

Monitoring the impact of heavy metal contamination on surface and groundwater in the Belgian Campine area

International workshop on Emerging policy challenges on New SOil contaminants (ENSOil) – 15/3/2024

Joni Dehaspe (R&D), Nele Desmet, Jan Bronders – Team Digital Water
Studie uitgevoerd in opdracht van OVAM

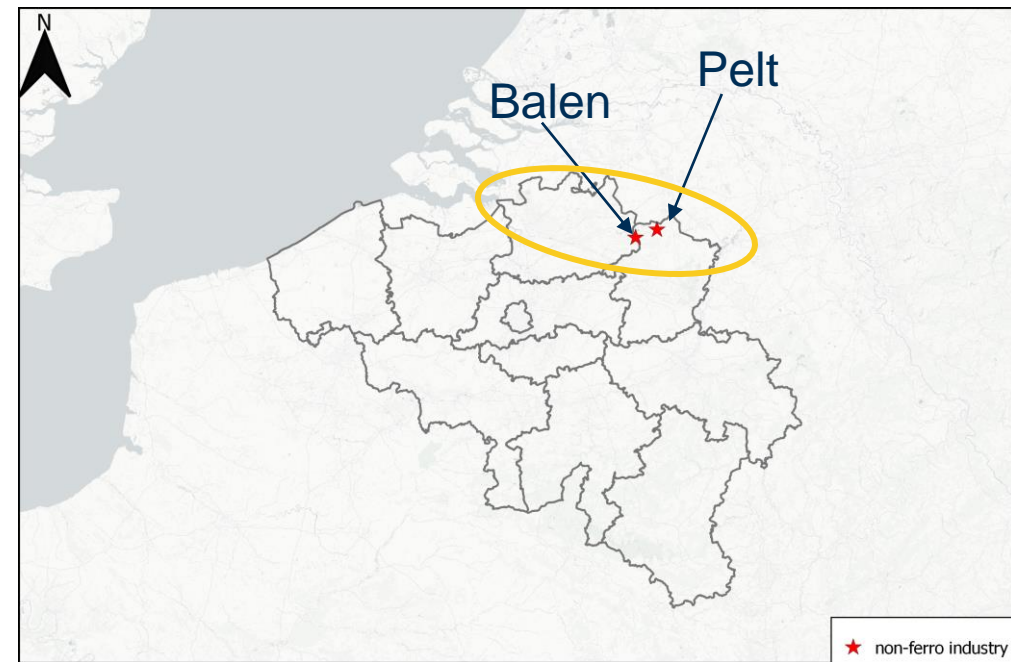
Contents

- Study area background
- Mitigation measures
- Data and results
 - Groundwater
 - Surface water
- Conclusions

Background

- Historical heavy metal pollution non-ferro industry in Belgian Campine area
 - Zn, Cd, As, Pb
 - Zinc slags as structural supports in roads
 - Atmospheric deposition
 - Diffuse pollution contamination surface and groundwater

- Surface water and groundwater should be in 'good' ecological and chemical condition by 2027
 - Environmental Quality Standards (EQS)



	groundwater	Surface water	
	MKN [$\mu\text{g/l}$]	JG-MKN [$\mu\text{g/l}$]	MAC-MKN [$\mu\text{g/l}$]
As	20	3	-
Cd	5	0.08-0.25	0.45-1.5
Pb	20	7.2	-
Zn	500	20	-

Mitigation measures

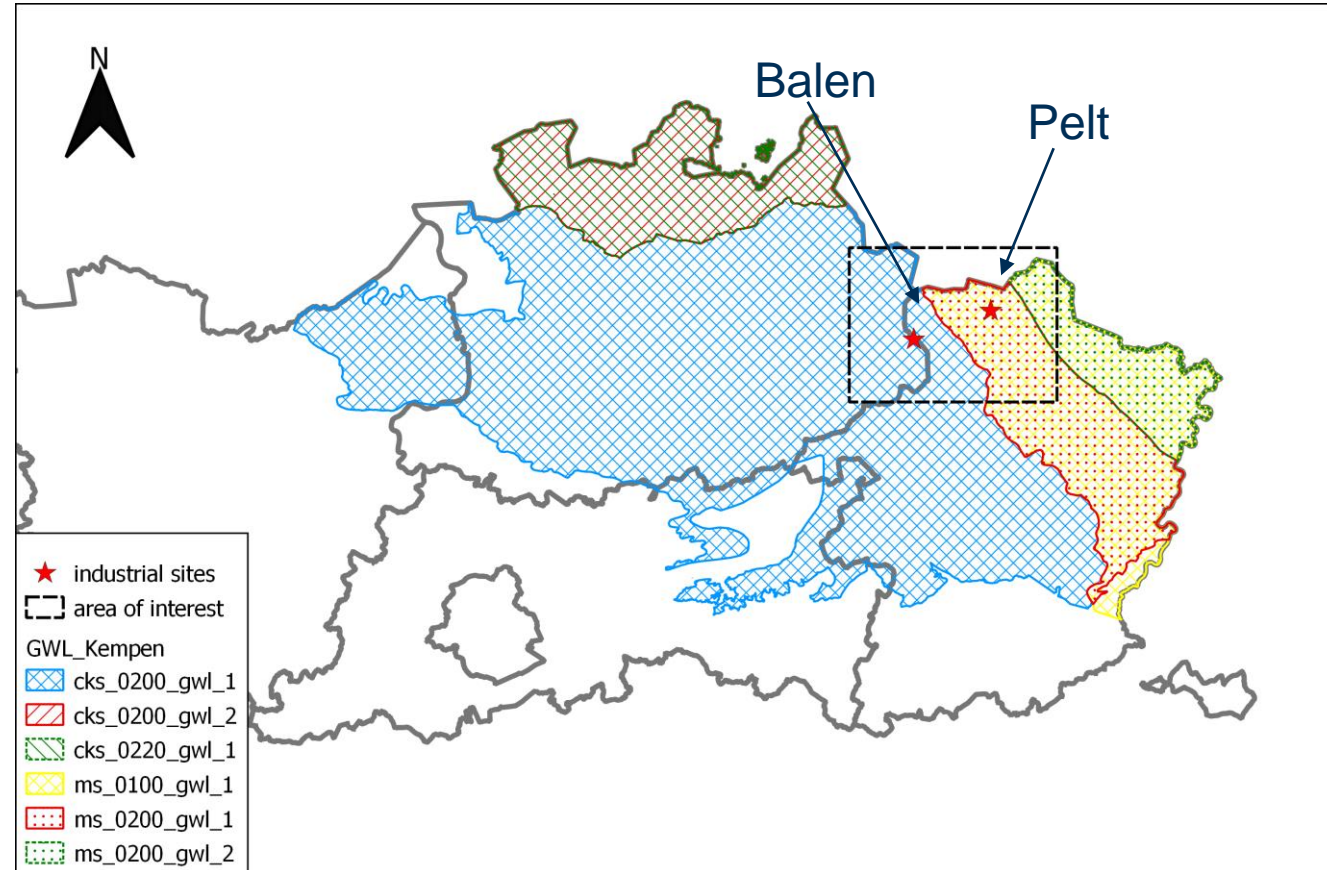
- BATNEEC evaluation
 - Excavation industrial sites
 - Groundwater pumping and treatment on industrial sites
 - Removal or immobilization of zinc slags in the area
 - Sanitation of residential areas neighboring industrial sites
- **Groundwater and surface water monitoring network**
 - Evaluation surface and groundwater quality in this region
 - Follow up mitigation measures
 - Indicate need for additional measures

