

ENSOr



WE MAKE
TOMORROW
BEAUTIFUL
OVAM

EmConSoil
a Multi-stakeholder Network
for Emerging Soil Contaminants

Nature-based approaches for metal contaminated alluvial plains

Froukje Kuijk, OVAM, Project Coordinator LIFE Narmena



be
EU
belgium24.eu

Nature-based Remediation of Metal pollutants in Nature Areas to increase water storage capacity



narmena[®]
Ruimte voor schone waterlopen



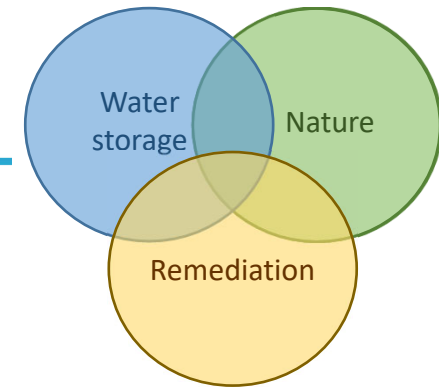
Problem setting

- Historical backlog of contaminated sites
 - Flanders is a densely populated land
 - Pressure on land, water resources and in particular blue-green infrastructure is high
 - In Flanders over 500 land and water sites are contaminated with metals
 - Drawbacks of conventional remediation
 - high cost (energy, materials, carbon emission, financial) for transport and treatment
 - considerable residual waste or by-products
 - change in edaphic conditions or soil erosion, drastic impact on nature
 - Dynamic character of sediments
 - Contaminated sediments spread easily via currents and flooding
 - Increasing flood risk and growing need for space to store water
-



LIFE Narmena

Nature-based Remediation of Metal pollutants in Nature Areas to increase water storage capacity



Nature-based: using natural processes, in-situ remediation

Remediation of Metal pollutants: (historical) metal contamination & nutrients in sediments, bank zones and floodplains of watercourses

➤ Reduction of bioavailable concentrations

Nature areas: demo sites are watercourses that flow through nature reserves (Natura2000)

To create water storage capacity: creation of natural flood control areas



NBR techniques benefits

- Less drastic impacts on nature (+ ecosystem services)
- Cost-efficient (also for energy & materials)
- Low CO₂-emission
- Co-benefits (water storage, nature goals)



Monitoring

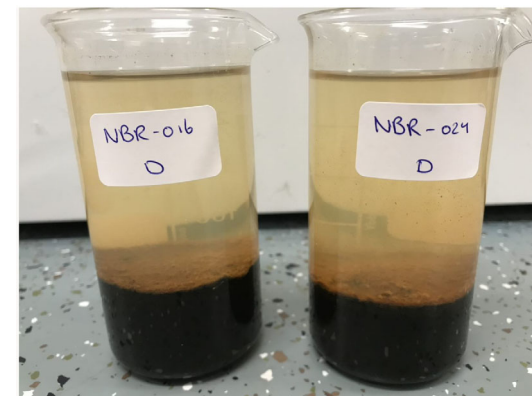
- Intensive baseline and post-remediation monitoring
 - Several methods to quantify bioavailable concentrations (e.g. passive sampling, metal extractions, bio-assays, AVS-SEM)
-



Ecomodelling



- Ecomodelling allows to extrapolate toxicity effects in the lab to populations in the field
 - More realistic
 - Extrapolation to non-tested scenarios
- Ecomodelling requires ecotoxicity data
 - As, Cd and Cr are most important contaminants
 - Literature study for available ecotoxicity data
 - Aquatic and soil: literature data available
 - Sediment: data gap
 - toxicity testing for certain metals on key biotic indicators





Project information



01/07/19 - 31/08/25 + 3 years After-LIFE



Total: € 4.520.488

55 % EC Co-funding

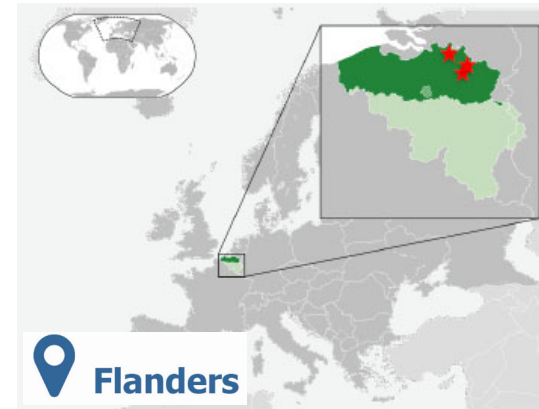


PROJECT PARTNERS

Coordination:



Associated partners:

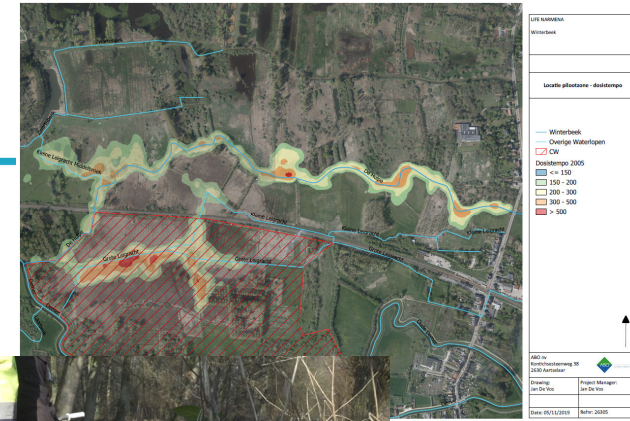
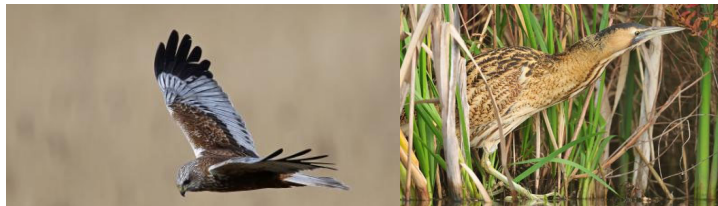


Grote Calie (Turnhout)
Winterbeek (Scherpenheuvel-Zichem)
Grote Laak (Geel-Laakdal)



