

# Monitoring Hollands Bloementuin

Improving water quality with constructed Wetlands



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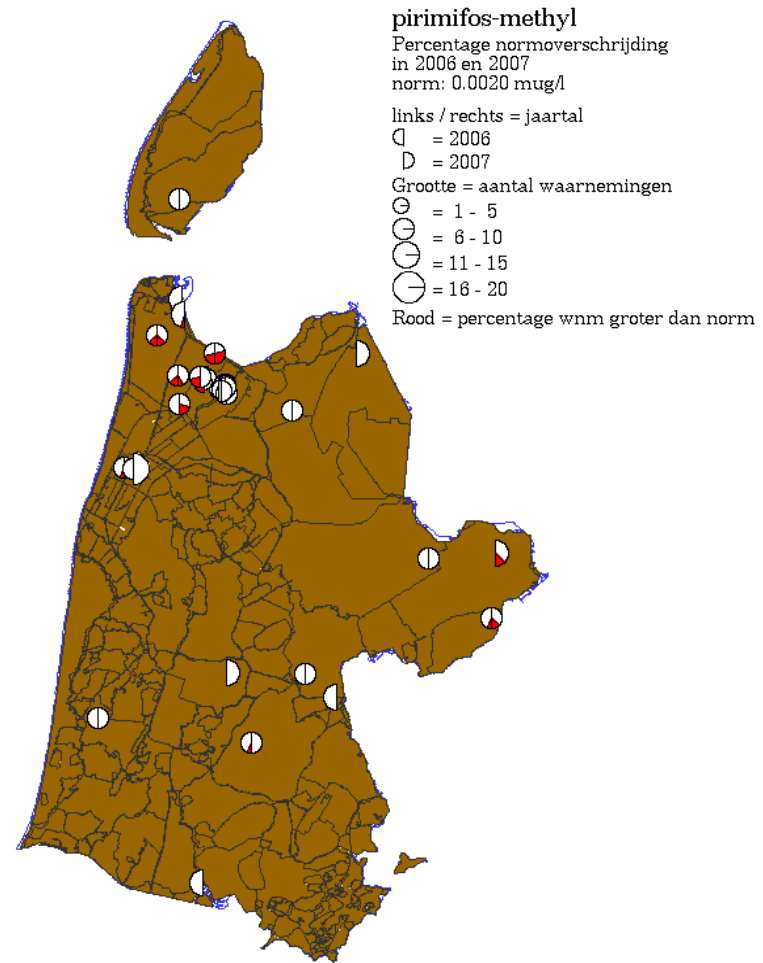
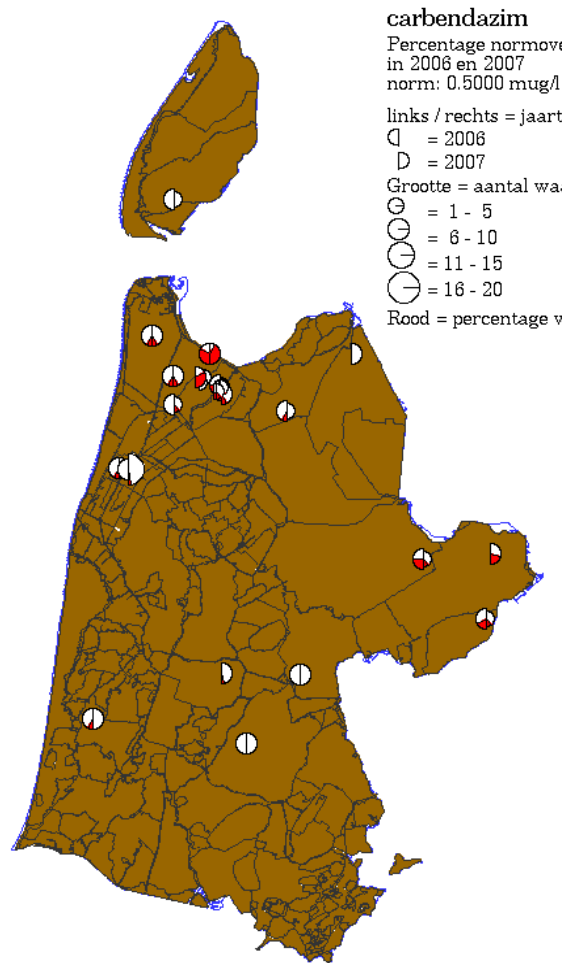
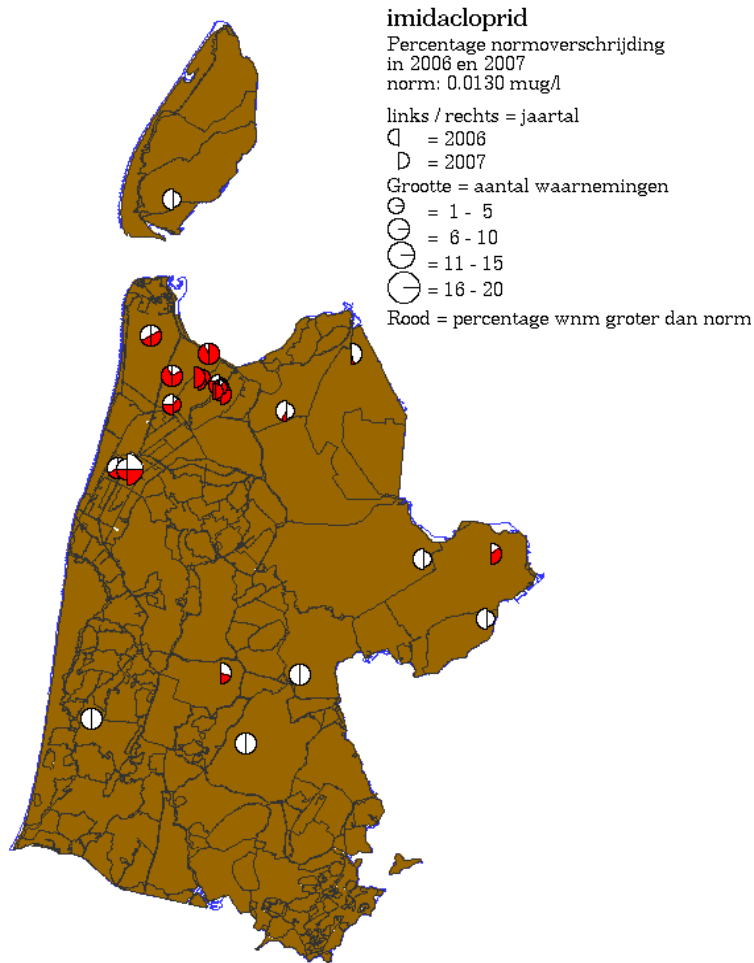