Groundwater data

- **Region of interest** around industrial sites Balen and Pelt (WO)

↔ wider environment

- 6 groundwater bodies



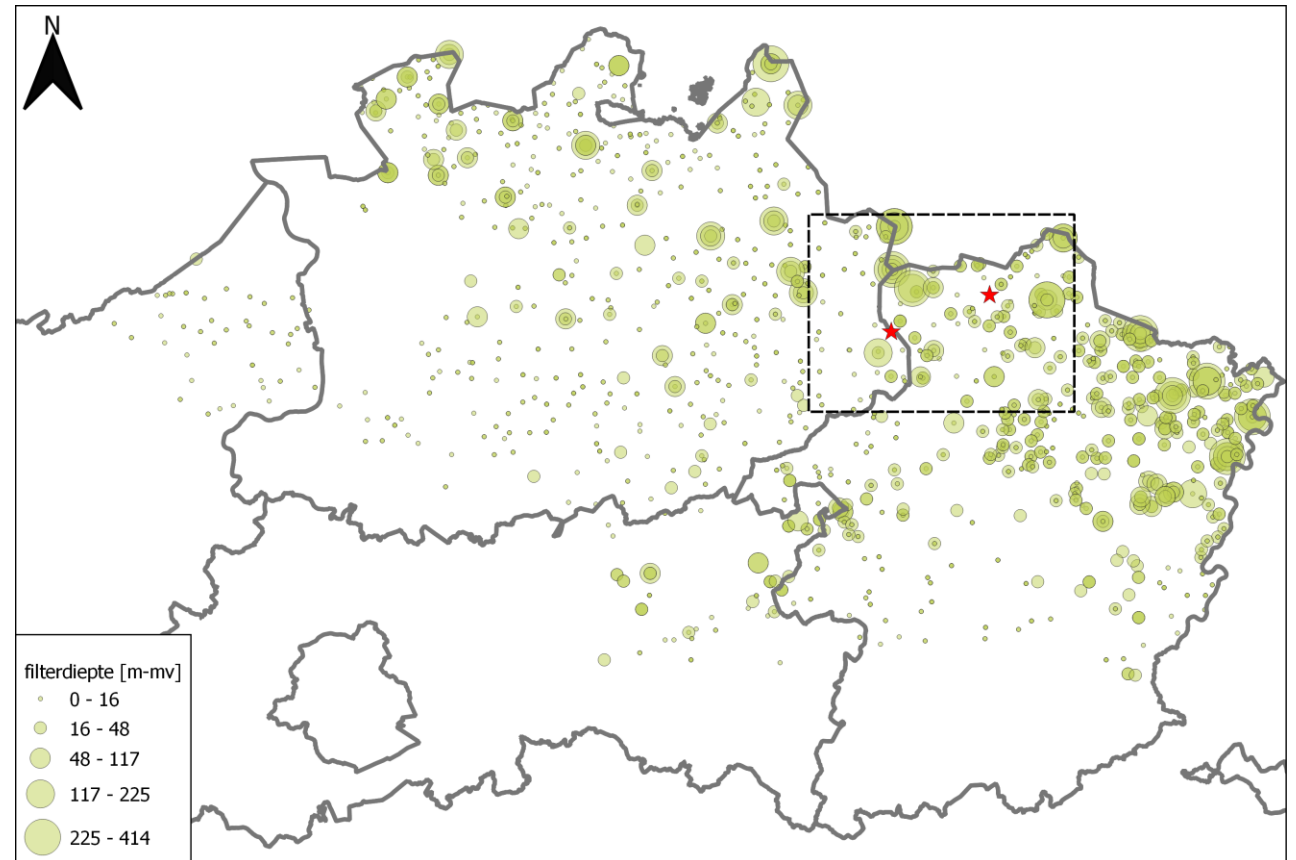
Groundwater data (2004-2020) data source: VMM and OVAM

- Dissolved Cd, Zn, As, Pb concentrations

- 831 monitoring wells
- >1800 filters on different depths
- 5 filter categories

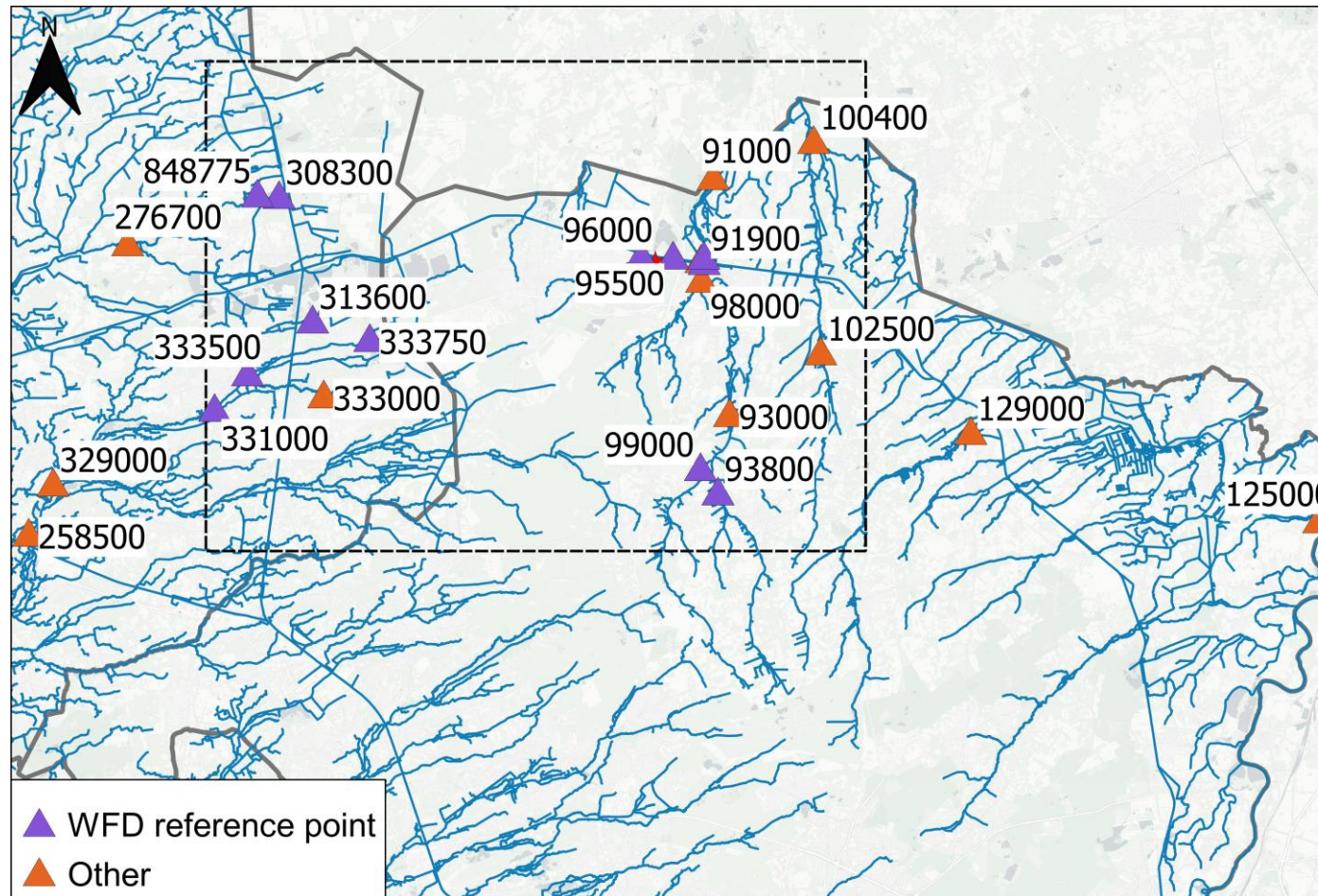
filter category	depth [m-mv]
1	0-16
2	16-48
3	48-117
4	117-225
5	225-414

