

# WP3.1 – Risk Assessment of reuse in cyclic water systems

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## 1 Research Objective

- Risks represented by micropollutants (MPs) during water reuse need to be properly understood
- Assessing the potential plethora of MPs remains challenging and requires innovative approaches (see Fig. 1)
- Combining chemical and bioanalytical approaches to analyse individual compounds but also entire mixtures

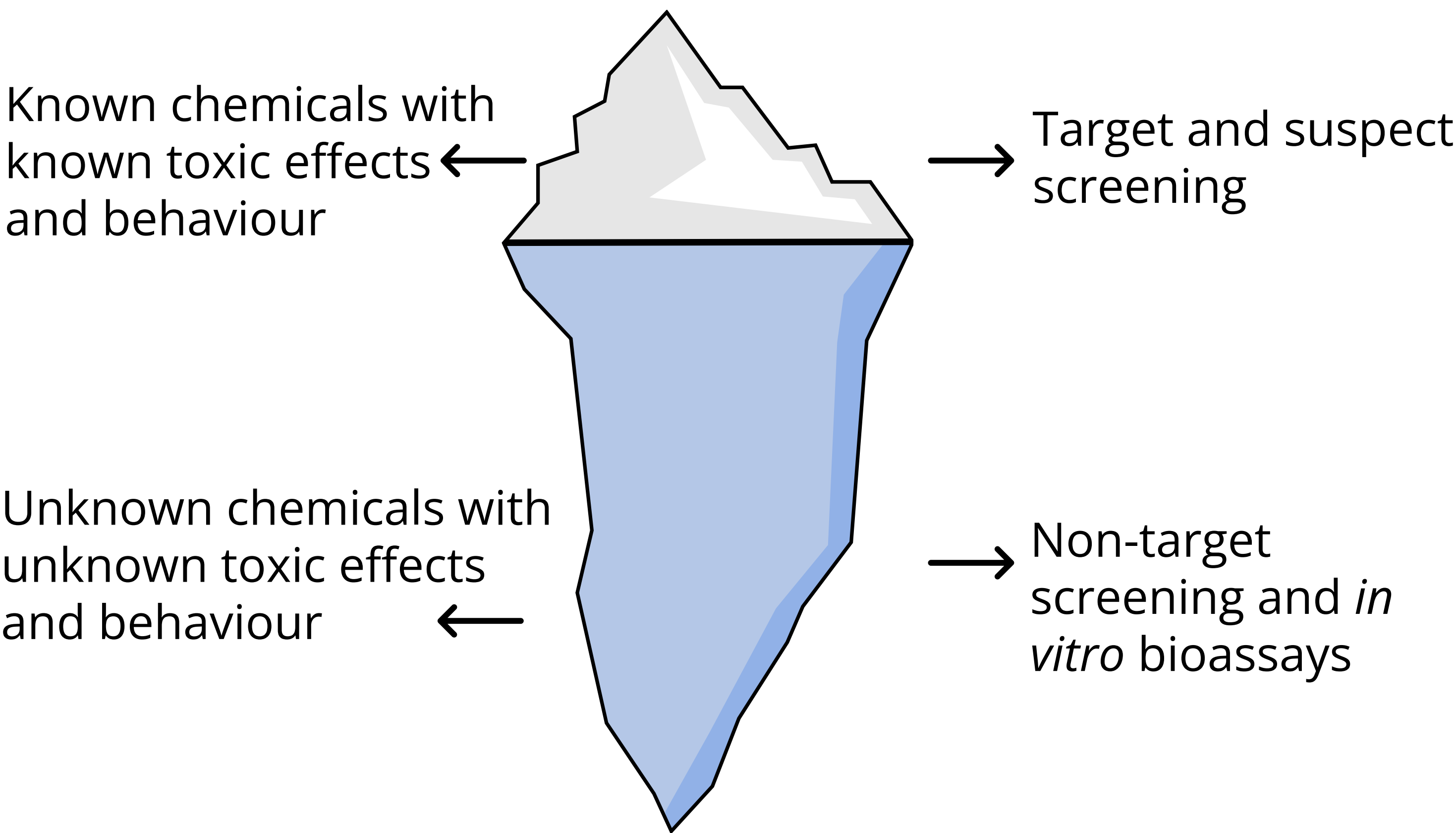


Fig. 1: Schematic distribution of known and unknown MPs in the aquatic environment and how to assess them.

