



REMTECH EXPO

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**USE OF AN EXISTING SURFACE WATER FIRE-FIGHTING
BASIN AT A CHEMICAL FACILITY AS A SUSTAINABLE
NATURE-BASED IMPROVEMENT TO A LARGE
GROUNDWATER PLUME CONTROL**

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REMTECH EUROPE CONFERENCE

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Background

- Site of over 100 ha used for chemical manufacturing
- Industrial waste landfill containing 720,000 m³ of wastes of different nature and 427,000 m³ of contaminated soils
- Over 45,000 m³ of fill material excavated and treated, leaching prior to the mass reduction → impact on GW
- Hydraulic barrier pumping 250 m³/hr, with extracted GW discharged to nearby River (system in place since mid 80s)
- Complex hydrogeology: interaction with nearby River (driver of local hydrogeology), vicinity of national border, aquifer mineralisation potentially limiting the available remedial options



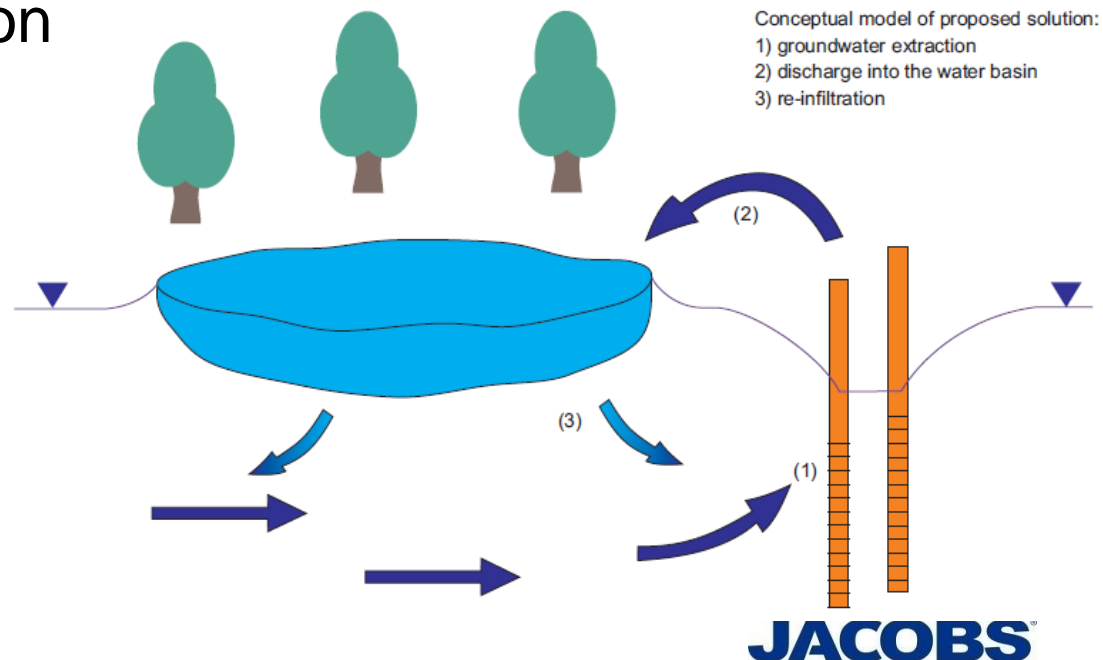
Project objectives and concept

Overall project objectives:

- optimisation of hydraulic containment system
- reduction of the discharge to the River

Use of an existing water basin → opportunity for a sustainable and nature based remedial approach:

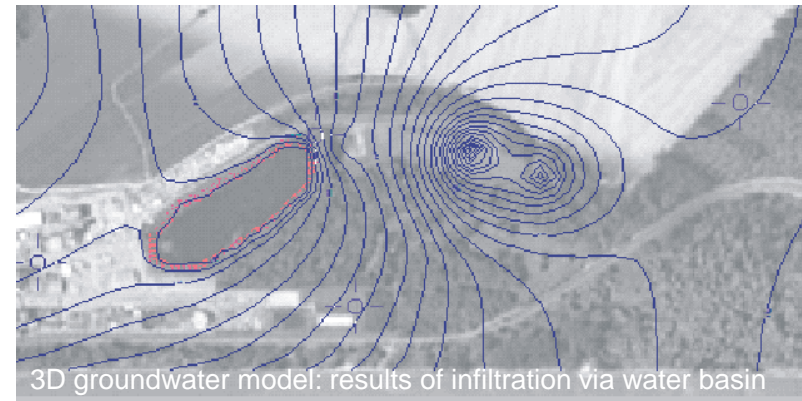
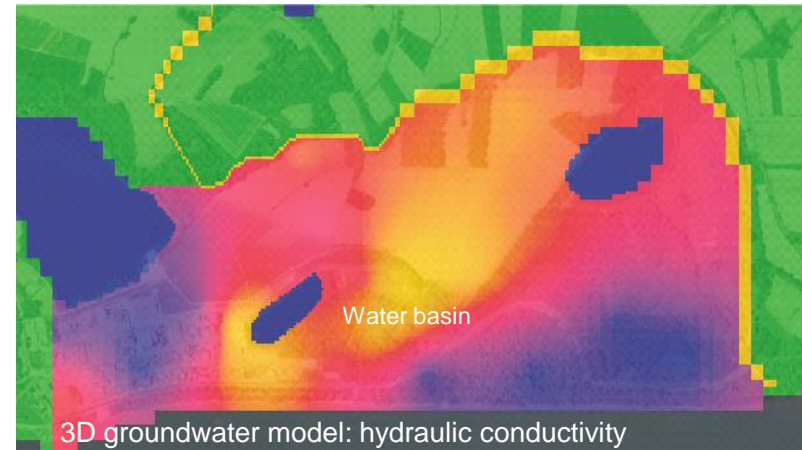
- re-infiltration (reduction or elimination of discharge to the River);
- enhance natural degradation;
- enhance degradation of dissolved plume.