- Number of locations measured varies yearly



Surface water data data source: <http://geoloket.vmm.be/Geoviews/>

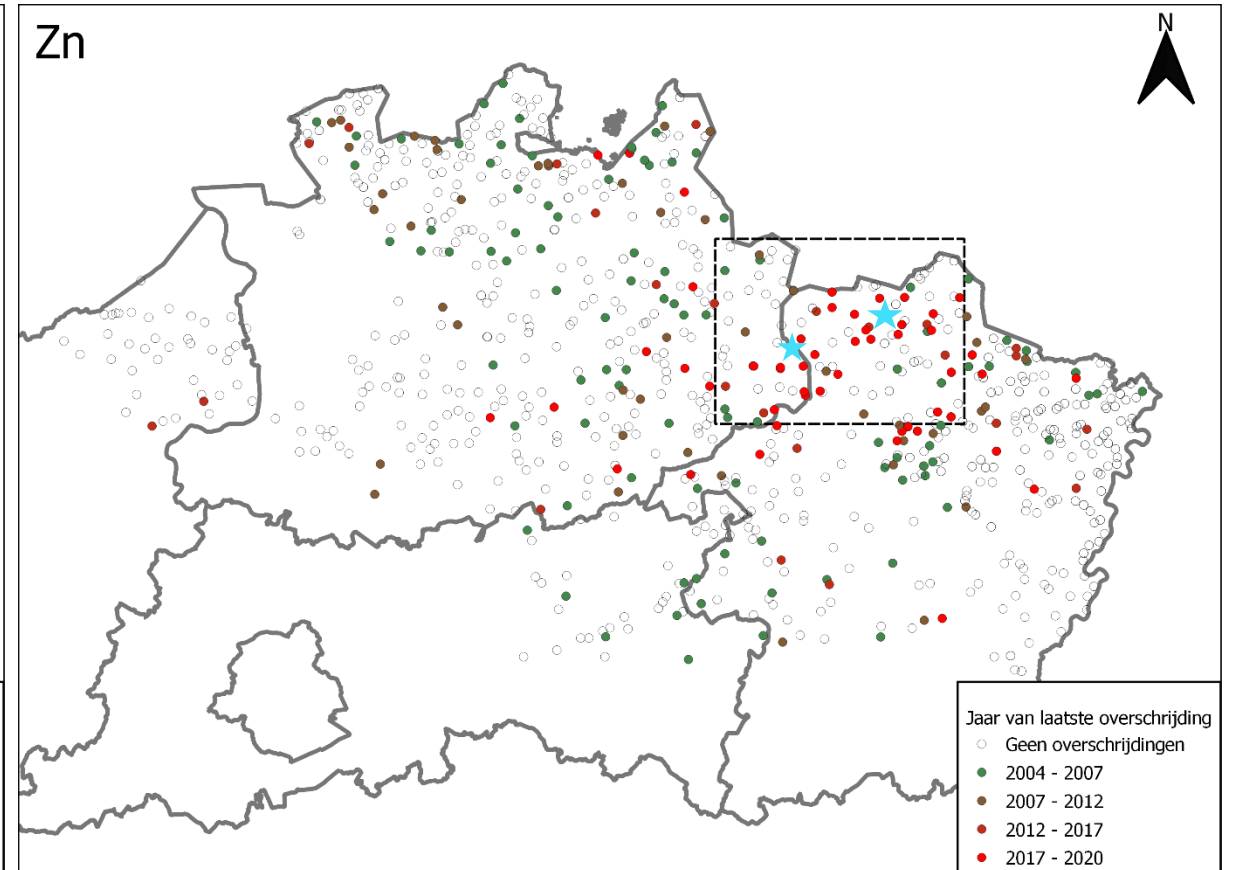
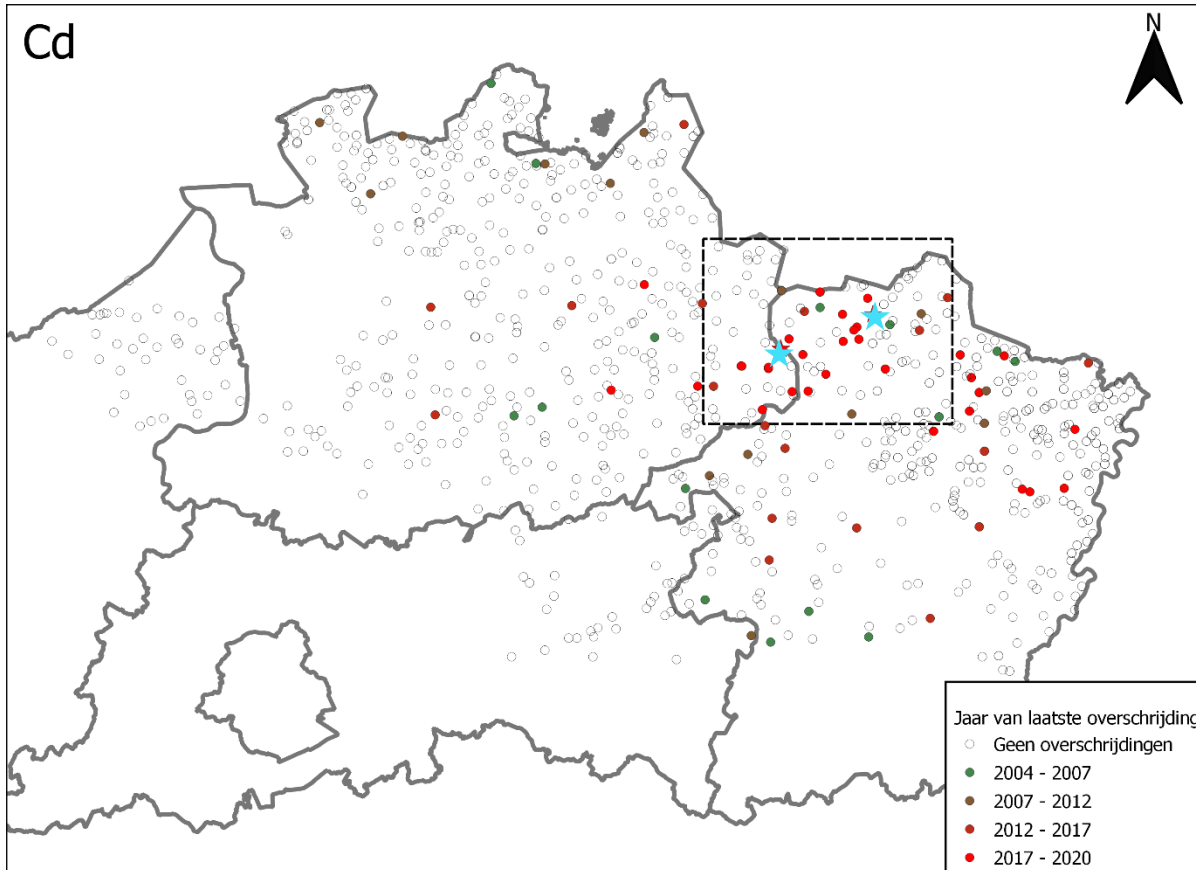
- Dissolved and/or total Cd, Zn, As, Pb concentrations