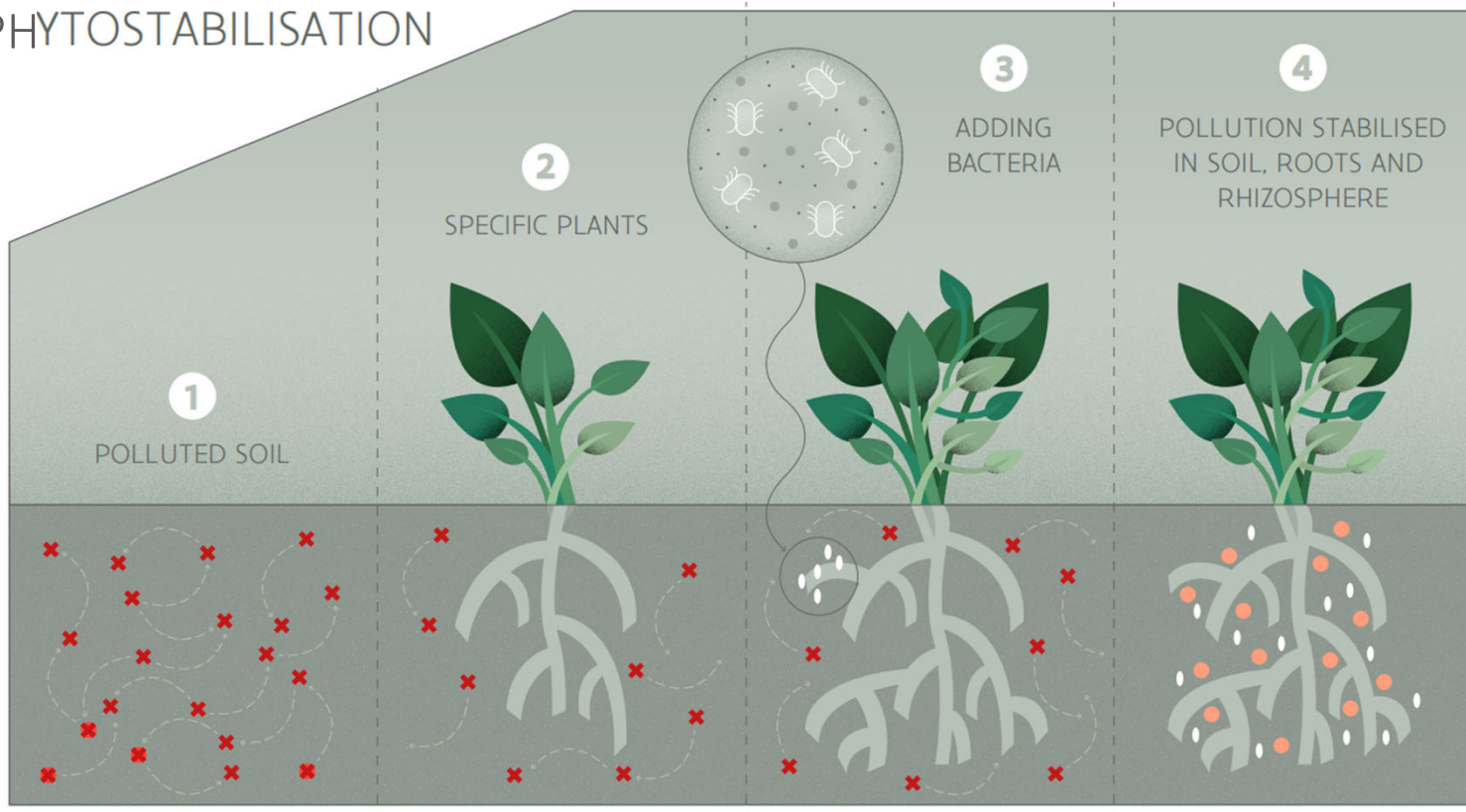
Pilot projects of Narmena

- Grote Calie (Turnhout)
 - 2 BAP (bacterie-assisted phytostabilisation) fields: nature and agricultural terrain
 - 1 constructed wetland
- Winterbeek (Scherpenheuvel-Zichem)
 - 1 constructed wetland (confluence area)
- Grote Laak (Laakdal - Geel)
 - 1 constructed wetland (confluence area)

