Flemish PFAS policy: what have we learned in the meantime?

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Overview presentation

Introduction

1. Inventory of PFAS suspected sites
2. Investigation of PFAS suspected sites
3. Temporary legal framework for PFAS
4. Assessment framework for the reuse of soil materials with PFAS
5. PFAS contamination former paper factory Willebroek

Lessons learned

Introduction

PFAS measuring campaign 2016-2018

Exploratory measuring campaign on PFAS

Inventory of risk activities

→ 24 sites were selected; soil and groundwater were analyzed for 21 PFASs

Conclusions:

→ Especially on fire fighting training grounds soil & groundwater are contaminated with PFAS

→ PFAS must be included as a suspect substance in soil investigations

These actions were started:

- ✓ **preventive actions** in collaboration with fire brigade organizations
- ✓ development of **limit values** for PFAS in soil & groundwater
- ✓ identification and **inventory of PFAS contaminated sites**
- ✓ development of **guidelines** for soil investigation

Accelerated by the 2021 crisis !

1. Inventory of PFAS suspected sites

Two calls for inventory to local authorities

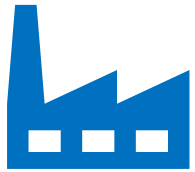
First call (July, 2021): Use of fire extinguishing foam

- Fire fighting training site
- Fire fighting facilities (industry)
- Fire extinguishing calamities
- Military training areas and airports
- Civil airports

→ **826** locations (fire fighting training sites & calamities)

Second call: PFAS processing or producing industry

Risk activities as determined in the study of 2018:
textile industry, paper industry, galvanic industry, ...



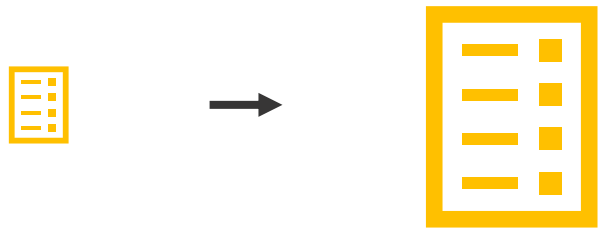
→ more than **4000** locations

PFAS risk activities

Update of list of risk activities has been published end 2024

Updated list of risk activities

→ **52** (2018) to **>300** categories:



2. Investigation of PFAS suspected sites

Investigation of fire fighting related sites

In July 2021 OVAM appointed soil experts for soil investigations (+/- 30 sites/month)

'Preliminary' soil investigations (according to a specific protocol):