Results - groundwater

Exceedances Cd and Zn

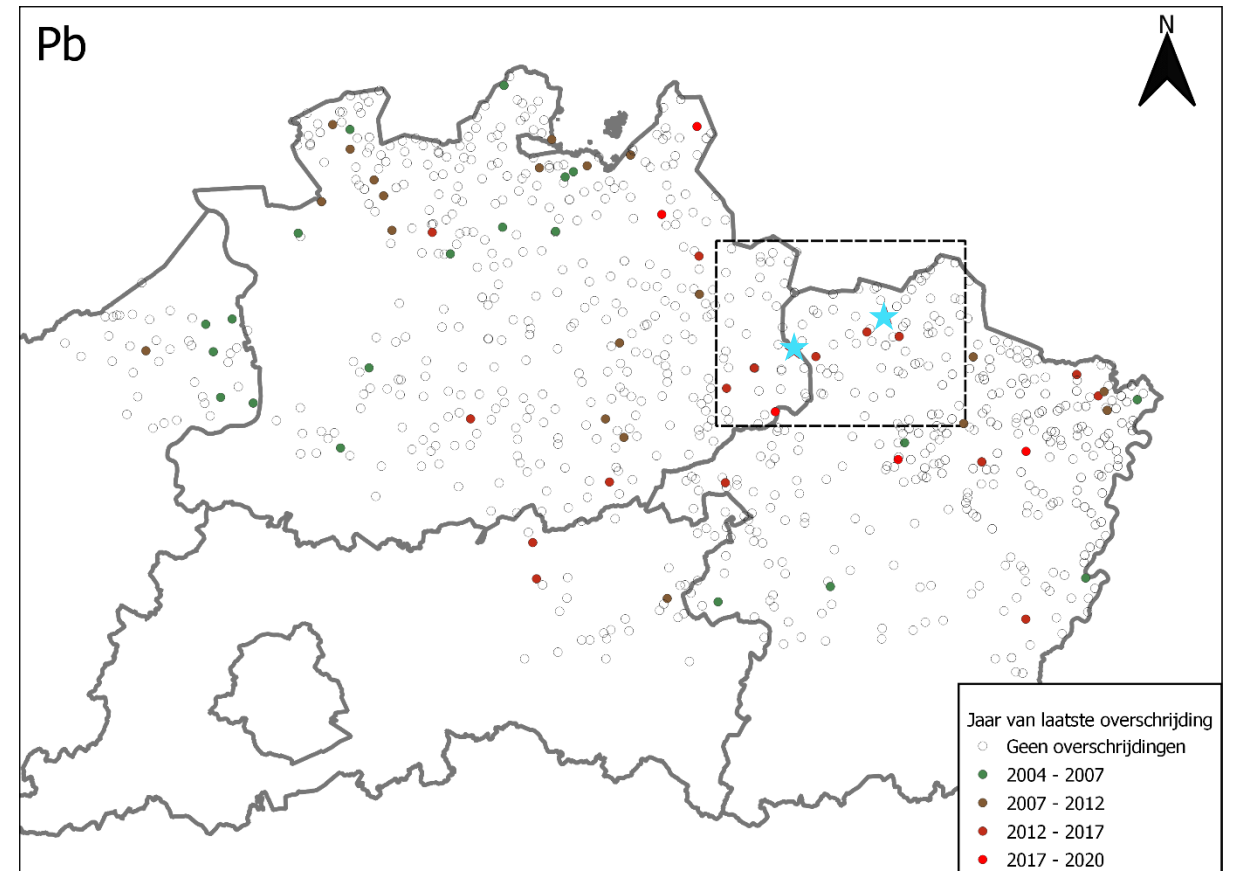
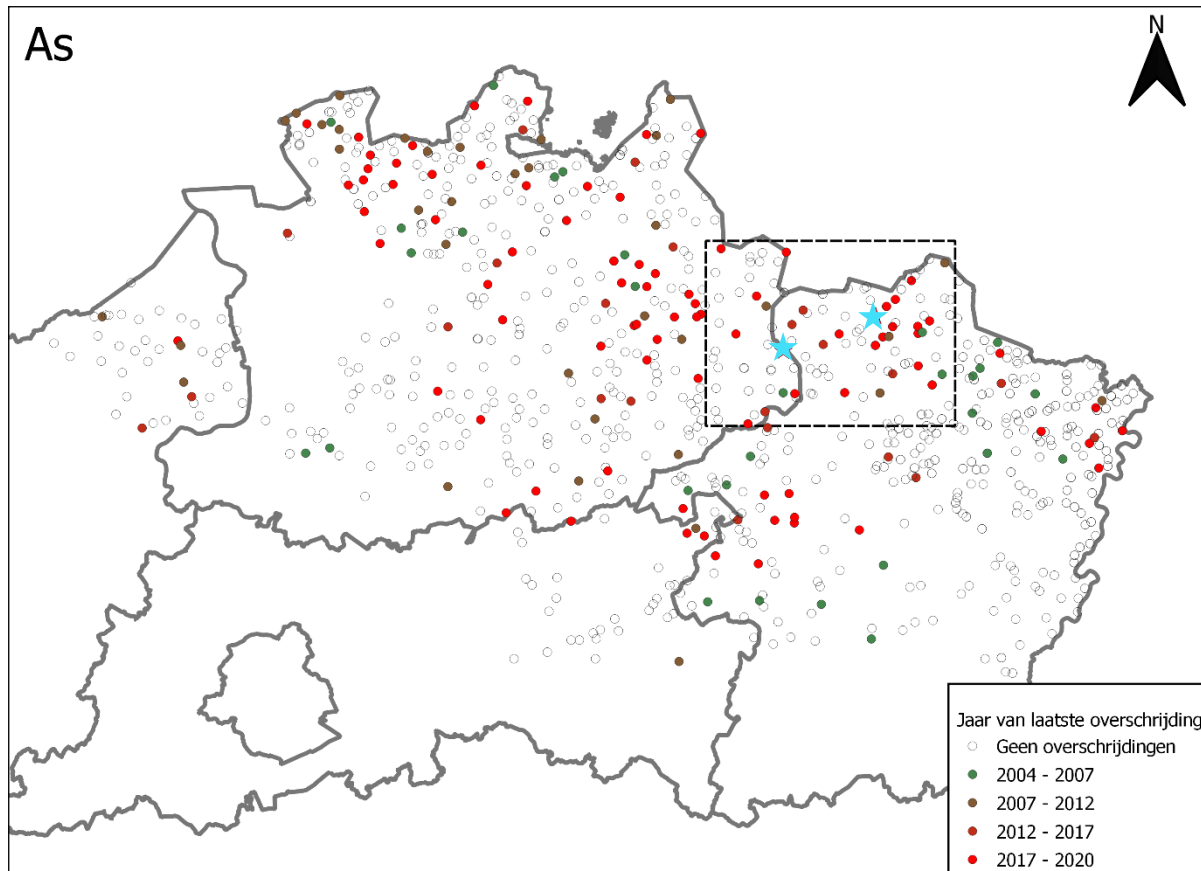
- Since 2017 still locations with exceedances for Cd and Zn in region of interest (WO)