## 2 Results - Wervershoof

- Potential reuse of wastewater treatment plant (WWTP) effluent by improving final water quality through advanced treatment

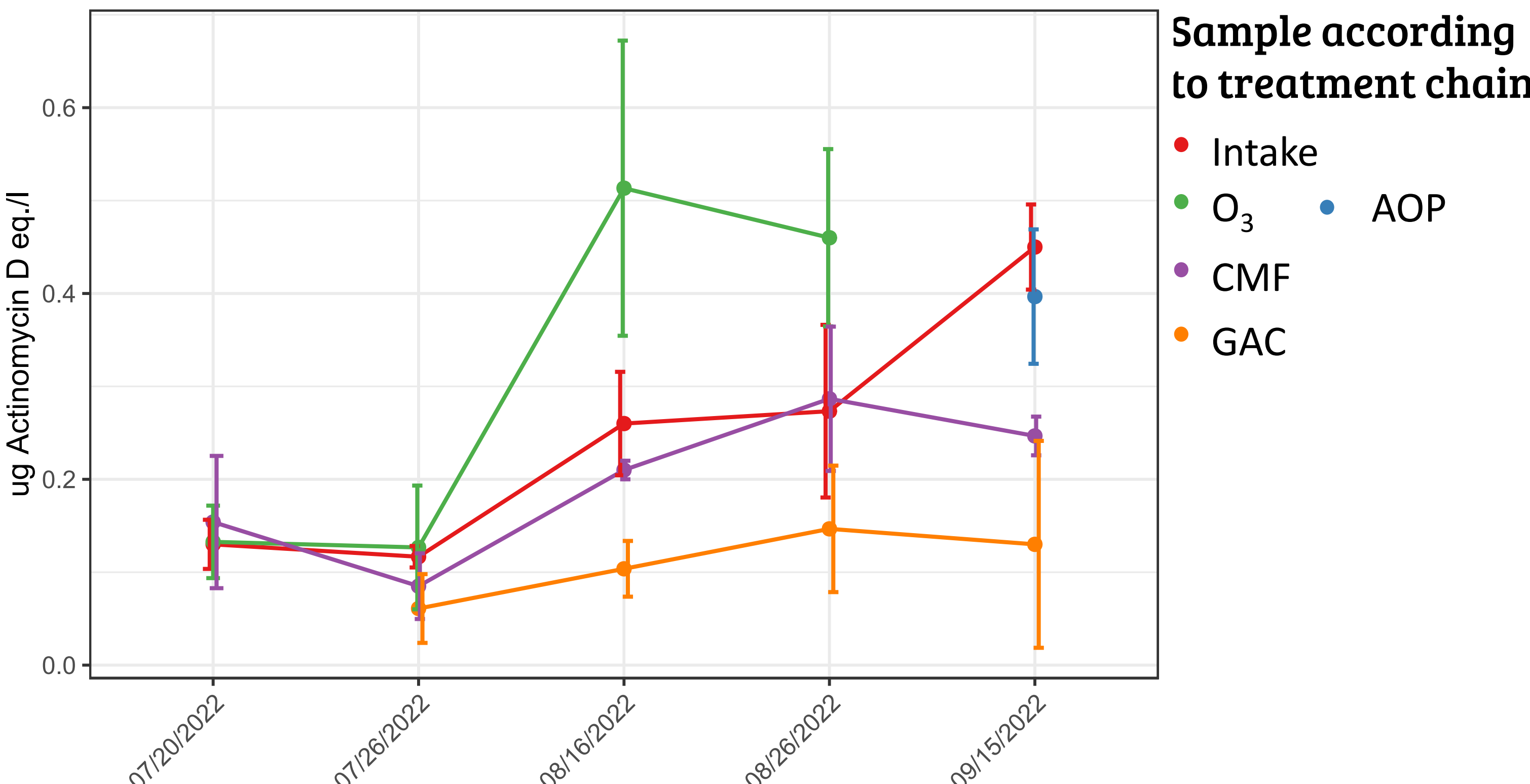


Fig. 2: Observed oxidative stress responses in the Nrf2 CALUX assay. Oxidative stress was monitored with the Nrf2 assay at each treatment step (n=3). The Y-axis shows the observed response translated as equivalent concentrations of the reference compound as mean with standard deviation.