# History of project Hollands Bloementuin:

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- Plan Hollands Bloementuin for stimulating flower bulb agriculture
- Problem: Emission has large negative environmental impact
  - Use of plant protection agents 10-50 times higher than in other sectors
  - Nutrients mobile on sandy soils, P-load 4-5 X higher than 'non flower bulb agriculture'
  - Frustrates WFD targets

# Effects flower bulbs: Pollution



# History of project Hollands Bloementuin:

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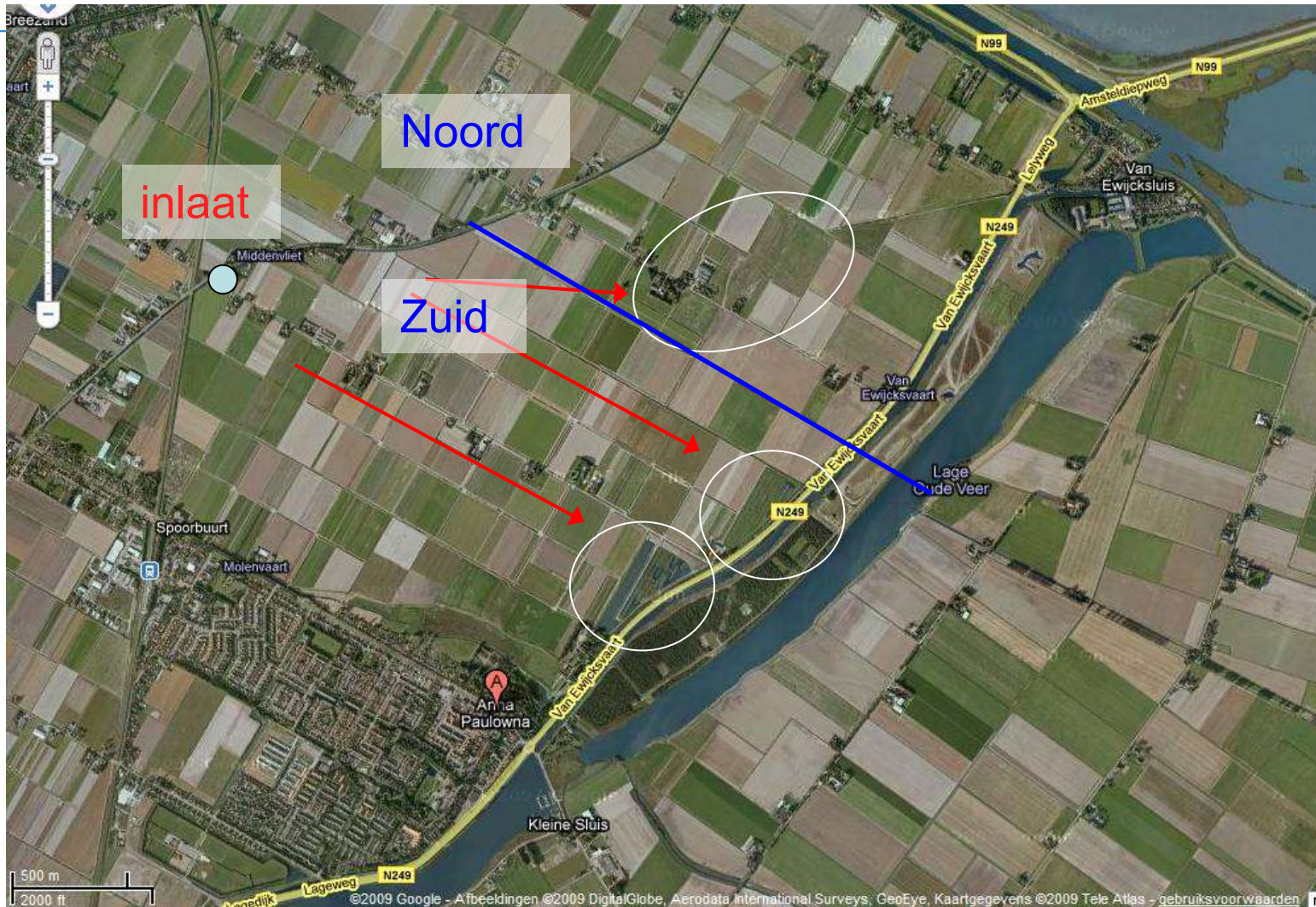
- Plan Hollands Bloementuin for stimulating flower bulb agriculture
- Problem: Emission has large negative environmental impact
- Solution: Hydrologic isolation and treatment before discharge ditch water on larger waterbodies.

