III SESSIONE | CASE STUDIES

MULTI-STAKEHOLDER APPROACH TO CHARACTERIZING AND REMEDIATING THE PFAS-CONTAMINATED SITE IN NORTHERN EUROPE

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The Project



- PFAS Manufacturing plant in Antwerp (Belgium) petrochemical cluster situated in a very complex and sensitive setting: nature reserve, farmland, residential, and the Scheldt river flowing to the North Sea
- Historical C8-PFAS production (mainly PFOS) stopped in 2002. Onsite remediation ongoing since 2010 through pump & treat
- Huge infrastructure project underway (Oosterweel) brought high attention to PFOS levels in soil around the site, generating a catalytic effect pushing for new onsite and offsite sampling and risk assessment and raising media and political storm since April 2021
- Impact spread by groundwater flow and atmospheric deposition
- Onsite and offsite remedial action plans (RAP) are under development to address the potential human and environmental risks



570 M€ Agreement with Flemish Government



Over 4,500 impacted parcels



Elevated PFOS levels in human blood



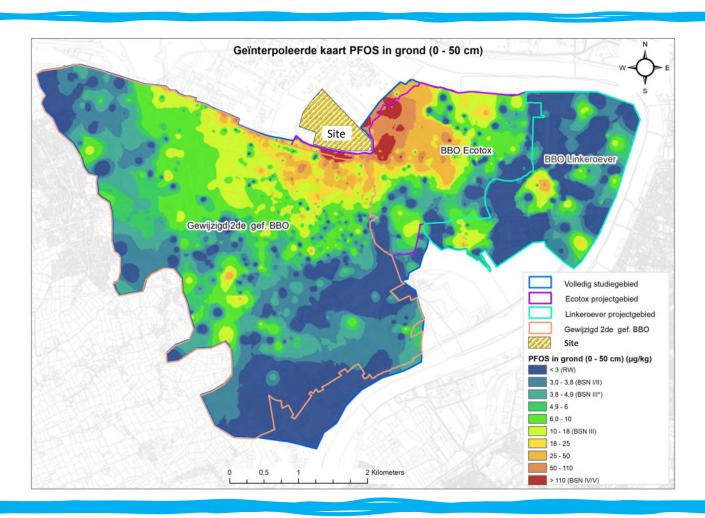


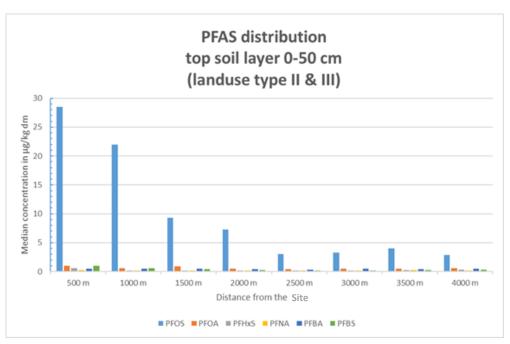




PFOS distribution in topsoil (and groundwater)



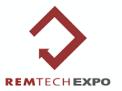








Seeking societal approval: What the stakeholders were saying when starting the RAPs development





be minimized as much as possible

Integrated plan needed covering manufacturing plant and its surroundings within regulations

We need to protect the nature area

Synergies should be developed with Oosterweel project

The reference frameworks need to be revisited based on current knowledge

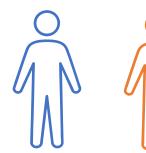
Compensation for property value loss and business impacts