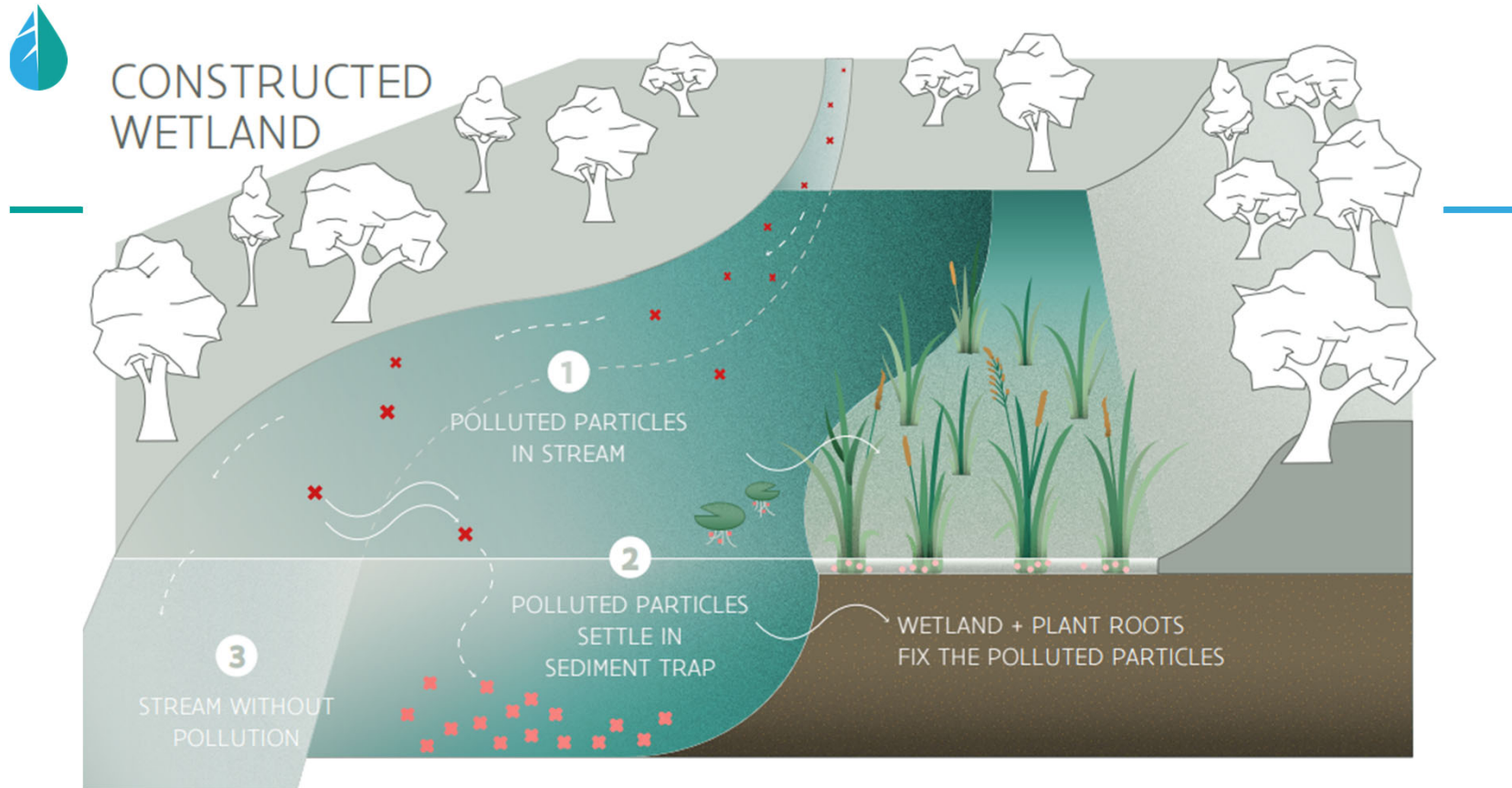




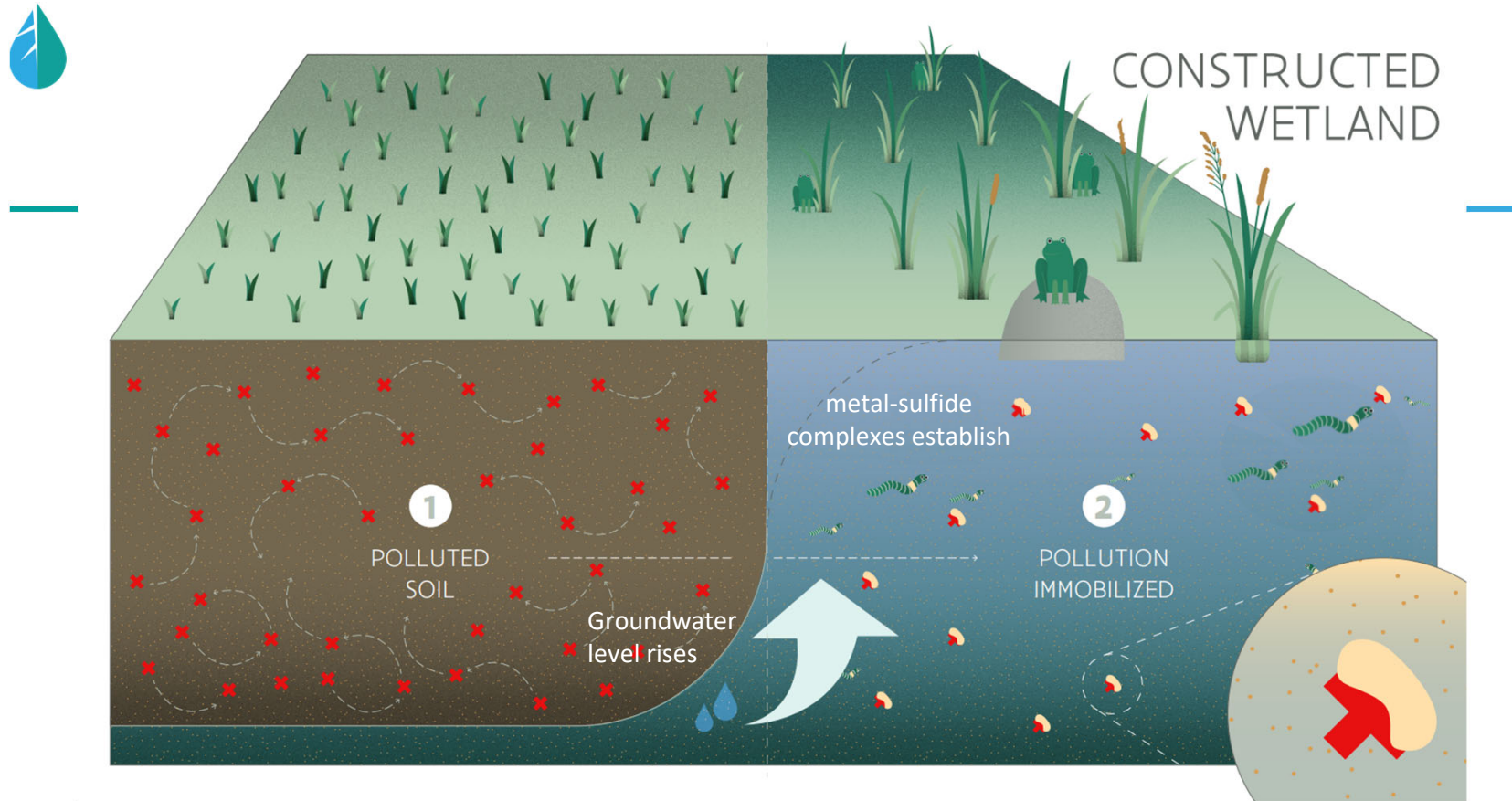
PHYTOSTABILISATION



Using phytostabilisation, the metals are fixed in the rhizosphere of the plants. Bacteria can be inoculated to help the plant stabilizing the metals and support surviving in environment with high metal concentrations.