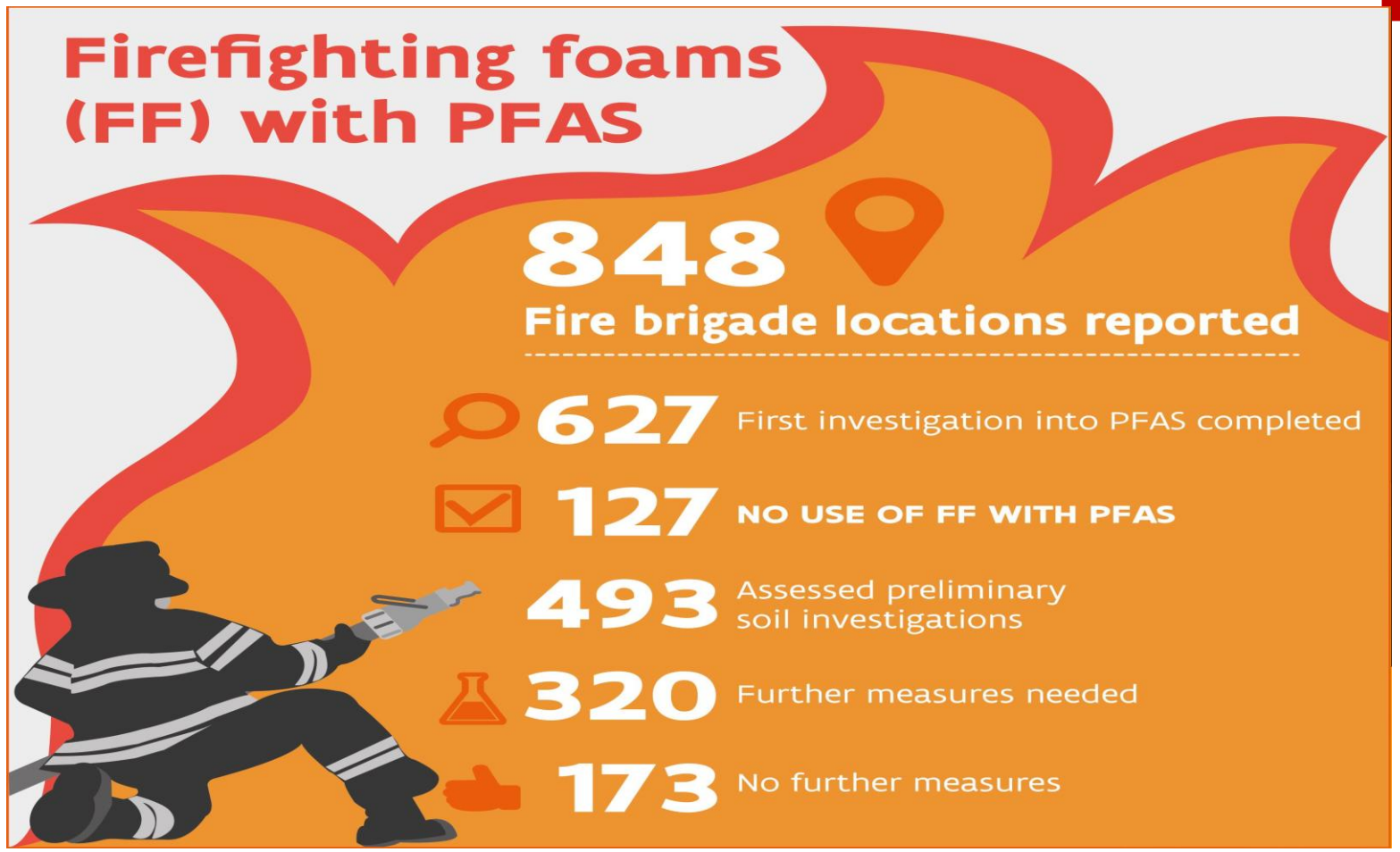
Focused on PFAS
Limited sampling in source area
Sampling near the edge of site (to estimate risks surroundings)
Decision whether furthe soil investigations are needed
Determine priority class (1-5)
→ 'No regret measures' by the Health Departement

75% of the sites are investigated – further investigation needed for 320 sites

Official request from OVAM to operator/owner ('*polluter pays*'-principle)