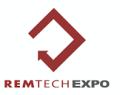




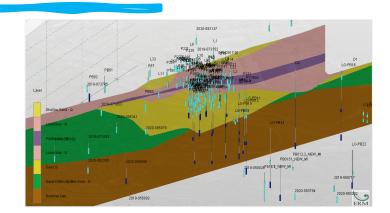


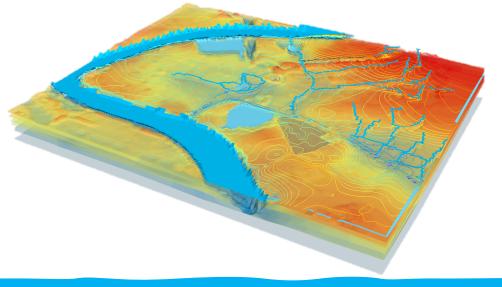


Internal area RAP: hydrogeological modelling as strategic management tool



- State-of-the-art, large-scale, numerical flow and PFAS transport model has been created as comprehensive management tool to assist in the definition of the site remedial actions
- The main objective of the model were:
 - improve and validate the Conceptual Site Model
 - guide new hydrogeological data acquisition
 - understand the details of GW flow and contaminant migration
 - support the design of remediation and containment actions through predictive scenarios in a sustainability framework

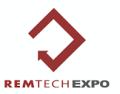






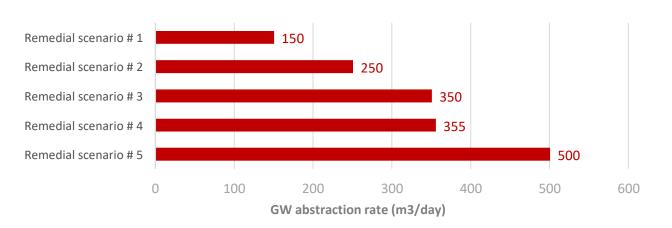


Groundwater remedial scenarios and sustainability evaluation

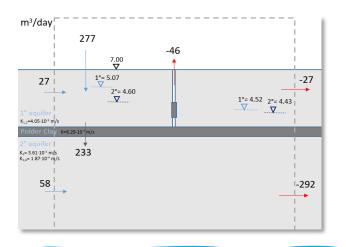


- Various predictive scenarios have been simulated to define the most effective and sustainable remedial approach
- The simulated scenarios comprise different combination of various remedial technologies, such as hydraulic confinement, capping, and physical barriers
- The sustainability is evaluated in terms of environmental and economic impact of each remedial scenario using cost/benefit approach, with the assumption that every solution should be 100% effective in groundwater containment

Preliminary results of remedial technologies sustainability evaluation



Mass balance of complex remedial scenarios







External areas RAP: main actions



- 70 cm soil exchange residential/agricultural area;
- Treatment/disposal of the excavated PFAS containing soils;
- Backfill with good quality soils, fertile top layer;
- Restoration of the residential gardens;
- Anticipated duration of the works 4 to 5 yrs, subject to backfill material/treatment capacity and agreements with the property owners.















Challenges to overcome



- Evolving policy & regulatory framework
- Biomonitoring results (blood serum) had to be integrated in the initial RAP addressing human tox risk
- PFAS framework in continuous evolution
- Human risk mainly driven by consumption of free-range chicken eggs
- Extremely short RAP development time imposed <6 months
- Remedial works will be intrusive for the involved people
- Many stakeholders involved with different interests







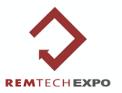


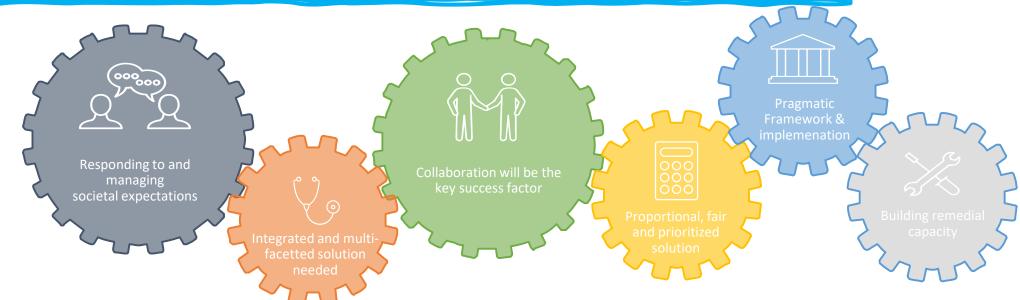






Co-creation is the only way to go

















Thank you



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