# Use constructed wetlands

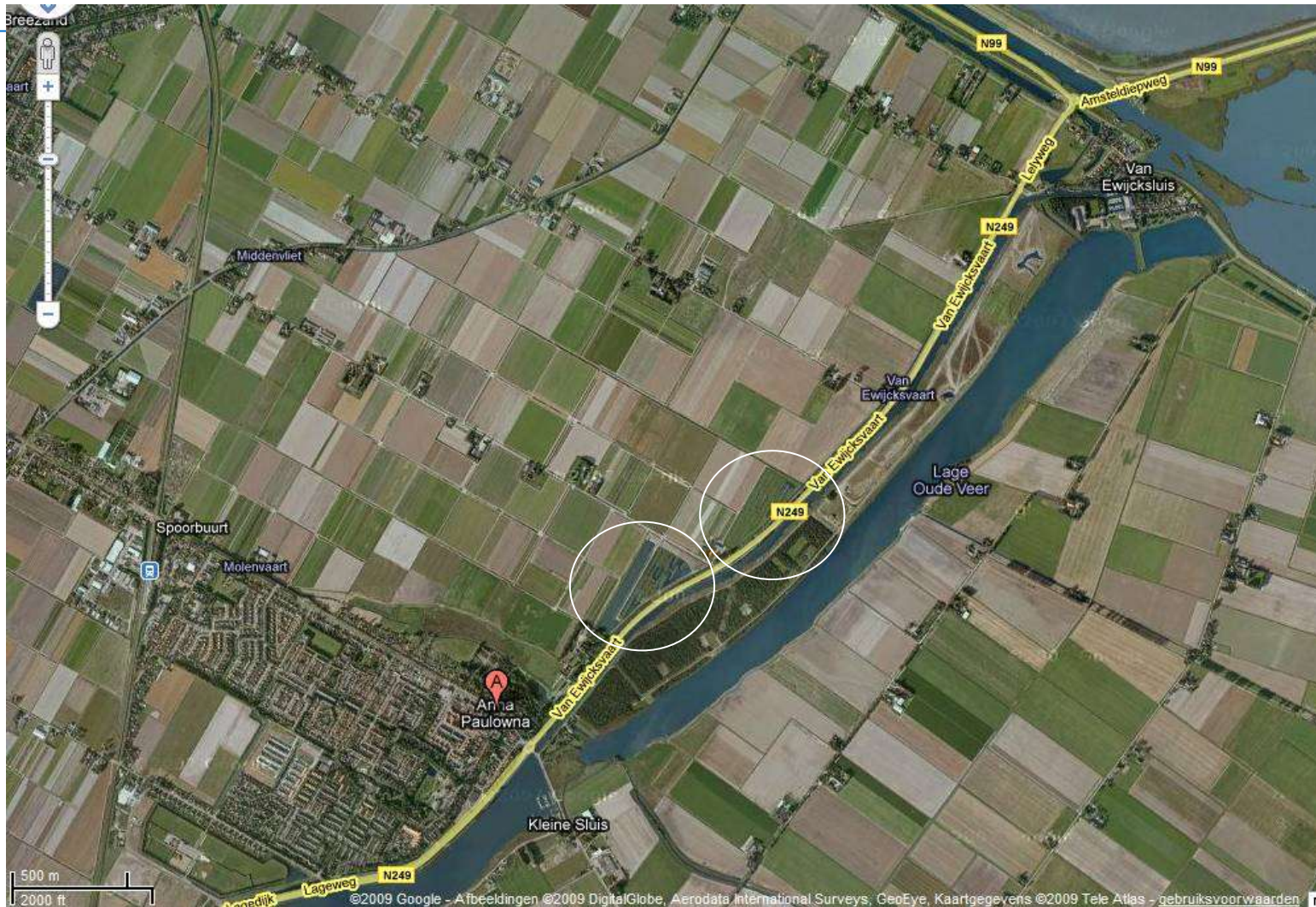
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- Decrease nutriënt load N en P
  - Theoretic efficiency 50%
  - Technical maintenance necessary
- Decrease pollution crop protectors through
  - Increased retention time
  - Fotolysis
  - Interaction with organic material