→ **descriptive soil investigation**

Investigation of fire fighting related sites



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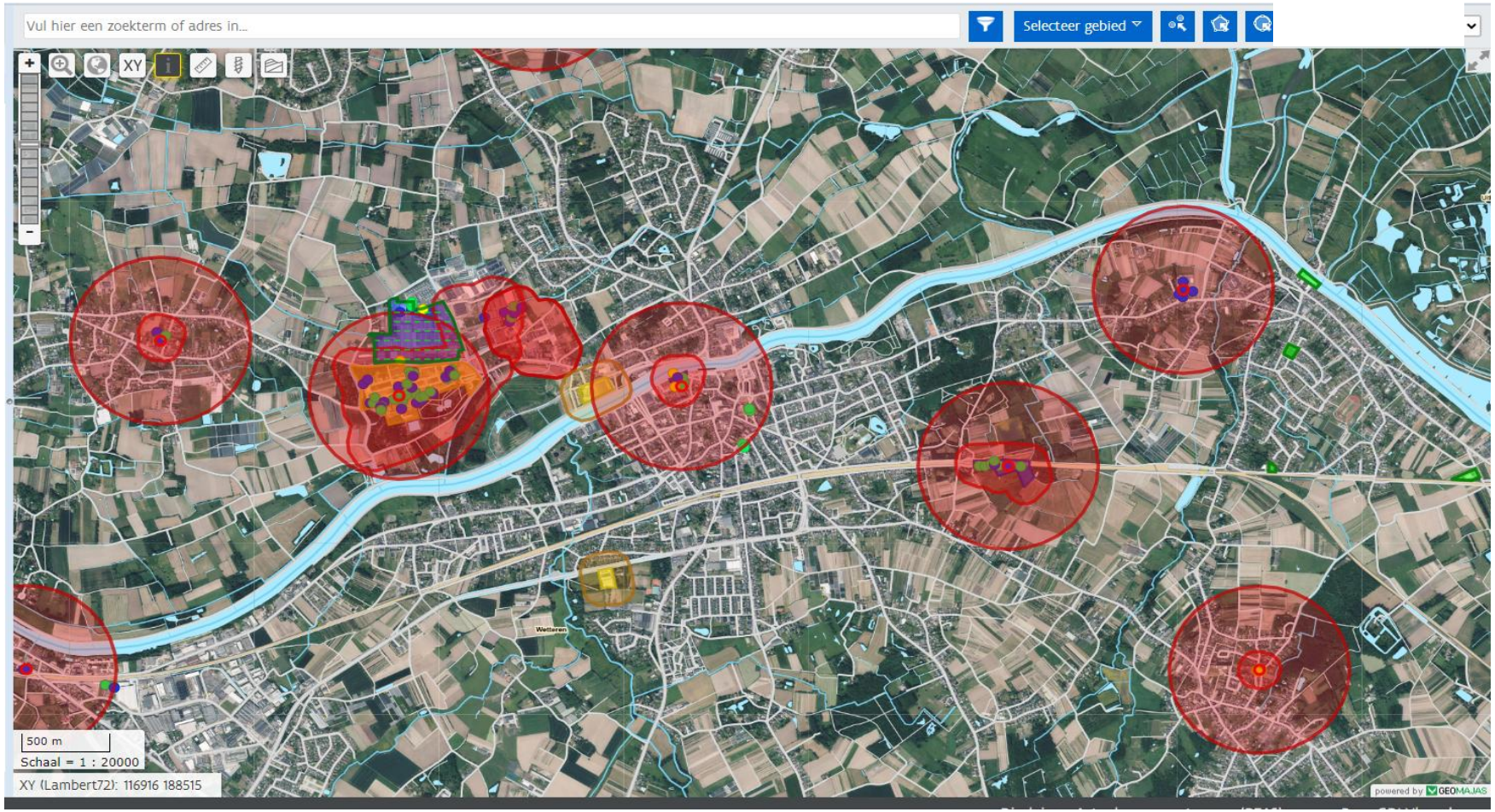
All data publicly available in database



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Fire fighting related sites – trends & insights

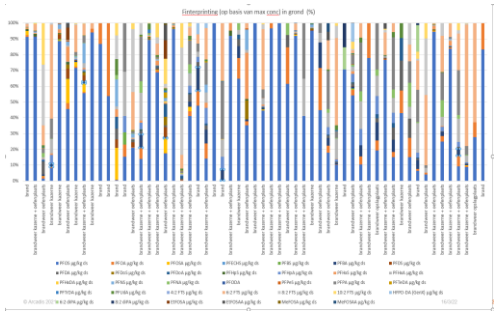
Frequently found PFAS

Soil and groundwater	Ground-water	Soil
PFOS	PFBA	8:2 FTS
PFHxS	PFHxA	10:2 FTS
6:2 FTS	PFHpA	
PFPA	PFOA	
	PFPeS	
	PFBS	

High variability in PFAS compounds (fingerprinting)

Old extinguishing foam: PFOS important

New extinguishing foam: 10:2 FTS, 8:2 FTS and 6:2 FTS



Different composition in soil vs groundwater

Complex leaching behaviour

Surfaces, whether paved or not

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Investigation of sites with PFAS processing or producing industry

Large sites:

- PFAS producing site in **Zwijndrecht** (3M)
- former paper mill **Willebroek**

PFAS integrated in existing obligations for soil investigation

more than **8000** locations - preliminary investigations on 850 locations

Questions: Many sites have been investigated & remediated before.
How and when to initiate investigation for PFAS?
Who is responsible?