Results - groundwater

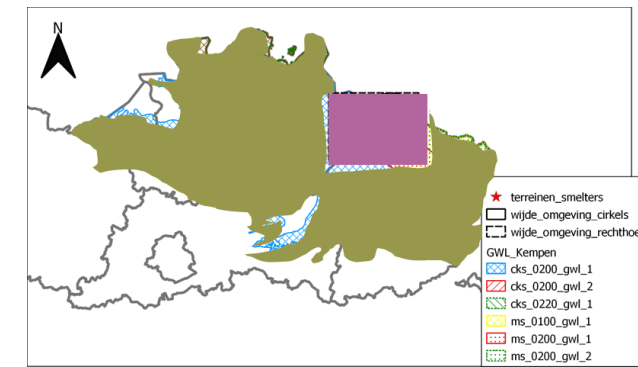
Exceedances As and Pb

- Many locations have As exceedances, fewer locations have Pb exceedances

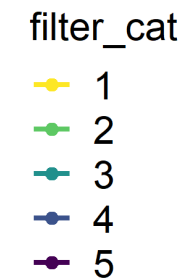
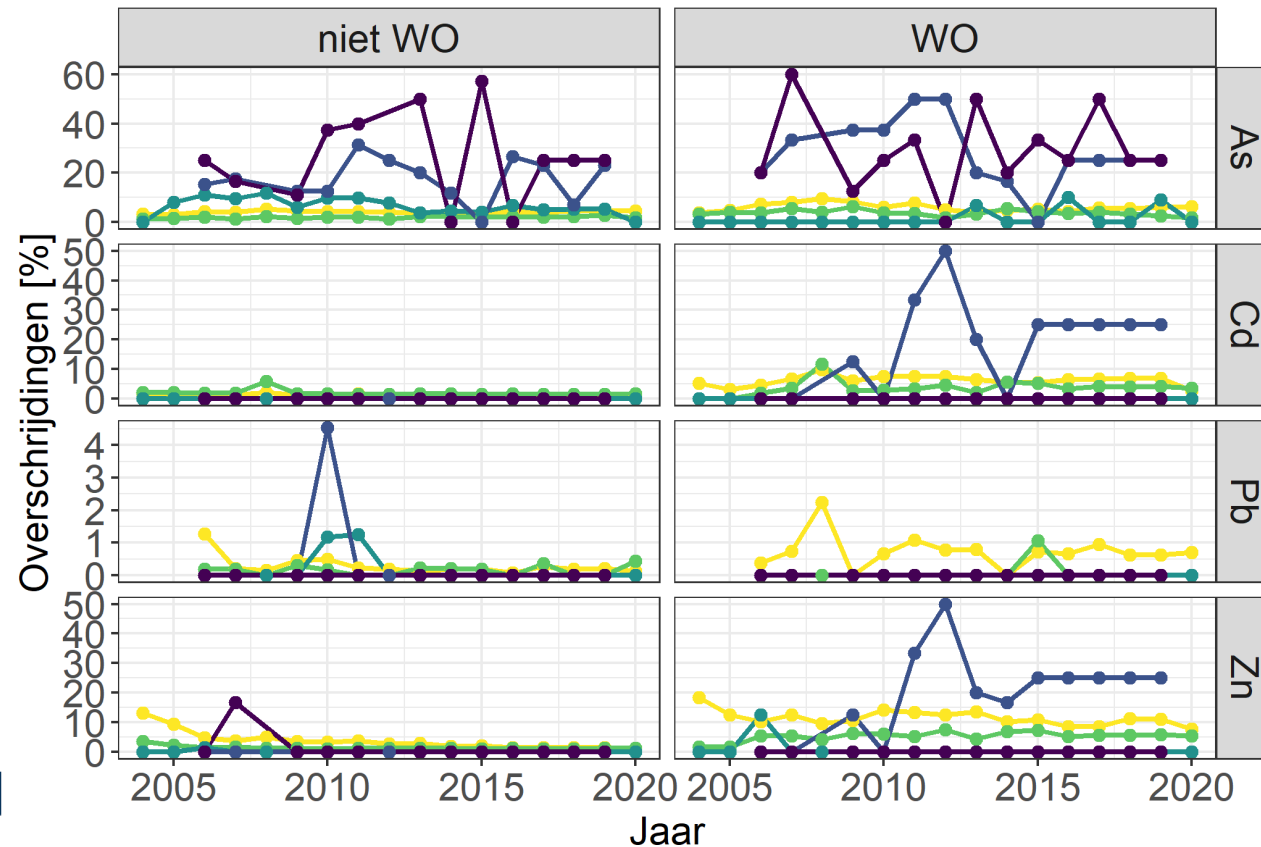


Results - groundwater

Exceedances per depth



- Most exceedances occur in 'WO' in shallow filters
- Large differences between 'WO' and 'not WO' for Cd en Zn in depth category 4