# Project area

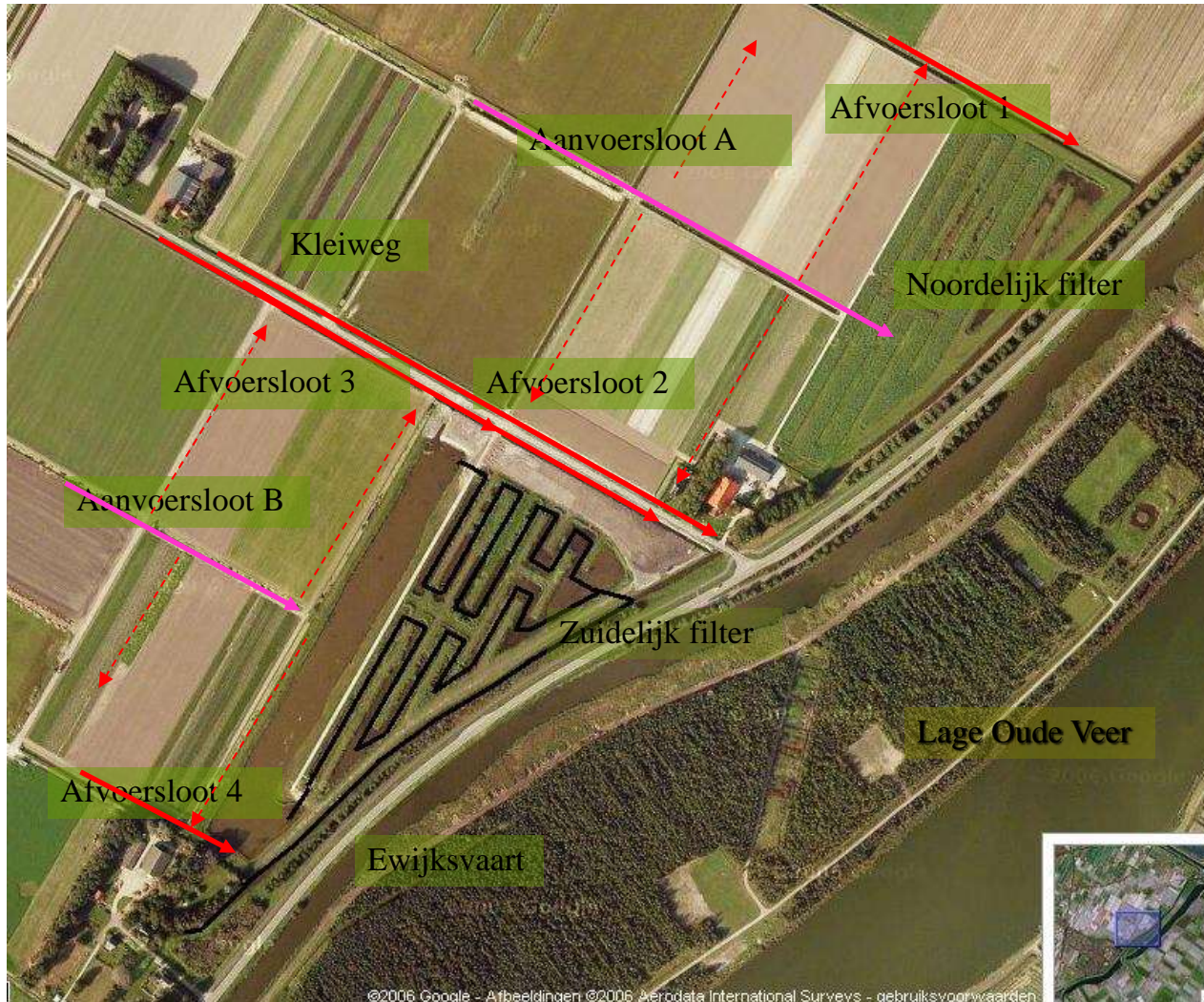


# Project area









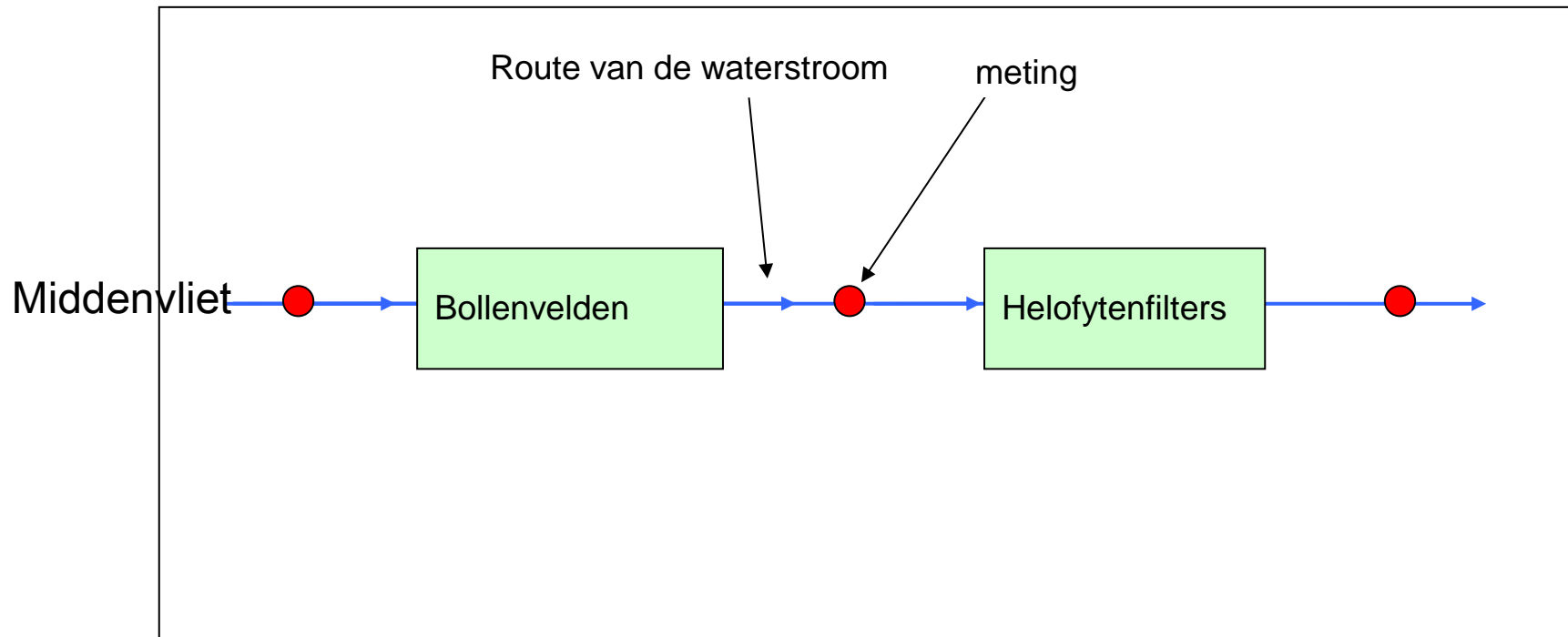
# Project Monitoring HBT:

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- Monitoring Goals :
  - Does watersystem function as planned?
  - Understanding routes of substances through the project area
  - Do constructed wetlands work as planned
    - Decrease of crop protectors
    - Decrease nutriënts?