Prioritization !

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Amendments executive order

- Executive order VLAREBO
  1. designation of fire exercises with PFAS-containing fire-fighting foam as a risk activity (entered into force on February 12, 2024)
  2. subsidy system (cofinancing) for parties who have the obligation to carry out a descriptive soil investigation for a fire-related PFAS contamination (entered into force on February 1st 2025) (*in preparation of a national fund for PFAS contamination*)
  3. new obligations for investigating PFAS-contamination

3. Temporary legal framework PFAS

Soil remediation values PFOS & PFOA – soil

Applicable since April 19, 2022

Soil remediation criteria Land use type	I/II nature / agriculture	III residence	IV recreation	V industry
PFOS (µg/kg dm)	3,8*	3,8** / 18	110	110
PFOA (µg/kg dm)	4,3	4,3* / 89	643	643

* adjusted for background value & target value
** for residential area with vegetable garden / free range chicken coop

- Implementation in legal documents

Approved by Flemish government, but has not come into force

Soil remediation criteria Land use type	I/II nature / agriculture	III residence	IV recreation	V industry
PFOS (µg/kg dm)	3,8*	4,9	110	268
PFOA (µg/kg dm)	2,5*	7,9	632	303

* adjusted for background value & target value

Soil remediation criterium - groundwater

Soil remediation criterium for groundwater is set at the European limit for drinking water:

0,1 µg/l for the sum of 20 PFAS (Drinking Water Directive)
&
0,5 µg/l for the sum of all quantitative measurable PFAS

Applicable since April 19, 2022

Same values in temporary legal framework
Approved by the Flemish government, but has not come into force

Background values – Target values

Soil

	Background values (µg/kg dm)	Target value (µg/kg dm)
PFOS	1,5	3
PFOA	1,0	3/2
Sum PFAS (quantitative measurable)		8

Groundwater (background)

No values in legal framework,
but proposed values for 'anthropogenic' background
based on observations in nature & rural areas, away from PFAS suspected sites

	Background values (P90) (ng/l)
PFBA	21,0
PFBS	9,4
PFOA	8,0
PFOS	5,0

4. Assessment framework for the reuse of soil materials with PFAS

Existing framework PFAS

- The current framework for reuse of soil materials is based on guidelines issued by OVAM
- For soil materials – free use of excavated soil

	Free use (µg/kg dm)
PFOS	3
PFOA	3
Sum PFAS	8

Expectations from the sector (soil remediation experts, contractors, owners, builders, initiators of infrastructure works, …) for a more legally secure framework

Temporary legal framework PFAS

- For soil materials – free use of excavated soil

	Free use (µg/kg dm)
PFOS	3
PFOA	2
Sum PFAS (quantitative measurable PFAS)	8

- Restriction: + Quality test for underwater applications & for use of soil materials in drinking water protection zones

- For use in construction purposes & use within project zone: max. concentrations & decision based on leaching concentrations (max. 80% of mean concentration in groundwater in project zone)

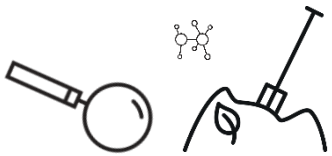
Challenges for reuse of soil materials with PFAS

- There is a need from the sector for more legal certainty
- Due to the rapidly evolving knowledge about PFAS, a temporary legal framework has been chosen
- For PFAS, the leaching properties are determining factors for the possibilities for reuse of soil materials
- More than 10% of the soil materials can no longer be used for free use due to increased PFAS concentrations
- For PFAS, both the standstill provisions for the quality of soil and groundwater are important
- SCBA PFAS - Cost efficiency exercise based on different scenarios