3D groundwater flow model

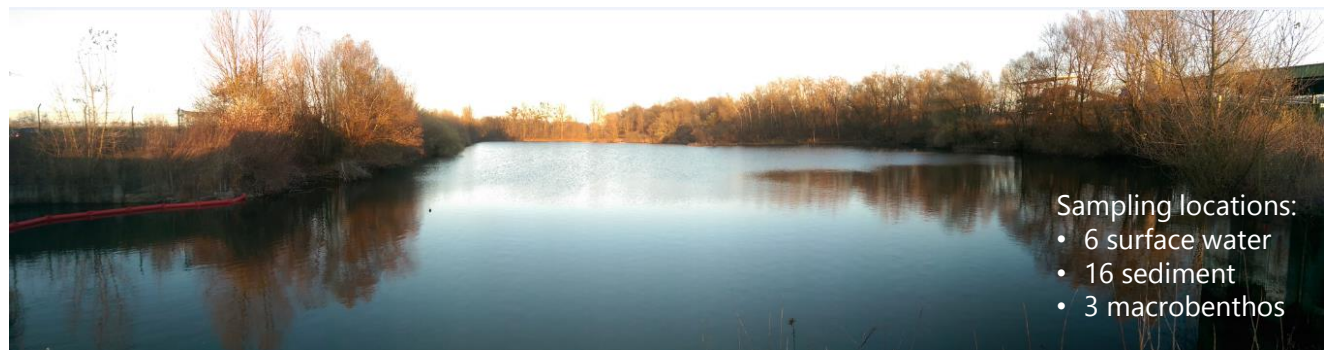
How to achieve the objectives

- Identify potential solutions
- Verify feasibility of identified solutions
- Development of 3D GW flow model used to:
 - verify feasibility of the re-infiltration via the water basin
 - engage the regulator, which embraced the proposed approach (field testing and an environmental impact assessment required)



Field testing

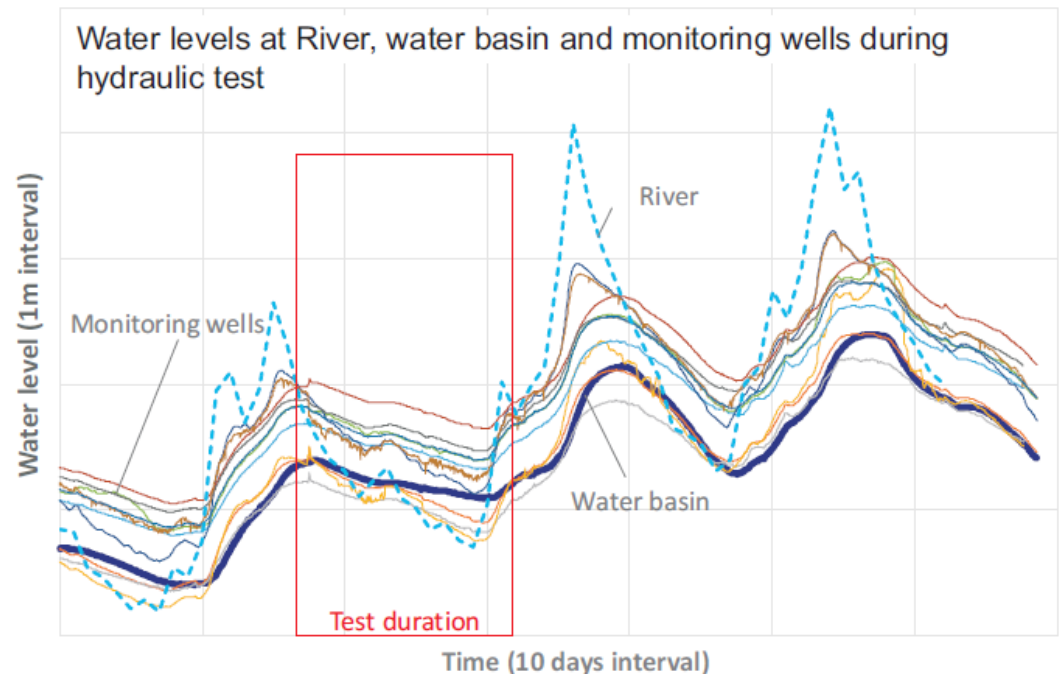
- 15-days duration
- 200 m³/hr of extracted GW discharged into the water basin
- Continuous logging of pond and GW water level and EC
- Sampling of water and sediment throughout the as part of the Environmental Impact Assessment study



