# The pollution control device

**Based on ecological engineering, the Life Adsorb prototype combines “grey techniques” and “green techniques”. It includes storage of the water to be treated in existing sanitation infrastructures.**

Water treatment is carried out using a nature-based solution through a natural retention/depollution structure: the semi-saturated vertical flow reed bed filter. The mechanical action of filtering particulate pollutants is combined with an adsorption action for dissolved micropollutants through a layer of adsorbent materials (hence the name "Life Adsorb"), along with the natural biodegradation of these substances.

The purified water is drained from the bottom of the filter and discharged into the artificial river adjacent to the filter before rejoining the natural aquatic environment, in this case, the Seine.

The water flows according to the following process:

- Rainwater from the périphérique is collected in the BUGEAUD storm overflow and stored in a storage tank. This storage structure, with a maximum volume of 3,500 cubic meters, is formed by the storm overflow itself, sealed by a movable gate.
- The stored water is then pumped towards the reed bed filter, which is saturated.
- The water arrives at the filter and flows through it to be depolluted.
- The purified water enters the river, which flows toward the Saint James pond.
- Overflow from the pond is redirected downstream of the movable gate into the storm overflow.
- The purified water eventually reaches the Seine.

The project demonstrator consists of three elements: the storage-pumping system, the reed bed filter itself, and an automated system that allows remote management of hydraulic devices and measurement tools.

The filter is actually a duo of filters. Filter 2 has the same structure as Filter 1, with the difference that it includes an adsorbent material, Rainclean® by the company FUNKE.

Vegetation contributes, on the one hand, to greater efficiency and a longer lifespan of the filter (by reducing clogging and supporting the development of microbial biomass) and, on the other hand, to biodiversity restoration and an improved living environment.

In Anglo-Saxon countries, where this type of infrastructure is already widely implemented, research has focused on its effectiveness regarding metals and nutrients.

However, the behavior of organic micropollutants in these systems remains relatively undocumented. The long-term fate of contaminants (accumulation, degradation, potential release) and the role of microbial flora thus represent significant challenges for managers.

Retention of the dissolved phase of micropollutants is generally less effective than that of the particulate phase, resulting in elevated concentrations at the system's outlet for certain micropollutants such as bisphenol-A, alkylphenols, and phthalates.

The LIFE ADSORB project aims to gain a comprehensive understanding of the system's functioning to optimize its performance.

To this end, a multidisciplinary team is conducting a three-year consecutive study of the hydraulic functioning, the quality of water discharged into the Seine, the physicochemical processes at work within the filter, and the evolution of soil and biodiversity in and around the reed bed filter.

The reeds used, **"Phragmites Australis,"** are aquatic plants that grow through a rhizome system.
They create a favorable environment for water treatment: the reeds have a physical role in preventing the clogging of the filter through the effects of wind and rhizomes.

They also play a biological role by creating a zone conducive to the development of bacteria within the root system.