- Toxic effects decrease along the treatment. Data exemplary only shown for the nrf2-CALUX assay
- Observed effects

Advanced treatment potentially enables water reuse

## 3 Results - Eibegen

- In Eibegen, the indirect potable reuse of wastewater-affected surface water is studied

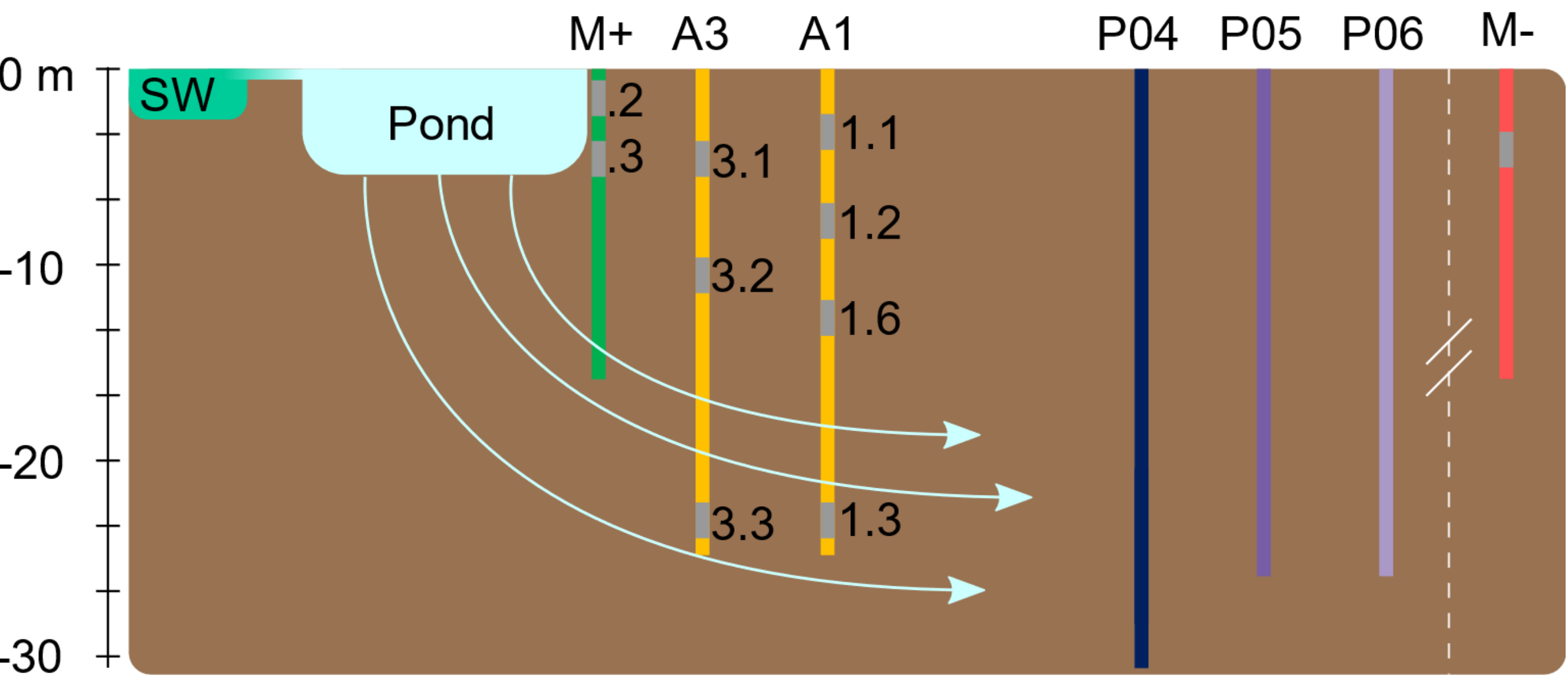


Fig. 3: Study site Eibegen with sampling points and depths. M+ indicates positive monitoring wells with a clear influence of the infiltration, vice versa M- indicates negative monitoring wells; SW = Surface water. A3 and A1 are transect wells. P04, P05, and P06 indicate extraction wells.