- Sampling locations:
- 6 surface water
 - 16 sediment
 - 3 macrobenthos

Hydraulic test results

- Discharge to existing water basin represents a viable solution
- Test period characterised by worst hydraulic conditions, with intense precipitation and consequent River fluctuations of several meters, which also affected the water levels at the water basin.
- Pre-date treatment to separate the response to the test from the one to the River variation (deconvolution) was therefore

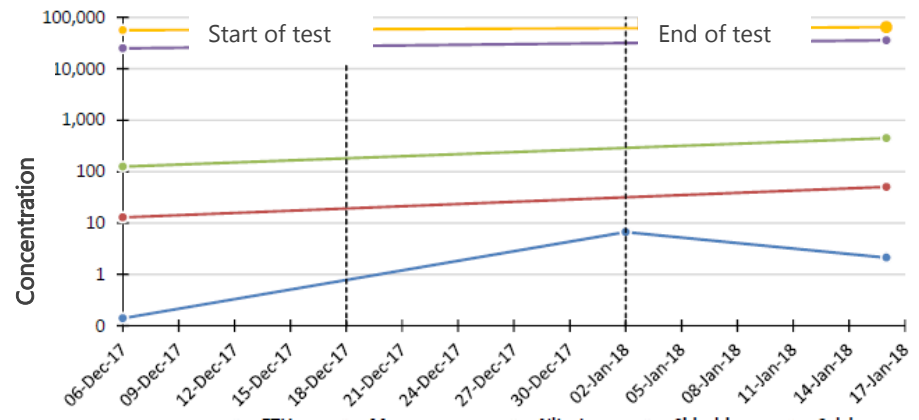
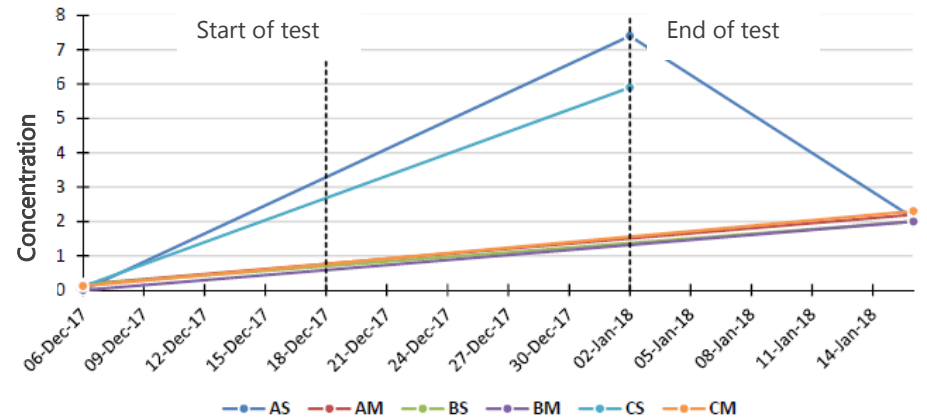


Hydraulic test results (cont.)

- Water basin has the capacity to receive the discharged groundwater, also during periods of intense precipitations and general aquifer high water levels (worst hydraulic conditions)
- Test indicated that 75% of the total discharged groundwater volume did infiltrate into the ground
- The response of the water basin was consistent with what predicted by the groundwater model (model validation)

Environmental impact assessment results

- Evolution in concentration of COCs confirmed degradation following the development of favourable conditions.
- Under test' conditions, accumulation was observed, suggesting need for additional measures to further enhance its degradation.
- Solutions for degradation enhancement currently being assessed: sustainable and nature based (wetland)



Conclusions

- 3D groundwater model successfully developed and used to verify efficiency of potential remedial option alternatives.
- Test confirmed that the existing fire water basin represents an opportunity for a sustainable and nature based remedial solution by allowing to reduce/eliminate the discharge to the River.
- Test demonstrated the capacity to degrade the key compound of concern. However the test suggests that additional measure for degradation enhancement should be considered.
- Solutions for the degradation enhancement in line with general approach currently under assessment: construction of small wetland within the pond.

Thank you!

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