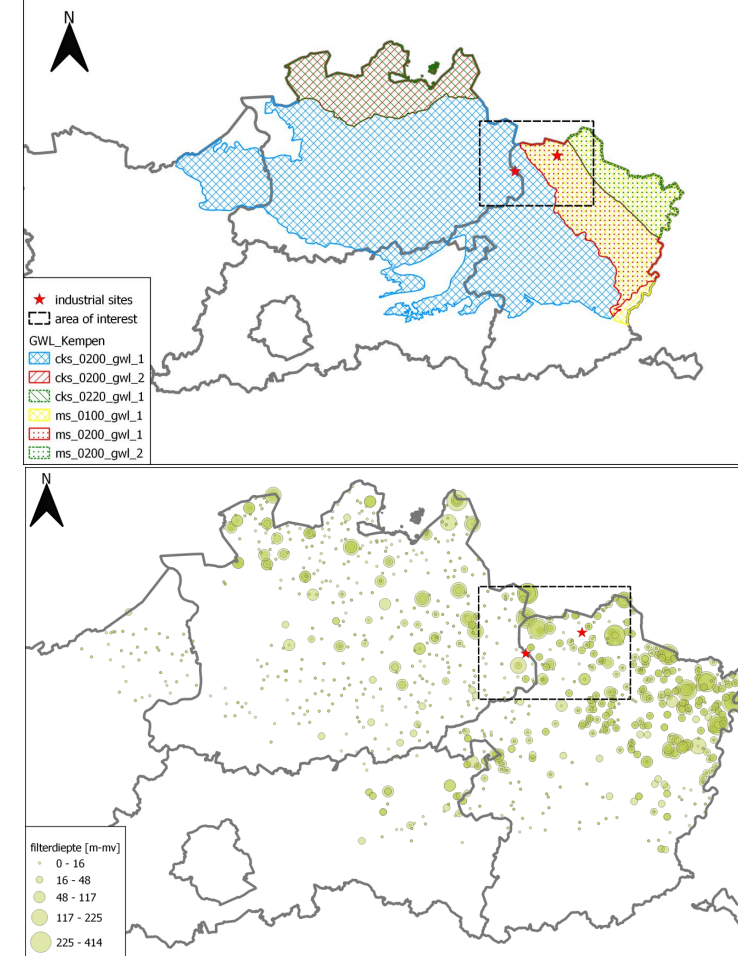
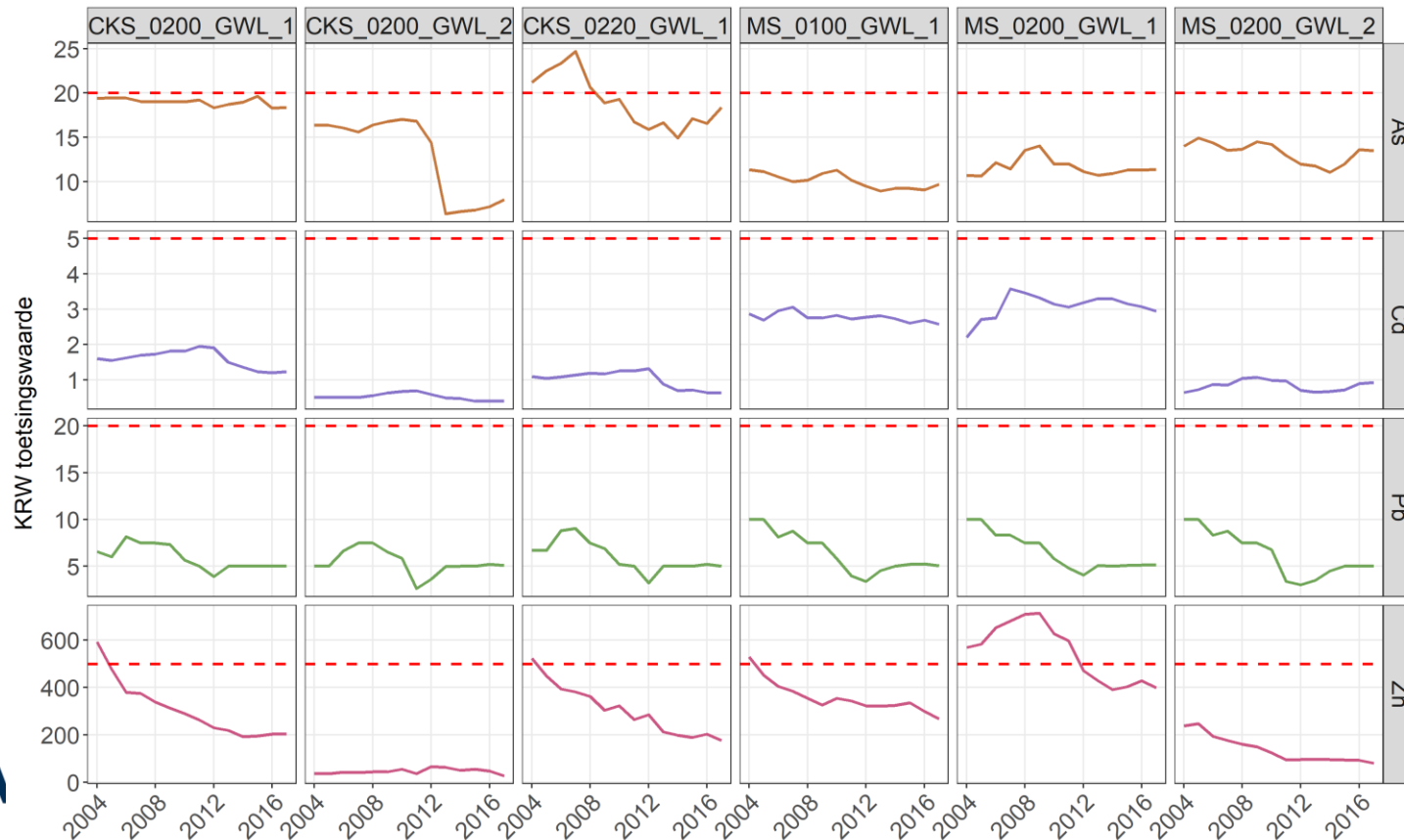


filter category	depth [m-mv]
1	0-16
2	16-48
3	48-117
4	117-225
5	225-414

Results - groundwater

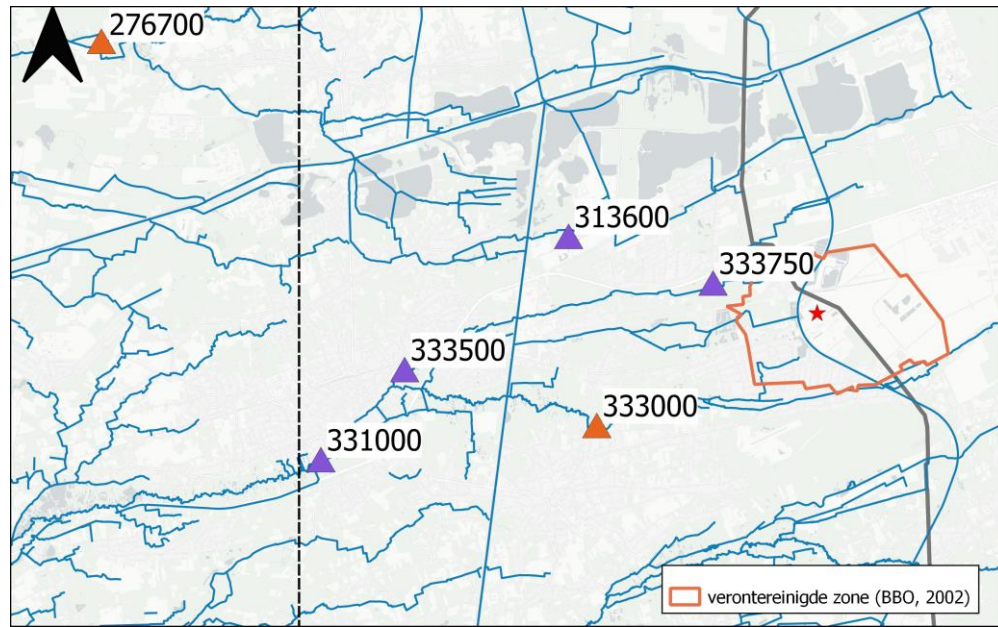
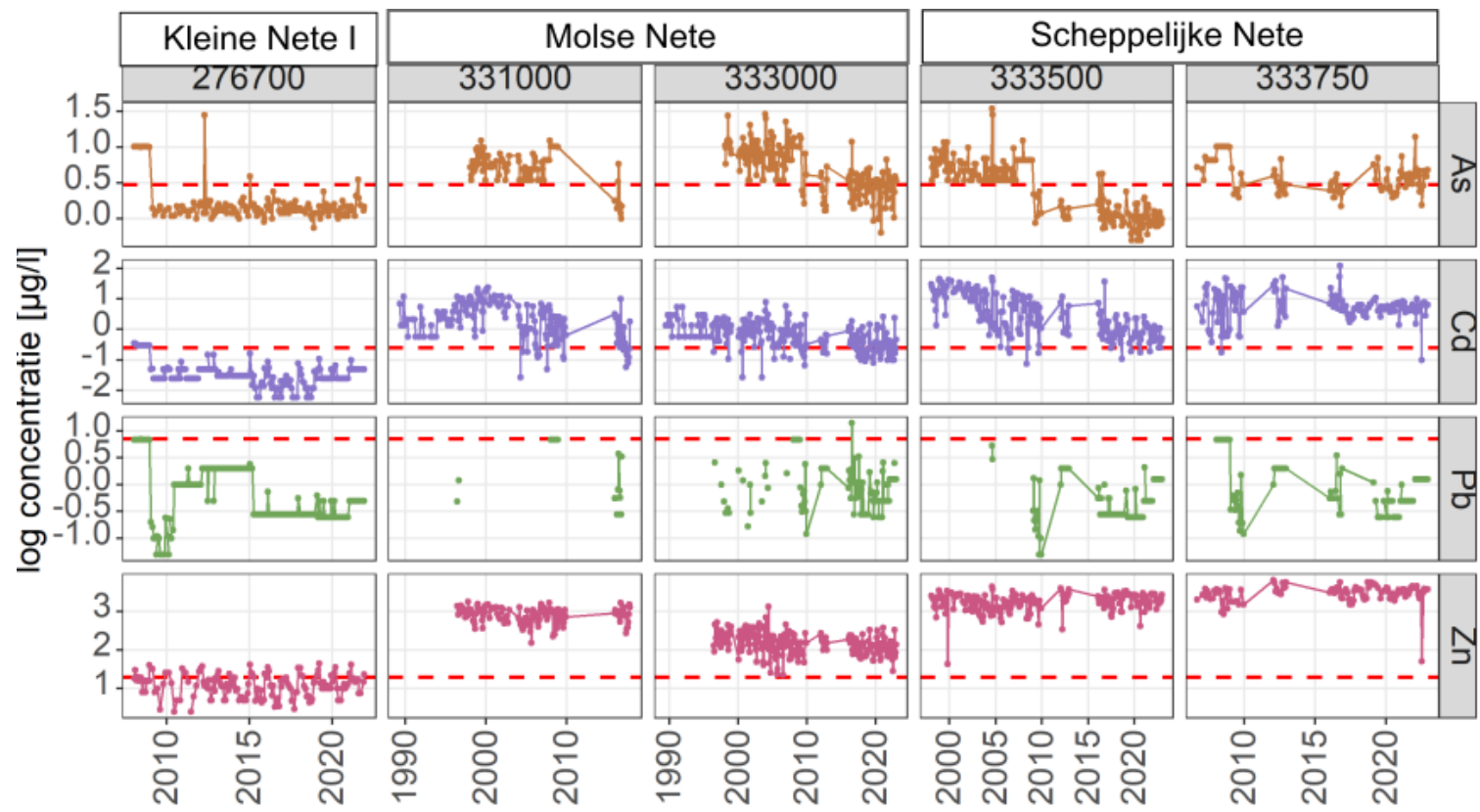
WFD status