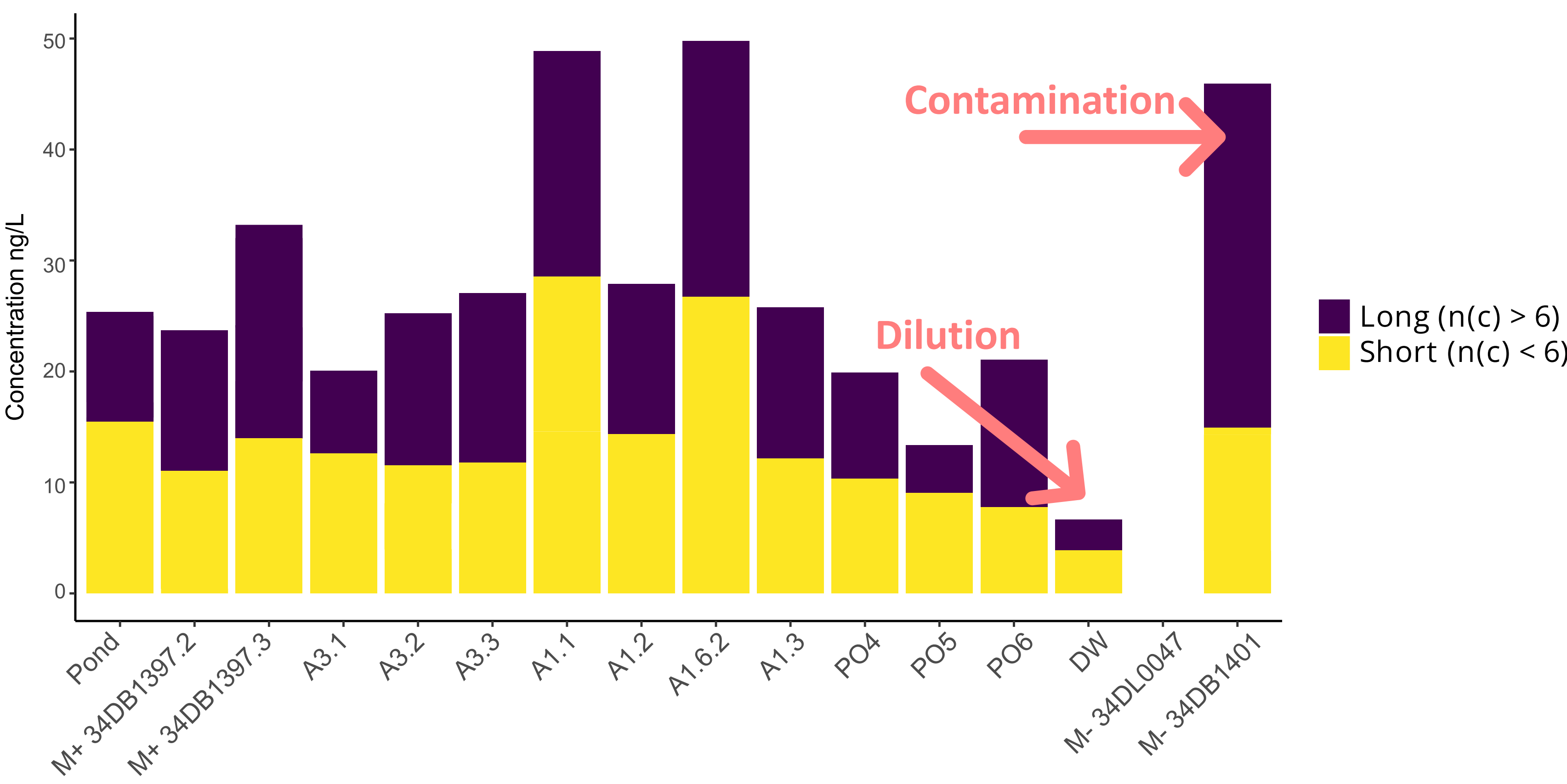


Fig. 4: Concentration of 47 PFASs during soil passage. Samples (X-axis) are ordered according to Fig. 3. Concentration levels (ng/L) are divided per long-chain PFASs (n(c) ≥ 6) and short-chain PFASs (n(c) < 6). Short PFASs are expected to be present at deeper levels due to increased mobility.

## 4 Future plans

- Finalise and validate LC-MS method (End 2023)
- Sample extraction and begin LC-MS measurements (Start 2024)
- Analyse bioassay data for Haaksbergen & Eibegen (End 2023)
- Start work with AMS together on the sewer mining project (November 2023)

## 5 Take-home message

- WWTP effluent reuse potential possible after advanced treatment. Easily assessable by a bioassay battery
- PFASs removal during soil passage is limited. No obvious difference in PFAS contaminant profile. Requires further in-depth analysis.