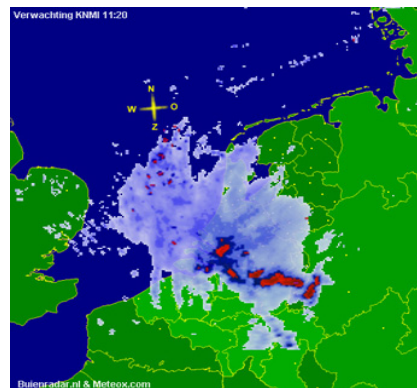
Water requirement



Waterlevel forecast



Rainfall forecast



Conclusions

- Hydrodynamic model
 - Predictions match reported inundation location
- Insight in factors leading to inundation
- Integrated approach important
- New tailor made solutions
 - Support



Discussion

- Data requirement
 - Hydraulic
 - Hydrological
- Calculation times
 - 1.5 days for one month
- Overland flow detail limited by software



Questions?