- Status value calculated per groundwater body
- For all groundwater bodies, As, Cd, Pb and Zn are below EQS



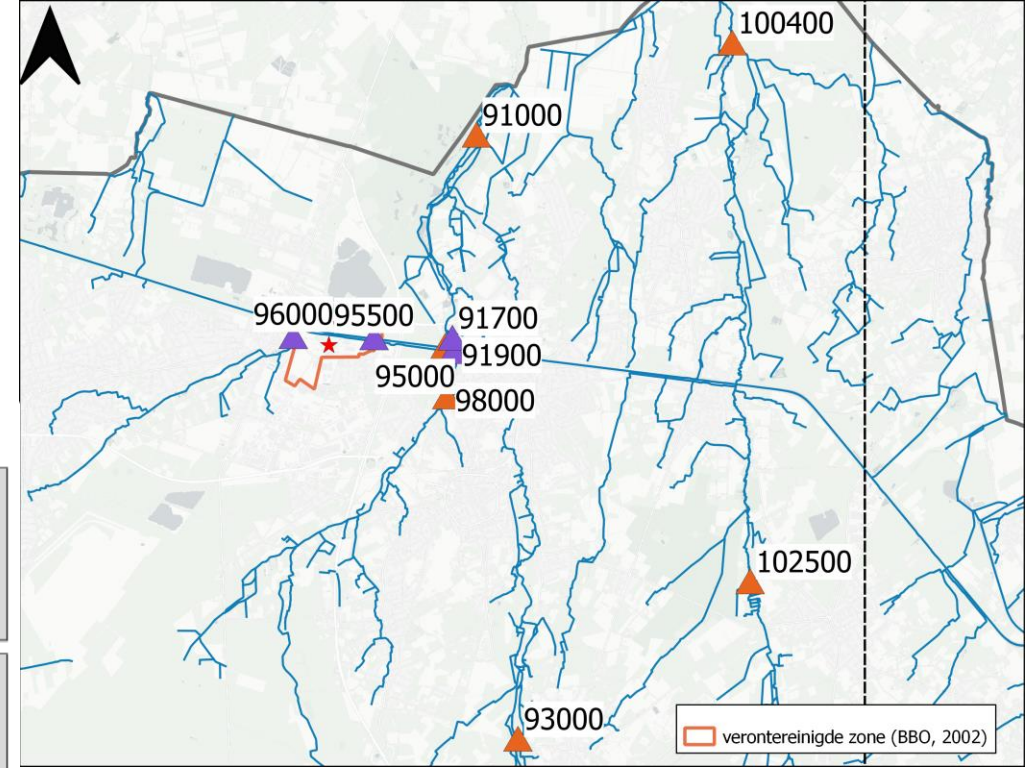
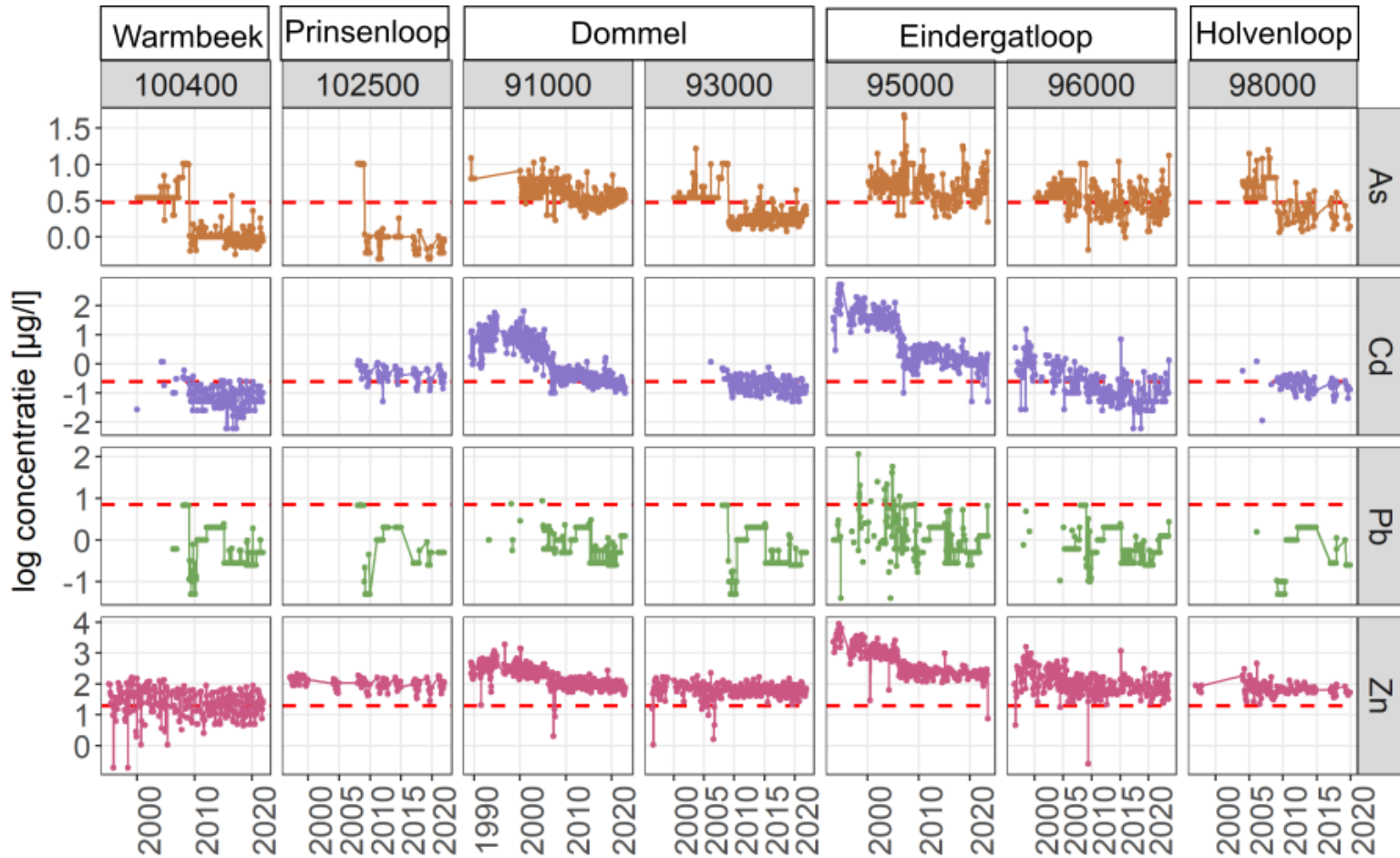
Results - surface water