# Implementation:

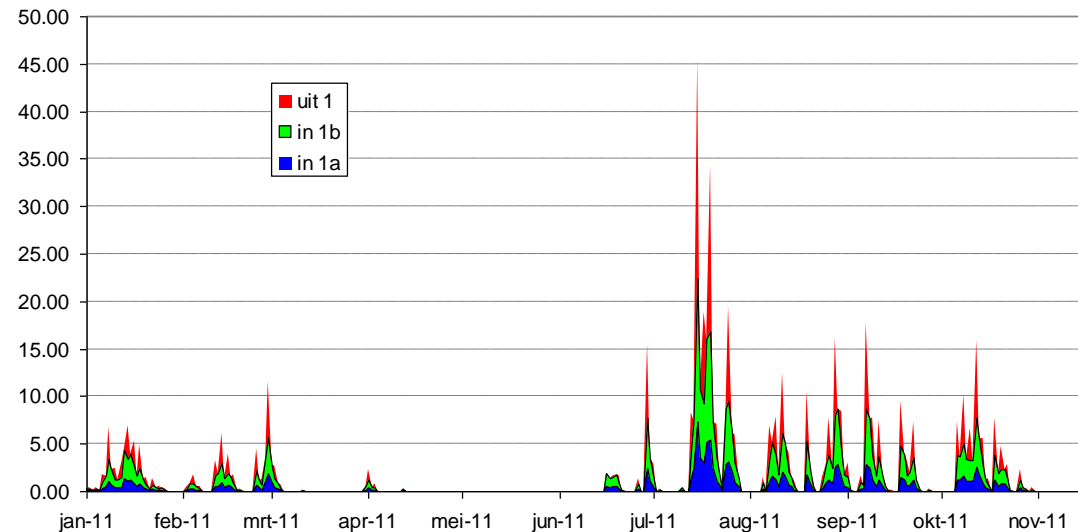
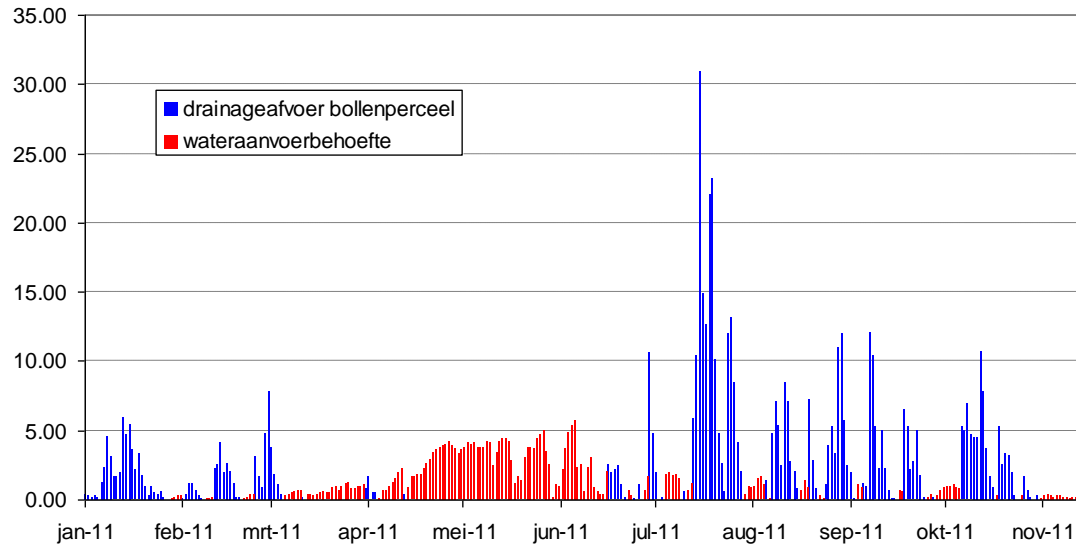
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