5. PFAS contamination former paper factory Willebroek

Outline of the case study

Overview of the project area/history/no regret measures

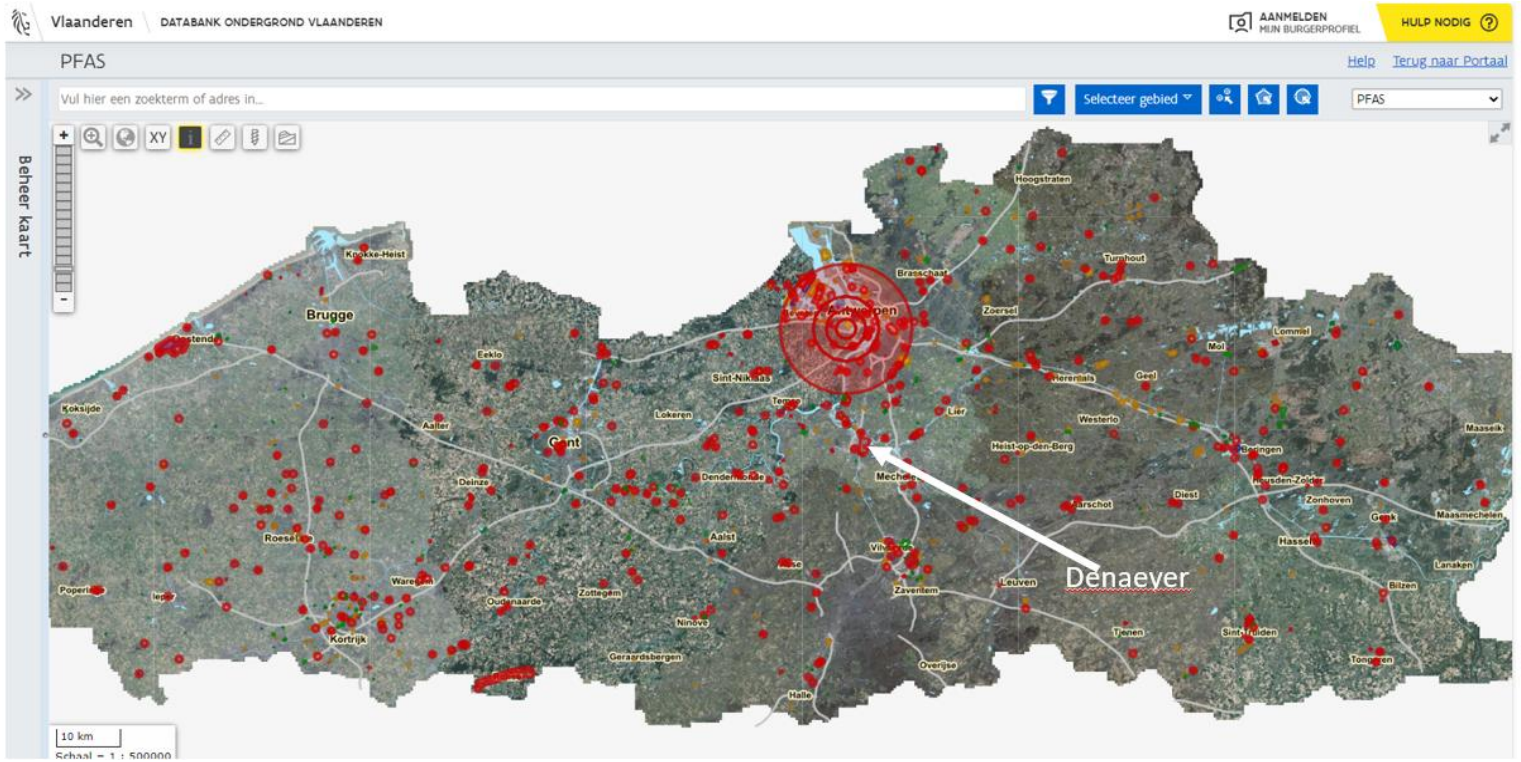


Investigation and precautionary measures

Communication

Next steps

Overview of the project area

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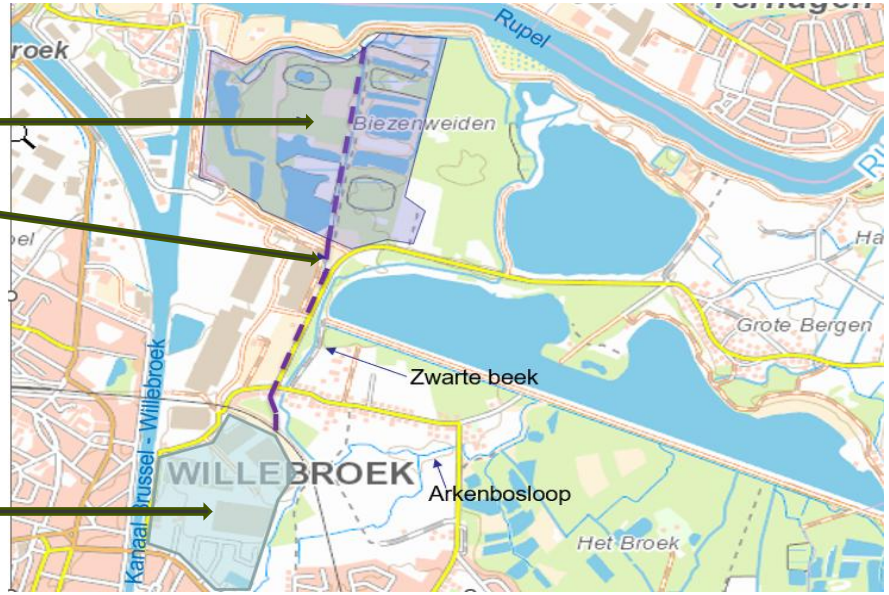
Nature reserve
De Naeyer

Fabrieksloop

Former site
De Naeyer
Paper Factory



Sediments were spread over the area

PFOS (→ 100-200 µg/kg dw) in top soil

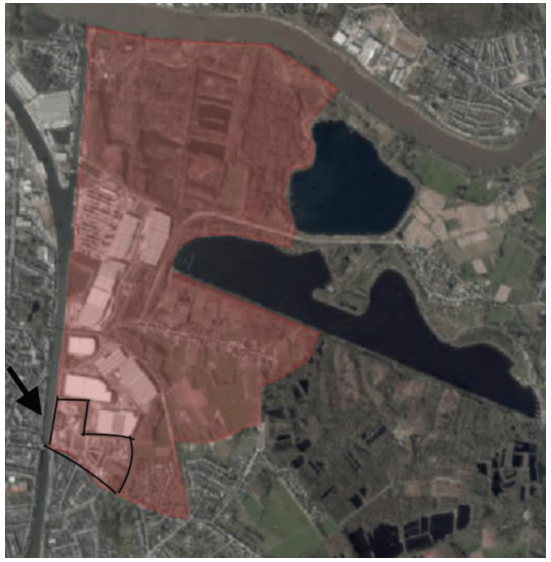
EtPFOSAA (→ 200-470 µg/kg dw)

PFOA (→ 5-9 µg/kg dw)

- June 2021 : exploratory aquatic soil investigation Fabrieksloop – PFAS detected !

- Additional research in residential zones / groundwater / river banks

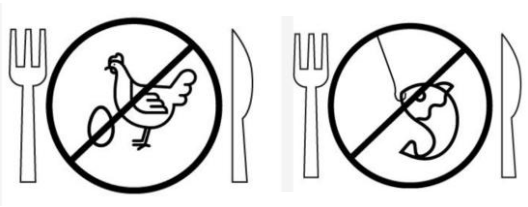
- Departement of Health Care – no regret measures



No regret measures

- Children prohibited to play on uncovered soil

- Nutrition :
  - → Vulnerable groups are advised no to consume home – grown vegetables or fruits
  - → General population : consumption of a good mix of commercial and homegrown vegetables is advised
  - → Do not eat homegrown small livestock
  - → Do not eat eggs from your own chickens
  - → Do not teat fish from ponds or rivers near the Naeyer



No regret measures

- Water: Do not use groundwater as drinking water, for your vegetable garden or to fill your swimming pool

- Soil and garden waste :
  → Do not use compost composed with material from your own garden
  → Avoid spreading of windblown soil
  → Take garden waste to the waste collection point