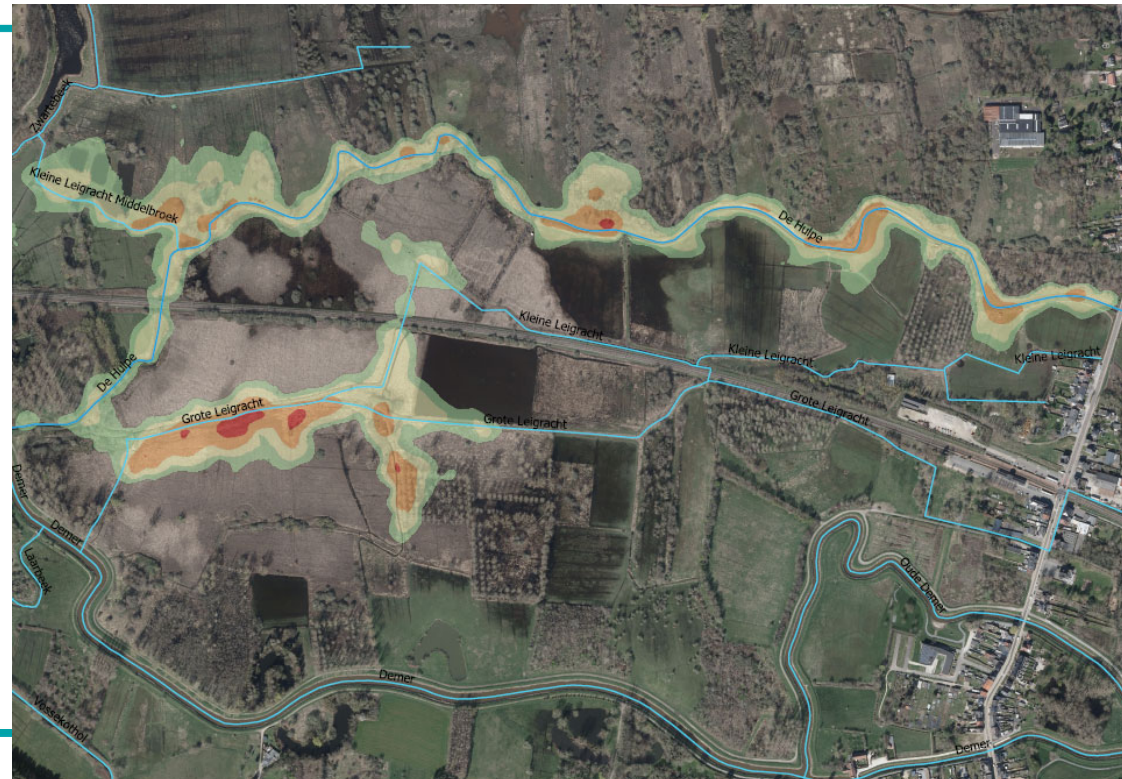
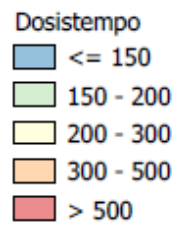
In this type of constructed wetland we tackle the spreading of contaminated sediment (chromium) downstream and lower the bioavailability of the chromium in the constructed wetland