Concentration timeseries Balen



Results - surface water

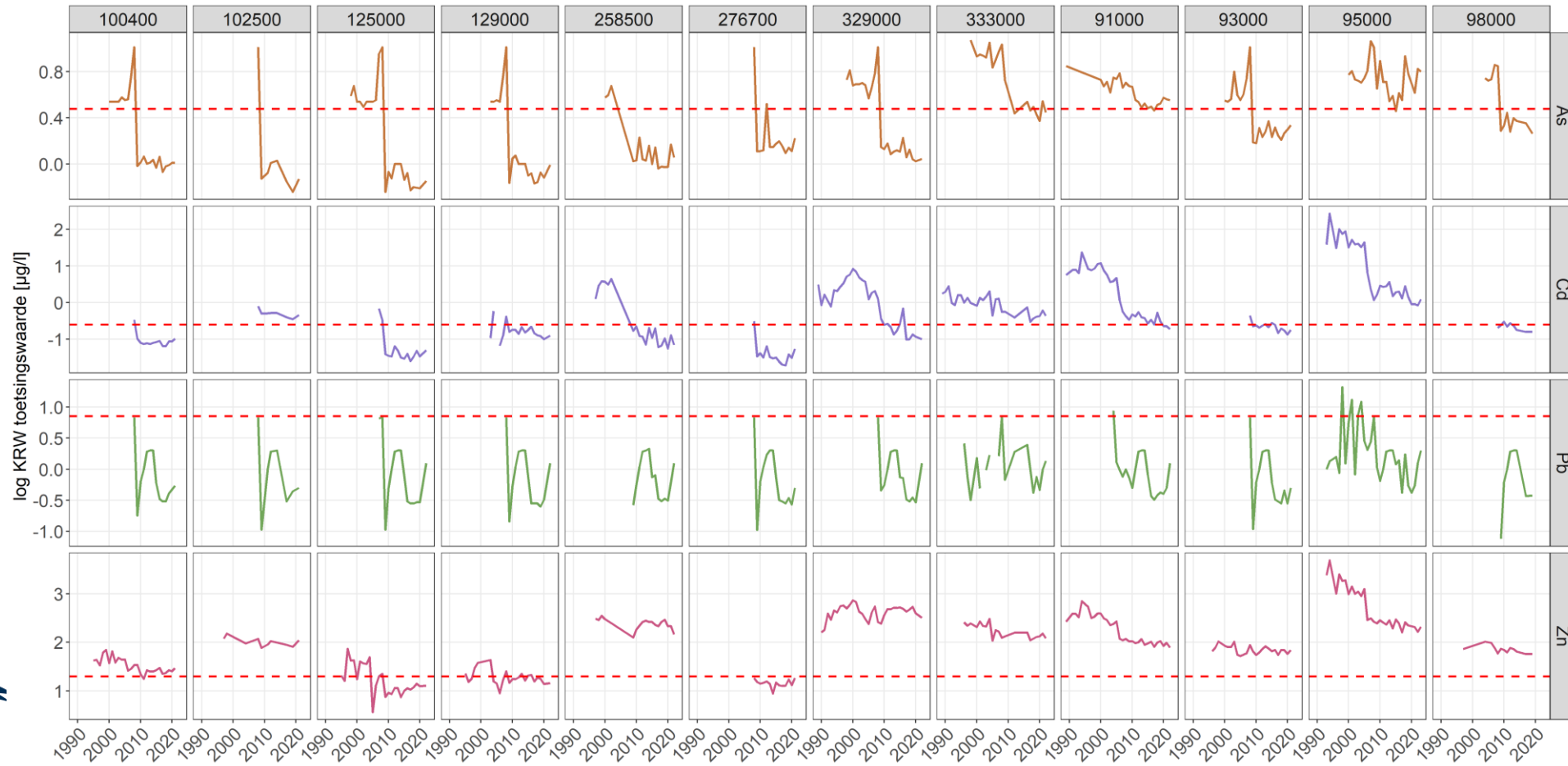
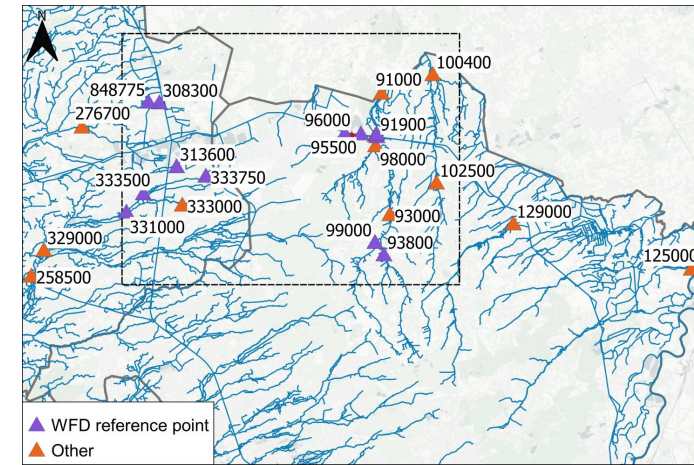
Concentration timeseries Pelt



Results - surface water

WFD status

- Status value calculated per WFD reference point
- Zn and Cd above norm in many locations



Conclusions

- Groundwater status 'good'
 - Hotspots underneath industrial sites
- Surface water status above norm mostly for Zn and sometimes for Cd
 - Hotspots cause heavy metal pollution downstream in Dommel en Nete catchments
- Important of monitoring network
- Issues under discussion with OVAM (and later with VMM)

Thanks for your attention

Questions?

For more information contact:

joni.dehaspe@vito.be

nele.desmet@vito.be

jan.bronders@vito.be

Or visit our website:

<https://digitalwater.vito.be>