- **Hygiene**
  → Wash your hands
  → Clean your house with water

Residential area: earth movement

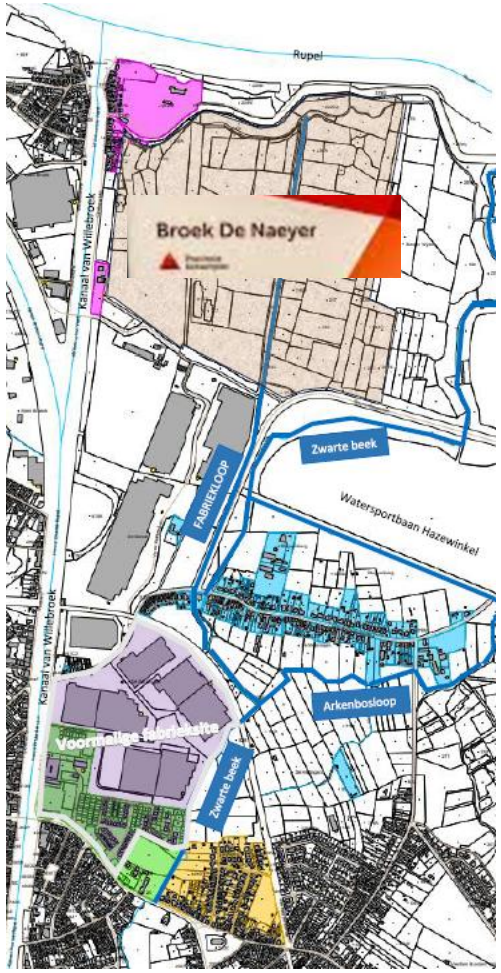
- During excavation work, the soil is kept wet
- Avoid contaminated dust entering the house
- Cover loose soil (sowing grass, gravel…) and piles of excavated soil
- Global technical report (municipality of Willebroek+ OVAM)

- Water activities permitted
  → No harmful effects on health - amount of water swallow while swimming – (Departement of Health Care)
- Study on PFAS in house dust in homes :
  → 26 local residents : link soil contamination – dust
  → Estimate exposure and human risk using S Risk model
  → No human risk

Investigation

- Site investigations residential areas :
  → OVAM

Zone F
Zone H
Zone K
Zone O



Precautionary measures

- Excavation of the top layer 70 cm on private terrains – 50 cm public area (march 2022 – june 2023)
- Replacement by new topsoil : checked for physical and chemical quality
- Restoration of fencing and refurbishment in consideration with the owners

Zone F

Communication

- Consultation with different stakeholders
- Newsletters and resident meetings
- Taskforce between OVAM, municipality and delegation of residents
- Ombudsman as contact point and mediator
- Website PFAS Willebroek : www.willebroek.be/pfas / special email address /FAQ

Recent developments – next steps

- Additional research in the different residential areas : egg and crop analyses – remediation needed for residential areas
- Bringing together research results
- Further investigation : extent of the groundwaterpollution / risk evaluation
- Innovative investigation and remediation techniques

Lessons learned

Conclusions

PFAS are perhaps not ‘everywhere’ but in most cases they are where we don’t want them

It is difficult to develop legislation and trigger values for substances around which new knowledge is constantly growing. This creates legal uncertainty for those involved in real estate management and the use of soil materials

PFAS production sites have received a lot of attention as sources of PFAS contamination in the environment, but the number of sites where PFAS has been used (fire fighting, textiles, paper production, etc.) are much larger, are mainly in living areas or have in many cases been converted into homes due to economic developments

Conclusions

PFAS have challenged us to renew policies surrounding the management and remediation of soil contamination

Cooperation at the international level is crucial for exchange of experiences and acquired knowledge, regarding scientific developments, soil policy, risk assessment, remediation techniques, communication, health impacts, ...

Harmonization of the approach can be strengthened by European and international policy, such as through the Soil Monitoring Law and the Chemicals Strategy for Sustainability

Thank you for your attention!

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"*Judge a man by his questions rather than by his answers*"
Voltaire