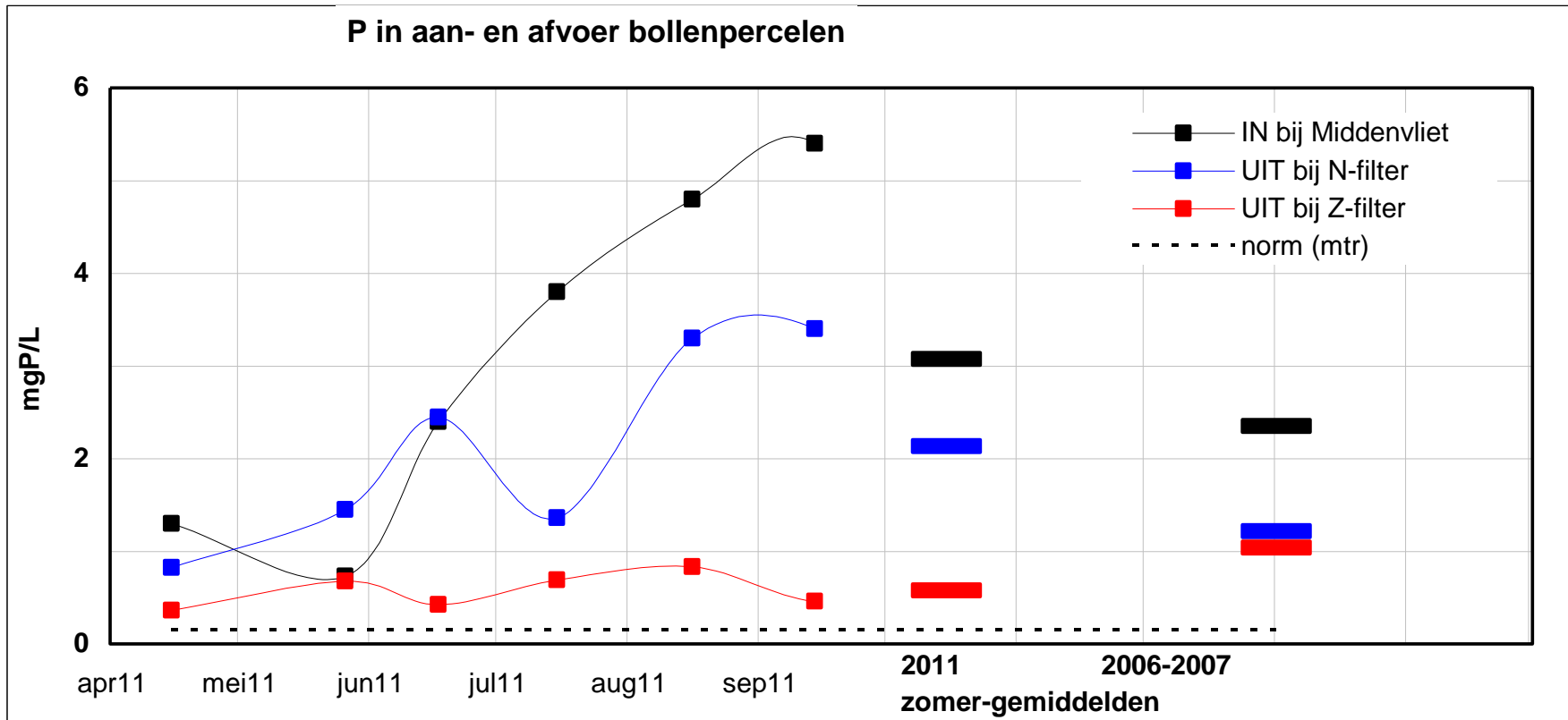
Water and solute balance and measurement of different compounds along the route