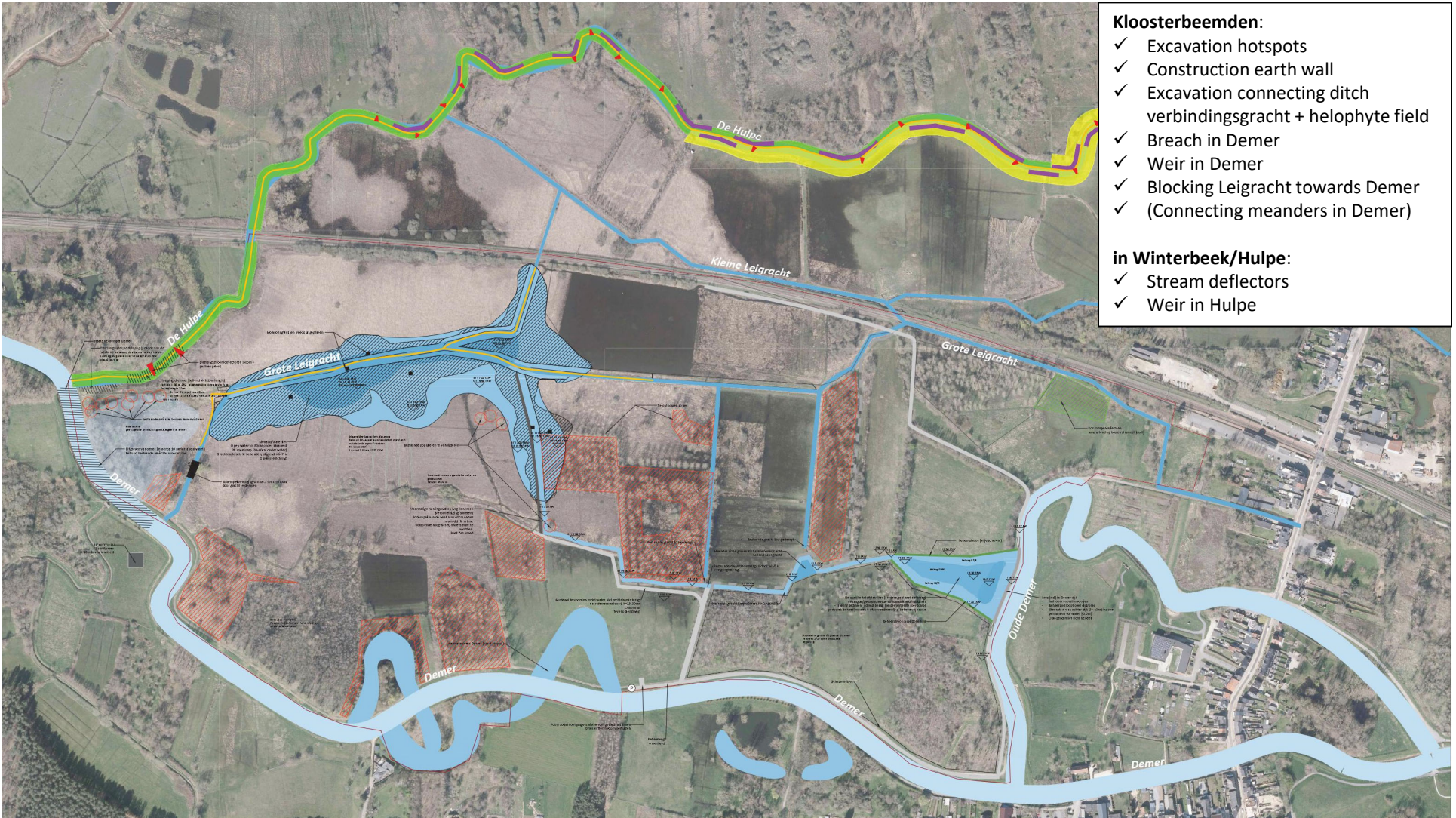


In this type of constructed wetland we immobilize the metal contamination (Cd and As) by complexation of metals with sulfides once anaerobic conditions are established. Metal-sulfide complexes cannot be taken up by organisms or plants.



Winterbeek: contamination





- Kloosterbeemden:**
- ✓ Excavation hotspots
 - ✓ Construction earth wall
 - ✓ Excavation connecting ditch
verbindingsgracht + helophyte field
 - ✓ Breach in Demer
 - ✓ Weir in Demer
 - ✓ Blocking Leigracht towards Demer
 - ✓ (Connecting meanders in Demer)
- in Winterbeek/Hulpe:**
- ✓ Stream deflectors
 - ✓ Weir in Hulpe









Lessons learned

- Dissemination of the results
 - Actively reaching out to nature and water managers, authorities, etc. EU-wide
 - Development of an application framework (AF) for NBR
 - AF aims to integrate the use of NBR-techniques in water retention, nature and soil policies
 - Responsible water and nature management bodies in Flanders participate in NARMENA
 - Develop a manual and improve guidelines and codes of good practice
 - AF will be transferred to observer locations for replication
-

Visit our website:

<https://www.narmena.com>

