



# Enabling aquifer storage and recovery (ASR) by high flowrate filtration for improved water management

## Societal challenge

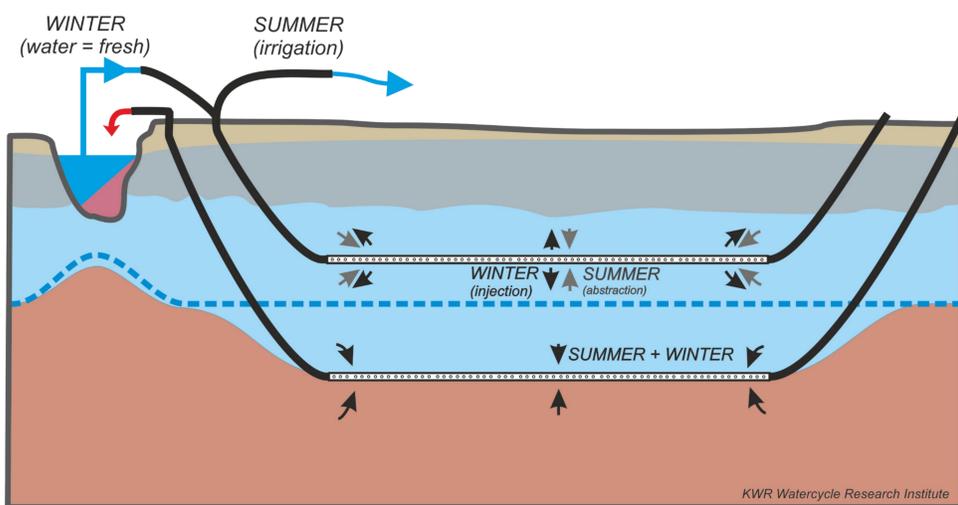
- Manage (extreme) rainfall and prevent pluvial flooding
- Water banking for use during later droughts

## Engineered solution

- Aquifer storage and recovery of harvested stormwater

## Benefits of the solution

- Local discharge, long-term water conservation
- Large capacity, limited spatial footprint, quality conservation



## Technical challenge

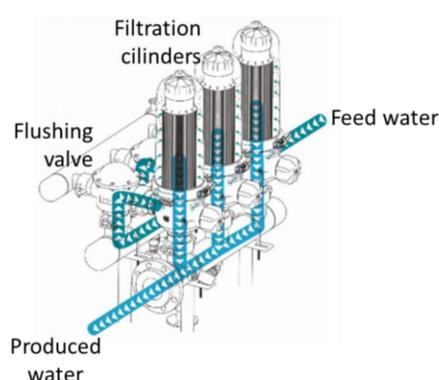
- Design of a stand-alone, high capacity rainwater treatment of low spatial footprint which cost-effective decreases infiltration well clogging rate
- Optimal design and operation to prevent overflows and oversizing

Strict limits for infiltration water quality during ASR to prevent well clogging

Prevention of well clogging (general)	
Suspended solids	<0,1 mg/L
Turbidity	<1 NTU
Dissolved Organic Carbon (DOC)	< 2 mg/L
Iron	<0,01 mg/L
Assimilable Organic Carbon (AOC)	< 10 µg acetate-C/L
Modified Fouling Index (MFI)	< 3-5 s/L <sup>2</sup>

## Methodology

- Evaluation of pre-treatment systems available
- Extensive field test of rapid and compact filtration system and disinfection fed by rainwater with a high clogging potential



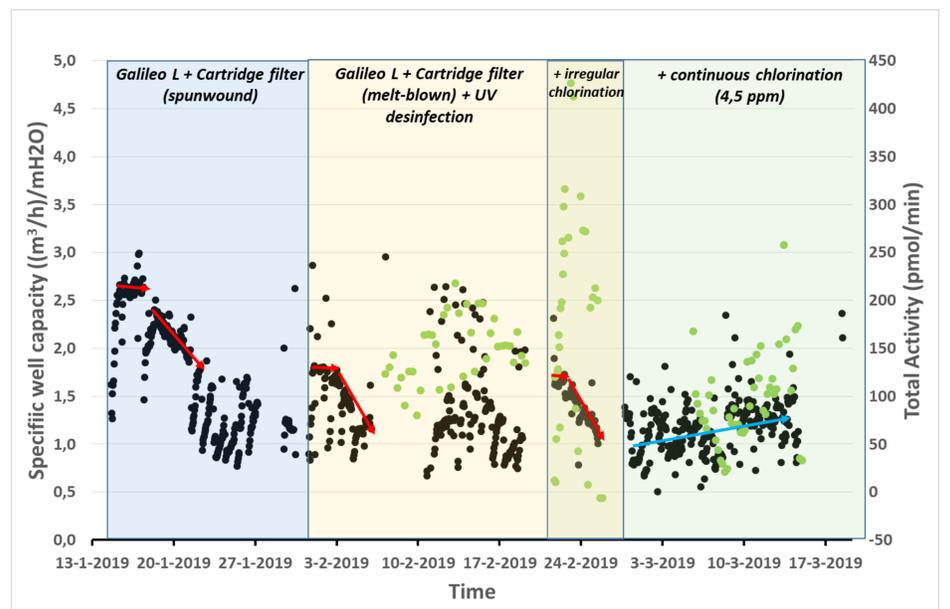
Rapid filtration system Galileo L



## Performance of the rapid pre-treatment system

- The Galileo L filter equipped with 5 micron filter disks was able to lower turbidity, but not sufficient to prevent clogging of the infiltration well
- Removal of particles > 1 µm was enhanced by adding 1 micron (nominal) cartridge filters, but rapid clogging was still observed due to penetration of particles through the filters and biological growth
- Local disinfection using UV did not improve the performance of the well, but continuous dosing of disinfectant (Na-hypochlorite) did
- Total activity measurements performed by the BACTcontrol (microLAN) suggest incomplete disinfection at the dosing point, but the restoration of the well capacity suggests that chlorination is successful in hampering biological growth within the infiltration well

Rapid pre-treatment using compact rapid filtration is a challenge, removal of even the finest particles and prevention of biological growth are vital.



Specific capacity of the Freshmaker well and measured total (biological) activity of the pre-treated rainwater in Ovezande during the pre-treatment tests in 2019



Impression of the pilot treatment system including BACTcontrol

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