# Water balance

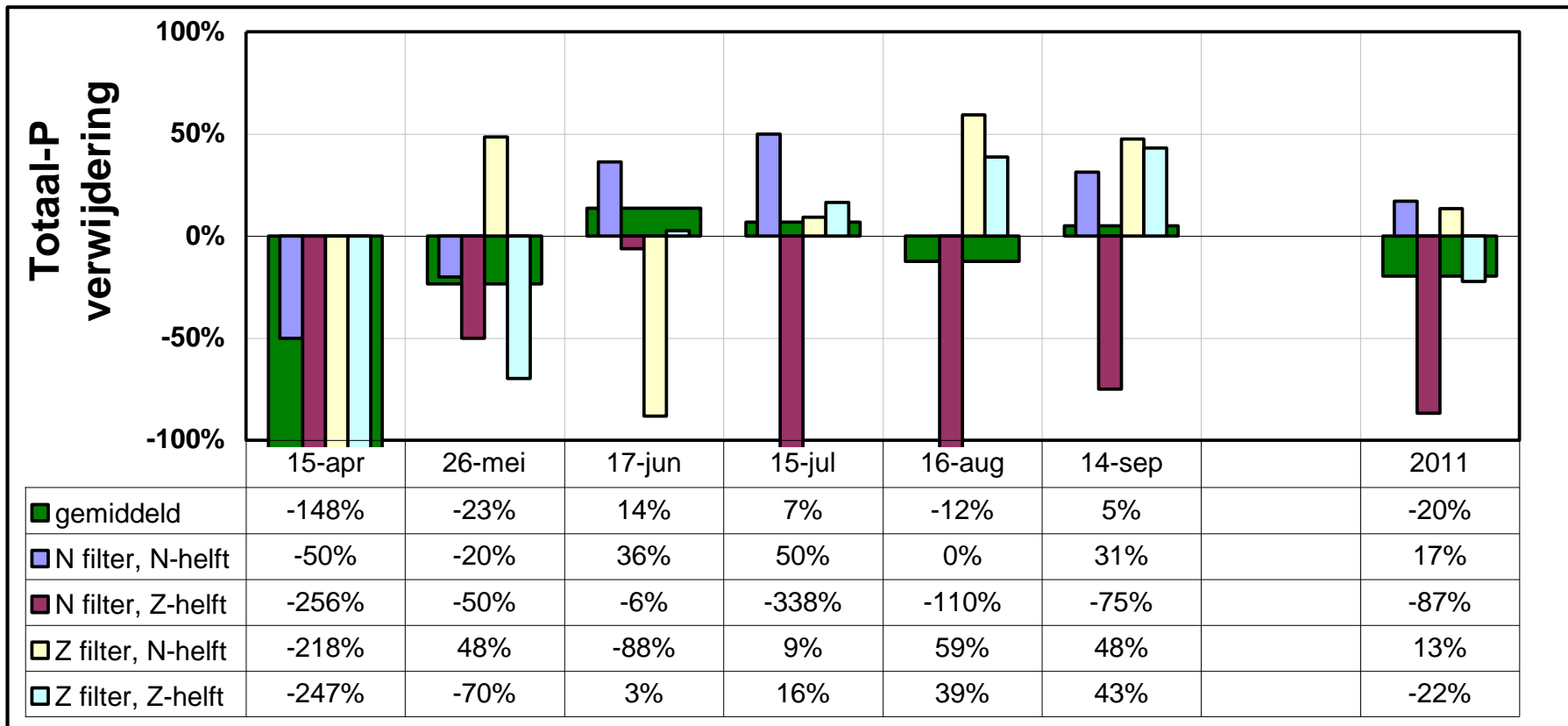


# Results:P-loading bulb fields



- Netto sprake van afname P in bollenvelden

# Results: P-removal wetlands



- Removal P overall is nihil but in 2007 33%



# Explanations

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- Lack of reed growth
- Peat and sulphur cause P-release



# Loading Bulb fields

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	2011			2007		
	P (mg/l)	N (mg/l)	Bstrm (ug/l)	P (mg/l)	N (mg/l)	Bstrm (ug/l)
Middenvliet	3,1	3,2	0,5	2,4	4,1	1,4
Bollenvelden	↓0,6 - 2,1	↑4,7 - 6	↓0,2 - 0,4	↓0,6 - 2,1	↑5,2 - 6,3	↓0,6-0,9

# Removal wetlands

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Efficiency	2011	2007	Expected
P	-87 to +17%	15	60% (zomer)
N	7 to 20%	34	50%(zomer)
Pesticides*	12 to 38%	25%	geen

- \* Generally removal until below risk values

# Crop protectors / Pesticides

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- Any given water sample contains about 12 different pesticides
- Dozens of measurements exceeding max. allowable concentrations
- After treatment hardly any exceedings left

# Summarising:

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- Bulb fields are a ' P-sink' for about 20 jaar
- Efficiency varies a lot per compartment
- Efficiency much lower compared to theory
- Local circumstances very important
- Management and maintenance is very important !!!!
- Very favorable effects on crop protectors

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Voor vragen en opmerkingen kunt u contact opnemen met:

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