

## Reactive mat on river bed catches groundwater contaminants and replaces sediment

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**Introduction:** Due to industrial production of tar and carbon black in the past, the soil and groundwater next to the small canal the Lieve in Gent (Belgium) got contaminated with aliphatic and (poly)aromatic hydrocarbons. The groundwater contaminants migrate to the canal, impact the surface water quality and cause an ecological risk. During the years, the canal was almost clogged due to the formation of a thick contaminated sediment layer. This layer was removed in 2019 as part of remediation and water management (climate adaptation). As a result the draining capacity of the canal increased and the adsorption capacity for contaminants decreased. Consequence was a further increase of contaminant concentrations in the canal to 300 times the threshold value. The concept to tackle this: a hydraulic conductive reactive mat on the riverbed that makes use of the natural draining function of the waterbody, the adsorption capacity of a natural or secondary adsorbent (green adsorbent) and a future habitat for micro-organisms that biodegrade contaminants. This pilot test is designed, implemented and monitored by a consortium of 6 partners from Belgium and the Netherlands (OVAM, TAUW, Envisan, Witteveen+Bos, iFLUX and TTE) within the framework of Interreg's project RESANAT.

**Methods:** First the situation in the field was characterized by analysis of soil structure (EnISSA), concentrations of contaminants in groundwater and surface water (samples and chemical analysis) and mass fluxes (flux cartridges) of contaminants into the surface water. On base of this, a site conceptual model was drawn. Then several types of green adsorbent were selected, and their adsorption capacity was tested for the specific contaminants (turn-over batches). Finally, a design was made of the reactive mat in close consultation with the geotextile producer, the contractor and the environmental consultant. The designing procedure was complex because of many product demands.

**Results:** The construction consists of mat elements that each have several compartments. After production of the geotextile body, in September 2020 the compartments of the mat elements were filled onsite with green adsorbent and ballast gravel. All elements were then installed and secured in the Lieve over a

length of more than 100 meters and a width of about 6 meters.



**Fig. 1: Placement of reactive mat in the Lieve**

Two types of green adsorbent were used: biochar for the heavily influenced part of the Lieve and sieved peat for the moderately influenced part. Based on calculations a lifespan of at least 10 years is expected for the adsorption material. The monitoring program with respect to the follow-up of the remediation measure started in December 2020. Information will be collected on the vertical flux of contaminants, the surface water- and groundwater quality and the presence of specific microdegraders. The dense and loaded sediment layer that was initially present is now replaced by a three-pillared Nature Based Solution technique to protect the quality of the water body.

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